Ling 151/Psych 156A: Acquisition of Language II

Lecture 18

Poverty of the stimulus I
Announcements

Review questions available for poverty of the stimulus

Be working on HW7 (due: 3/7/18)
Remember all those things children learn about their language?

What they’re doing: Extracting patterns and making generalizations from the surrounding data mostly just by hearing examples of what’s allowed in the language (= positive evidence).
Positive evidence

speech segmentation, syntactic categorization, metrical phonology, syntax, semantics, pragmatics

https://www.youtube.com/watch?v=a7Un06tDOon0&feature=youtu.be
0:35-1:33: positive evidence
Evidence that children seem to use evidence for structure.

This contrasts with making inferences based on negative evidence: what’s not in the language.
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- pragmatics
- syntax
- syntax, semantics

Pearl & Mis 2016

This yields one dimension of variation for evidence children use.

negative evidence
what’s not in the language

positive evidence
what’s in the language
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- pragmatics
- syntax
- syntax, semantics

Pearl & Mis 2016

Another dimension is whether there is **certainty** or **uncertainty** about the data in question.

- negative evidence: what’s *not* in the language
- positive evidence: what’s in the language
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- pragmatics
- syntax
- syntax, semantics

Pearl & Mis 2016

There can be certainty if the learner directly observes the data in the language (or is told about its absence).


certainty

negative evidence
what’s not in the language

positive evidence
what’s in the language

uncertainty
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- pragmatics
- syntax, semantics
- syntax

Pearl & Mis 2016

Direct positive evidence: Encountering examples of what’s in the language from other speakers. The learner can be certain these are in the language because she heard other speakers saying them.

Certainty

Positive evidence: what’s in the language

Negative evidence: what’s not in the language

Uncertainty
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- syntax
- semantics
- pragmatics

Pearl & Mis 2016

Direct positive evidence

Example with anaphoric *one*

“Look, a pretty kitty! There’s another *one*.”

certainty

negative evidence
what’s *not* in the language

positive evidence
what’s in the language

uncertainty
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- syntax, semantics
- syntax
- pragmatics

Pearl & Mis 2016

**Direct positive evidence**: This is the main kind of data we think children have access to.

- certainty
- uncertainty
- negative evidence: what’s not in the language
- positive evidence: what’s in the language
- direct positive

✔
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- pragmatics
- syntax
- syntax, semantics

Pearl & Mis 2016

Direct negative evidence: This would occur when people explicitly tell a child “This item isn't in the language”.


certainty

negative evidence

what’s not in the language

uncertainty

positive evidence

what’s in the language

✔
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- syntax
- semantics
- pragmatics

Pearl & Mis 2016

Example with anaphoric *one*

“You can’t say `This kitty drinks from the cup of milk and that kitty drinks from the one of water.’”

Direct negative evidence

Direct positive evidence

negative evidence

what’s *not* in the language

positive evidence

what’s in the language

uncertainty

certainty
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- syntax
- syntax, semantics
- pragmatics

Pearl & Mis 2016

Direct negative evidence: This doesn’t occur all that often, and even when it does, children seem to mostly ignore it.

- certainty
- direct negative
- direct positive
- positive evidence

- negative evidence
- what’s not in the language
- ✔

- uncertainty
- what’s in the language
- ✗
Evidence that children seem to use

Uncertainty about a data point can occur when a child makes an inference about it — perhaps because other data in the language indirectly indicate something about it (because they are similar to it in some way).
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- pragmatics
- syntax
- syntax, semantics

Pearl & Mis 2016

Indirect negative evidence: A child expects a data point to be in the input, but it keeps not being in the input.
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- syntax
- syntax, semantics
- pragmatics

Pearl & Mis 2016

Example with anaphoric one

“Look, a pretty kitty. There’s another one!” never occurs when the second kitty isn’t pretty.

Indirect negative evidence

Direct negative

negative evidence

what’s not in the language

Direct positive

positive evidence

what’s in the language

Uncertainty
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- pragmatics
- syntax
- syntax, semantics

Pearl & Mis 2016

Indirect negative evidence: Children seem capable of using this kind of evidence.

What’s not in the language

- negative evidence
- indirect negative

What’s in the language

- direct negative
- direct positive
- positive evidence

Certainty vs. Uncertainty
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- syntax
- syntax, semantics
- pragmatics

**Pearl & Mis 2016**

*Indirect positive* evidence: Children, based on their *expectations* about how language items relate to each other, notice that other similar data to the data point in question are *in the language.*

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**Certainty**

<table>
<thead>
<tr>
<th>Direct Negative</th>
<th>Direct Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td>✔</td>
</tr>
</tbody>
</table>

**Uncertainty**

<table>
<thead>
<tr>
<th>Indirect Negative</th>
<th>Positive Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔</td>
<td>✗</td>
</tr>
</tbody>
</table>

what’s *not* in the language

what’s *in* the language
Evidence that children seem to use

Pearl & Mis 2016

Indirect positive evidence

Example with anaphoric one

“Look, a pretty kitty. I want it!” always refers to the fact that the kitty is pretty. Because it and one are both pronouns, maybe one’s antecedent always includes the modifier, too.

Certainty

Direct positive

Direct negative

Indirect negative

Negative evidence

Positive evidence

What’s not in the language

What’s in the language

Uncertainty
Evidence that children seem to use

- speech segmentation
- metrical phonology
- syntactic categorization
- syntax
- semantics
- pragmatics

Pearl & Mis 2016

Indirect positive evidence: Children seem to use this too.

- Direct negative evidence: What's not in the language
- Indirect negative evidence: What's in the language
- Direct positive evidence: What's in the language
- Indirect positive evidence: What's not in the language

Pearl & Mis 2016
So how exactly do children learn all this?

What they’re doing: **Extracting patterns** and **making generalizations** from the surrounding data mostly just by hearing examples of what’s allowed in the language. (Note how all the evidence types they seem to use involve paying attention to what’s present, even if they’re inferring something from what’s absent.)

What’s so hard about that?
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

???

“birdie”

“What a pretty birdie!”
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

???

“birdie”

“Look - a birdie!”
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

“Look at that birdie!”

“birdie”
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

How to generalize beyond the input?

???

“birdie”
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

One hypothesis

+blue

“birdie”
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

Another hypothesis

+on branch

“birdie”
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

The right hypothesis

+bird

“birdie”
So how exactly do children learn all this?

What’s so hard about that?

There are often many ways to generalize beyond the input, and most of them aren’t right.

speech segmentation

metrical phonology

syntactic categorization

syntax

syntax, semantics

pragmatics

These kind of induction problems are everywhere in cognitive development, including language acquisition.

Language acquisition = Solving a lot of induction problems.
Induction problems

Children don’t encounter all the items that are part of the language (they have finite time to learn, after all).

If they only encounter a subset of the language’s items, how do they know everything that belongs in the language?

They generalize!
Induction problems

Children don’t encounter all the items that are part of the language (they have finite time to learn, after all).

If they only encounter a subset of the language’s items, how do they know everything that belongs in the language?

But how far?

There are a lot of options...the exact number depends on the hypotheses the child is entertaining.
The problem is that children must make the right generalization from data that are compatible with multiple generalizations. In this sense, the data (stimulus) encountered are impoverished. The data don’t single out the correct generalization by themselves.
Induction problems

A numerical analogy

Suppose you encounter the numbers 3, 5, and 7. What set are these numbers drawn from? That is, what is the right “number rule” for this language that will allow you to predict what numbers will appear in the future?
Induction problems

A numerical analogy
Some of these hypotheses seem more likely than others priori (this would appear in the prior you’d assign these hypotheses). This has to do with the biases you bring to the induction problem — all these hypotheses are compatible with the data you’ve seen. So the data alone don’t help you decide.

Odd numbers
Odd numbers less than 20
Odd numbers less than 20 that also aren’t divisible by 9
Prime numbers
Numbers less than 20

Odd numbers less than 16

18 17 9 6 12 13 11 2
Induction problems

A numerical analogy

The data alone don’t help you decide: This is an induction problem because the data are “impoverished” in this sense. This is referred to as the poverty of the stimulus.
Poverty of the stimulus

Children encounter data that are compatible with many hypotheses about the correct rules and patterns of the language.
Poverty of the stimulus

Specifically, the data encountered are compatible with both the correct hypothesis and other incorrect hypotheses about the rules and patterns of the language.
An unbiased rational learner would consider all compatible hypotheses, and perhaps choose the wrong hypothesis in the end, or at least make errors during acquisition.
But what if children behave as if they only consider some of the possible hypotheses? That is, they never produce errors compatible with some possible incorrect hypotheses. They only seem to produce items that are compatible with some (and not others) of the available hypotheses.

Why would they do this?
Poverty of the stimulus implications

Implication: children have **some prior knowledge** that causes them never to consider (some of) the incorrect hypotheses. Instead, they only consider some of the possible hypotheses for what the rules and patterns of the language might be.
Poverty of the stimulus implications

Let’s look at a concrete example of this situation.

Prior knowledge restricts children’s hypothesis to this

or maybe this

but they never consider this
Structure dependence

Idea: Rules for word order depend on linguistic structure
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Statement
Jareth can alter time.

How do we turn this into a question whose answer is either yes or no?
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Yes/No question
Can Jareth alter time?

What changed?
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Statement
Jareth *can* alter time.

Yes/No question
Can Jareth alter time?

Where the auxiliary *can* appears.
Where the noun/subject *Jareth* appears.
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Statement
Jareth can alter time.

Yes/No question
Can Jareth alter time?

Where the auxiliary *can* appears.
Where the noun/subject *Jareth* appears.

The child’s job: Figure out the rule for turning statements into yes/no questions.
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Rule: Something about one or both of these?
Where the auxiliary *can* appears.
Where the noun/subject *Jareth* appears.

Rule? Swap the order of the first two words
Rule? Swap the order of the subject and the auxiliary
Rule? Move the first noun to the second position
Rule? Move the auxiliary to the first position

And there are others...

Let’s look at some additional data.
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

This one doesn’t capture the pattern.

- Rule? Swap the order of the first two words
- Rule? Swap the order of the subject and the auxiliary
- Rule? Move the first noun to the second position
- Rule? Move the auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Which auxiliary and what’s “swapping” mean if they’re not next to each other?

Rule? Swap the order of the subject and the auxiliary
Rule? Move the first noun to the second position
Rule? Move the auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

This doesn’t handle “would” being in the first position.

Rule? Move the first noun to the second position
Rule? Move the auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Which auxiliary?

Rule? Move the auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

This would capture the first question’s pattern too.

Rule? Move the last auxiliary to the first position

Let’s look at some additional data.
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Someone who can solve the labyrinth can show someone else who can’t how.

Can someone who can solve the labyrinth show someone else who can’t how?

This doesn’t capture the pattern.

Rule? Move the last auxiliary to the first position

Now what?
**Structure dependence**

Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Someone who can solve the labyrinth can show someone else who can’t how.

Can someone who can solve the labyrinth show someone else who can’t how?

This doesn’t capture the pattern.

Rule? Move the last auxiliary to the first position

Let’s try incorporating structure.
Structure dependence

Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.
Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.
Would anyone who can wish away their brother be tempted to do it?

Someone who can solve the labyrinth can show someone else who can’t how.
Can someone who can solve the labyrinth show someone else who can’t how?

Rule? Move the main clause auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Main subject
Someone who can solve the labyrinth can show someone else who can’t how.

Can someone who can solve the labyrinth show someone else who can’t how?

✔ Rule? Move the main clause auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Main subject

Someone who can solve the labyrinth can show someone else who can’t how.

Main objects

Can someone who can solve the labyrinth show someone else who can’t how?

Rule? Move the main clause auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.

Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Main subject
Someone who can solve the labyrinth

Main verb phrase
Can show someone else who can’t how.

Main objects
Can someone who can solve the labyrinth show someone else who can’t how?

Rule? Move the main clause auxiliary to the first position
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Jareth can alter time.
Can Jareth alter time?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Anyone who can wish away their brother would be tempted to do it.

Would anyone who can wish away their brother be tempted to do it?

Rule? Move the main clause auxiliary to the first position

This also works for the other examples.
Structure dependence
Rules for word order depend on linguistic structure

An example: Yes/No question formation in English

Rule? Move the main clause auxiliary to the first position

Because this rule refers to clause structure, it’s structure-dependent.
Structure dependence

Rules for word order depend on linguistic structure

Yes/No question formation in English

✔ Rule? Move the main clause auxiliary to the first position

When do children figure this out?
Structure dependence
Rules for word order depend on linguistic structure
Yes/No question formation in English
✔ Rule? Move the main clause auxiliary to the first position

Crain & Nakayama 1987
Elicited productions from three- to five-year-olds
Structure dependence

Rules for word order depend on linguistic structure

Yes/No question formation in English

✔ Rule? Move the main clause auxiliary to the first position

Crain & Nakayama 1987
Elicited productions from three- to five-year-olds

“Ask Jabba if…

“...the boy who can see Mickey Mouse is happy.”
“...the boy who is happy can see Mickey Mouse.”
Structure dependence
Rules for word order depend on linguistic structure
Yes/No question formation in English

Rule? Move the main clause auxiliary to the first position

Crain & Nakayama 1987
Elicited productions from three- to five-year-olds

Common errors that occurred:

(Restarts)
- simplifying the subject so main clause auxiliary is more accessible
  “Is the boy who can see Mickey Mouse, is he happy?”
  “Can the boy who is happy, can he see Mickey Mouse?”

  “Ask Jabba if...

  “…the boy who can see Mickey Mouse is happy.”
  “…the boy who is happy can see Mickey Mouse.”
Structure dependence
Rules for word order depend on linguistic structure
Yes/No question formation in English

Rule? Move the main clause auxiliary to the first position

Crain & Nakayama 1987
Elicited productions from three- to five-year-olds

Common errors that occurred:
(Restarts) - simplifying the subject so main clause auxiliary is more accessible

(Initial is prefix) - giving up (sort of a generic question marking)
“Is the boy who can see Mickey Mouse is happy?”
“Is the boy who is happy can see Mickey Mouse?”

“Ask Jabba if...
“...the boy who can see Mickey Mouse is happy.”
“...the boy who is happy can see Mickey Mouse.”
Structure dependence
Rules for word order depend on linguistic structure
Yes/No question formation in English

✓ Rule? Move the main clause auxiliary to the first position

Crain & Nakayama 1987
Elicited productions from three- to five-year-olds

Common errors that occurred:
(Starts) - simplifying the subject so main clause auxiliary is more accessible
(Initial is prefix) - giving up (sort of a generic question marking)

Errors that didn’t occur (Structure-independent auxiliary movement)
“Can the boy who __ see Mickey Mouse is happy?”
“Is the boy who __ happy can see Mickey Mouse?”

“Ask Jabba if...

“...the boy who can see Mickey Mouse is happy.”
“...the boy who is happy can see Mickey Mouse.”
Structure dependence

Rules for word order depend on linguistic structure

Yes/No question formation in English

✔ Rule? Move the main clause auxiliary to the first position

Crain & Nakayama 1987

Elicited productions from three- to five-year-olds

Common errors that occurred:

(Restarts) - simplifying the subject so main clause auxiliary is more accessible

(Initial is prefix) - giving up (sort of a generic question marking)

Errors that didn’t occur (Structure-independent auxiliary movement)

How we can interpret this: As young as three years old, children have some very specific constraints on the kind of hypotheses they’ll consider for complex yes/no questions.
Structure dependence
Rules for word order depend on linguistic structure

Yes/No question formation in English
By three years old, children have some very specific constraints on hypotheses about word order.

https://www.youtube.com/watch?v=lbyO2D1A83E&feature=youtu.be

1:40 - 2:43: How few errors kids make
2:44-3:54: Why we only see errors in experiments sometimes
Structure dependence

Rules for word order depend on linguistic structure

Yes/No question formation in English

By three years old, children have some very specific constraints on hypotheses about word order.

How could they learn this?
Structure dependence
Rules for word order depend on linguistic structure

Yes/No question formation in English
By three years old, children have some very specific constraints on hypotheses about word order.

A potential input issue

Most of the yes/no question data children encounter (particularly before the age of 3) consists of simple yes/no questions compatible with many different rules.

Rule? Swap the order of the first two words
Rule? Swap the order of the subject and the auxiliary
Rule? Move the first noun to the second position
Rule? Move the auxiliary to the first position
Rule? Move the main clause auxiliary to the first position

Jareth can alter time.
Can Jareth alter time?
Structure dependence

Rules for word order depend on linguistic structure

Yes/No question formation in English

By three years old, children have some very specific constraints on hypotheses about word order.

**How** do children choose the right rule from all the possible rules that are compatible? That is, how do they generalize the right way from the subset of the data they encounter?
Structure dependence
Rules for word order depend on linguistic structure

Yes/No question formation in English
By three years old, children have some very specific constraints on hypotheses about word order.

How do children choose the right rule from all the possible rules that are compatible?

Answer: They have prior knowledge to help guide their inferences.

Where did this knowledge come from?
Structure dependence
Rules for word order depend on linguistic structure

Yes/No question formation in English
By three years old, children have some very specific constraints on hypotheses about word order.

Answer: They have prior knowledge to help guide their inferences.

If they learned it from prior language experience, we call it prior linguistic knowledge.

If knew it innately, we call it “innate knowledge”. This is the position of nativists.

If knew it innately and it’s specifically knowledge about language, we call it “innate linguistic knowledge”. This is the position of linguistic nativists.
Structure dependence
Rules for word order depend on linguistic structure

Yes/No question formation in English
By three years old, children have some very specific constraints on hypotheses about word order.

Wherever this prior knowledge comes from (experience or innately known), it allows children to make constrained generalizations — they don’t generalize all the possible ways they logically could because they have prior biases to constrain their generalizations.
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Adults ✓ he = Jareth?
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Adults ✔ he = Jareth?

While he danced around the throne room, Jareth smiled.
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

**Adults**  ✔  he = Jareth?

Jareth smiled while he danced around the throne room.

**Adults**  ✔  he = Jareth?
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

**Adults** ✔ he = Jareth?

Possible generalization for the language given these data: Can put pronoun before name or name before pronoun (the order doesn’t matter)
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

Adults ✔ he = Jareth?

Possible generalization: Can put pronoun before name or name before pronoun

Expectation: Children accept these pronoun interpretations too.
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

Adults ✔ he = Jareth?   Children ✔

Possible generalization: Can put pronoun before name or name before pronoun

And they do! So far so good...
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While *he* danced around the throne room, Jareth smiled.

Jareth smiled while *he* danced around the throne room.

**Adults** ✔️ he = Jareth?  **Children** ✔️

Possible generalization: *Can put pronoun before name or name before pronoun*

Now, let’s swap the order of the name and pronoun some more and see what happens.
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

Adults ✔ he = Jareth? Children ✔

Possible generalization: Can put pronoun before name or name before pronoun
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

Adults  ✔  he = Jareth?   Children  ✔

While Jareth danced around the throne room, he smiled.

Adults  ✔  he = Jareth?   Children  ✔

So far, so good!

Possible generalization: Can put pronoun before name or name before pronoun
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

While Jareth danced around the throne room, he smiled.

**Adults ✓**  he = Jareth?  **Children ✓**

Jareth smiled while he danced around the throne room.

Possible generalization: *Can put pronoun before name or name before pronoun*
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

While Jareth danced around the throne room, he smiled.

**Adults** ✔ he = Jareth? **Children** ✔

He smiled while Jareth danced around the throne room.

**Adults** ✗ he = Jareth? **Children**

That's not with this rule would predict!

Possible generalization: Can put pronoun before name or name before pronoun
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While he danced around the throne room, Jareth smiled.

Jareth smiled while he danced around the throne room.

While Jareth danced around the throne room, he smiled.

**Adults** ✅ he = Jareth? **Children** ✅

He smiled while Jareth danced around the throne room.

**Adults** ✗ he = Jareth? **Children** ✗

Luckily, that’s not the rule children seem to infer.

Possible generalization: Can put pronoun before name or name before pronoun
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While *he* danced around the throne room, Jareth smiled.

Jareth smiled while *he* danced around the throne room.

While Jareth danced around the throne room, *he* smiled.

**Adults** ✔  *he* = Jareth?  **Children** ✔

*He* smiled while Jareth danced around the throne room.

**Adults** ✗  *he* = Jareth?  **Children** ✗

They constrain their generalizations about pronoun interpretations, and the way they do it seems to match the way adults do it.
Another example of children’s constrained generalization

Crain & McKee (1985): pronoun interpretation

While *he* danced around the throne room, Jareth smiled.

Jareth smiled while *he* danced around the throne room.

While Jareth danced around the throne room, *he* smiled.

 Adults  ✔  he = Jareth?  Children  ✔

He smiled while Jareth danced around the throne room.

 Adults  ✗  he = Jareth?  Children  ✗

Fun fact: The way they do it seems to be structure-dependent.
Poverty of the stimulus + constrained generalization leads to prior knowledge about language:

Summary of Logic

1) Suppose there are some data.
Poverty of the stimulus + constrained generalization leads to prior knowledge about language:
Summary of Logic

1) Suppose there are some data.

2) Suppose there are some incorrect hypotheses compatible with the data (along with the correct hypothesis).
Poverty of the stimulus + constrained generalization leads to prior knowledge about language:

Summary of Logic

1) Suppose there are some data.

2) Suppose there are some incorrect hypotheses compatible with the data.

3) Suppose children behave as if they never entertain some of the incorrect hypotheses. That is, they make constrained generalizations.
Poverty of the stimulus + constrained generalization leads to prior knowledge about language:

Summary of Logic

1) Suppose there are some data.

2) Suppose there are some incorrect hypotheses compatible with the data.

3) Suppose children behave as if they never entertain some of the incorrect hypotheses. That is, they make constrained generalizations.

Conclusion: Children possess prior (possibly innate) knowledge ruling out those incorrect hypotheses from consideration.
Recap

Children generalize only in a very specific way. In particular, they don’t just generalize everything that they can. Their generalizations appear to be constrained.

Nativist idea for how their generalizations/hypotheses are constrained: innate knowledge.

Linguistic nativist idea for how their generalizations/hypotheses are constrained: innate knowledge about language.
Questions?

You should be able to do up through question 11 on the poverty of the stimulus review questions and up through question 1 on HW7.