

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?

speech segmentation

metrical phonology

syntactic categorization

pragmatics



syntax

syntax, semantics

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

pragmatics

syntax

syntax, semantics



<https://www.youtube.com/watch?v=a7Un06tDOn0&feature=youtu.be>

0:35- 1:33: positive evidence



Evidence that children seem to use

speech segmentation

syntactic categorization

metrical phonology

pragmatics

syntax

syntax, semantics



This contrasts with making inferences based on **negative evidence**:
what's not in the language.

Evidence that children seem to use

speech segmentation

syntactic categorization

metrical phonology

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syntax, semantics



Pearl & Mis 2016

This yields one dimension of variation for evidence children use.

negative evidence

positive evidence

what's *not* in the language

what's in the language

Evidence that children seem to use

speech segmentation

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syntax, semantics



Pearl & Mis 2016

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

negative evidence

positive evidence

what's *not* in the language

what's in the language

Evidence that children seem to use

speech segmentation

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metrical phonology

pragmatics

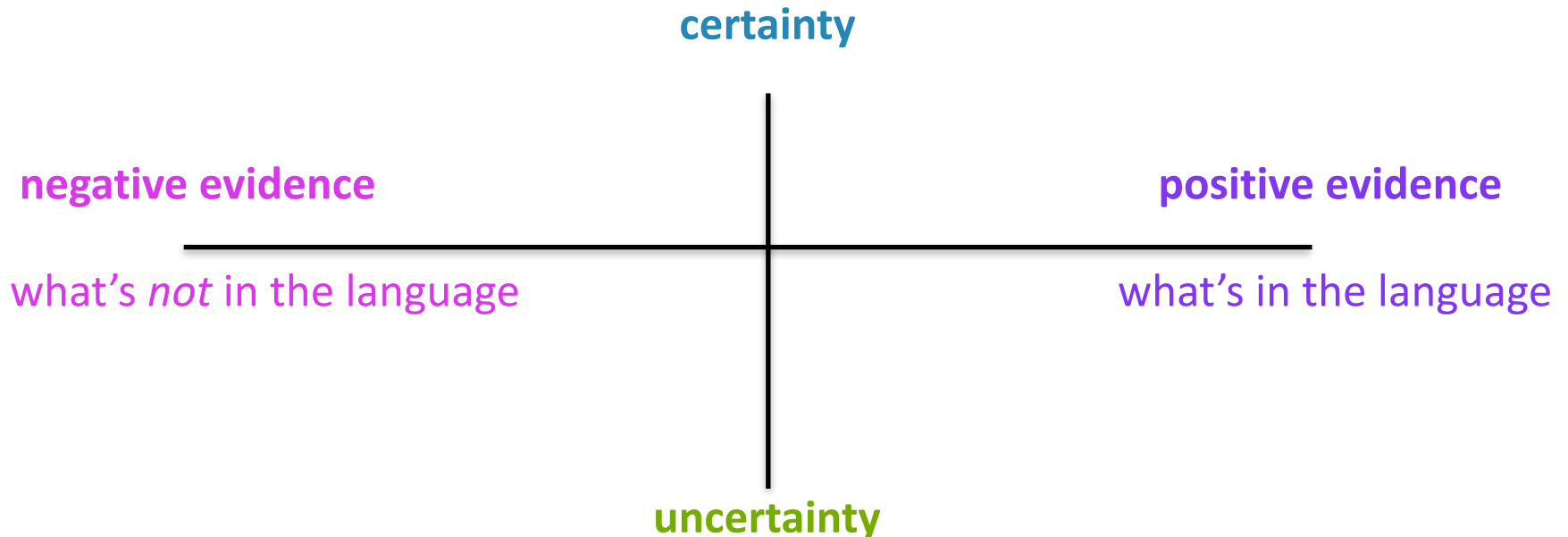
syntax

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).



Evidence that children seem to use

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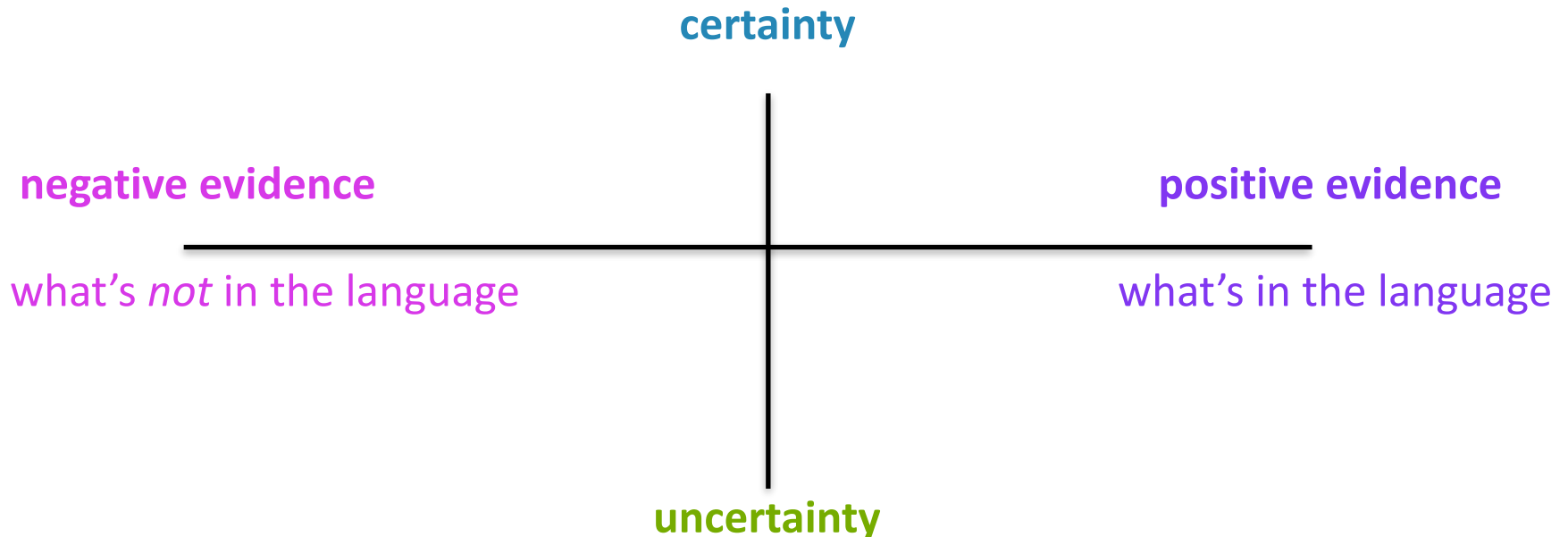
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Pearl & Mis 2016

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.



Evidence that children seem to use

speech segmentation

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syntax, semantics



Pearl & Mis 2016

Direct positive evidence

Example with anaphoric *one*



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

certainty

negative evidence

positive evidence

what’s *not* in the language

what’s in the language

uncertainty

Evidence that children seem to use

speech segmentation

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pragmatics

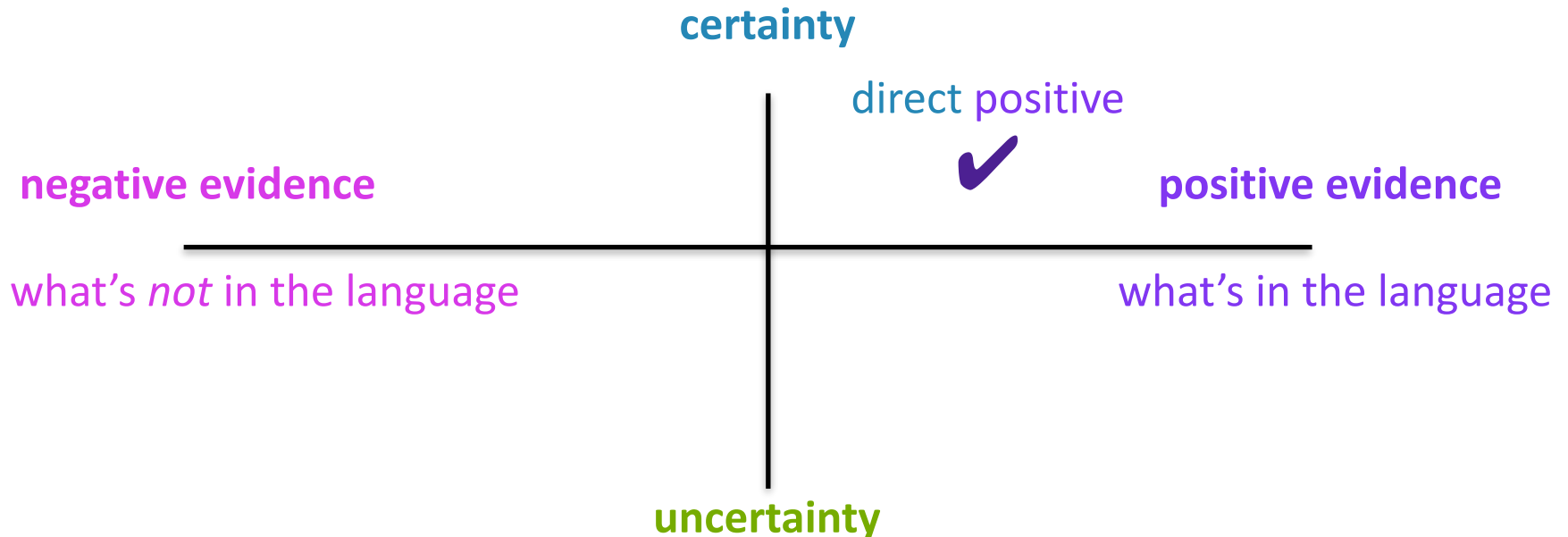
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Pearl & Mis 2016

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



Evidence that children seem to use

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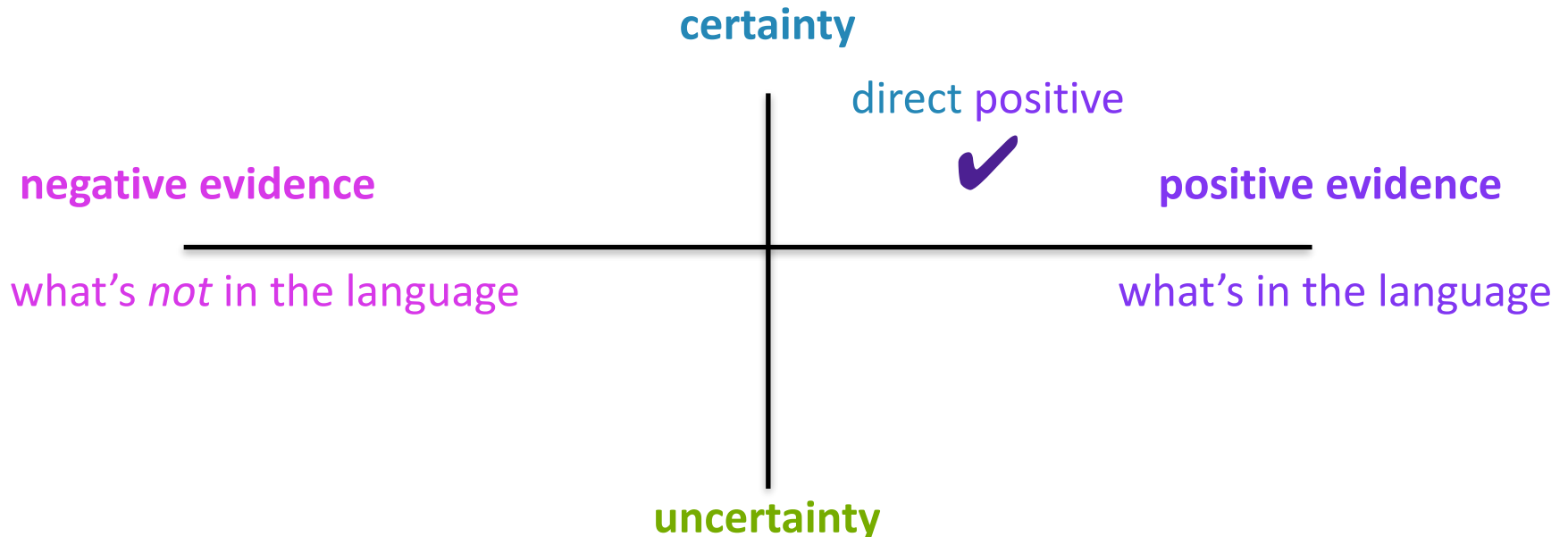
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Pearl & Mis 2016

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



Evidence that children seem to use

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Pearl & Mis 2016

Example with anaphoric *one*

Direct negative evidence



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

certainty

direct positive



negative evidence

positive evidence

what’s *not* in the language

what’s in the language

uncertainty

Evidence that children seem to use

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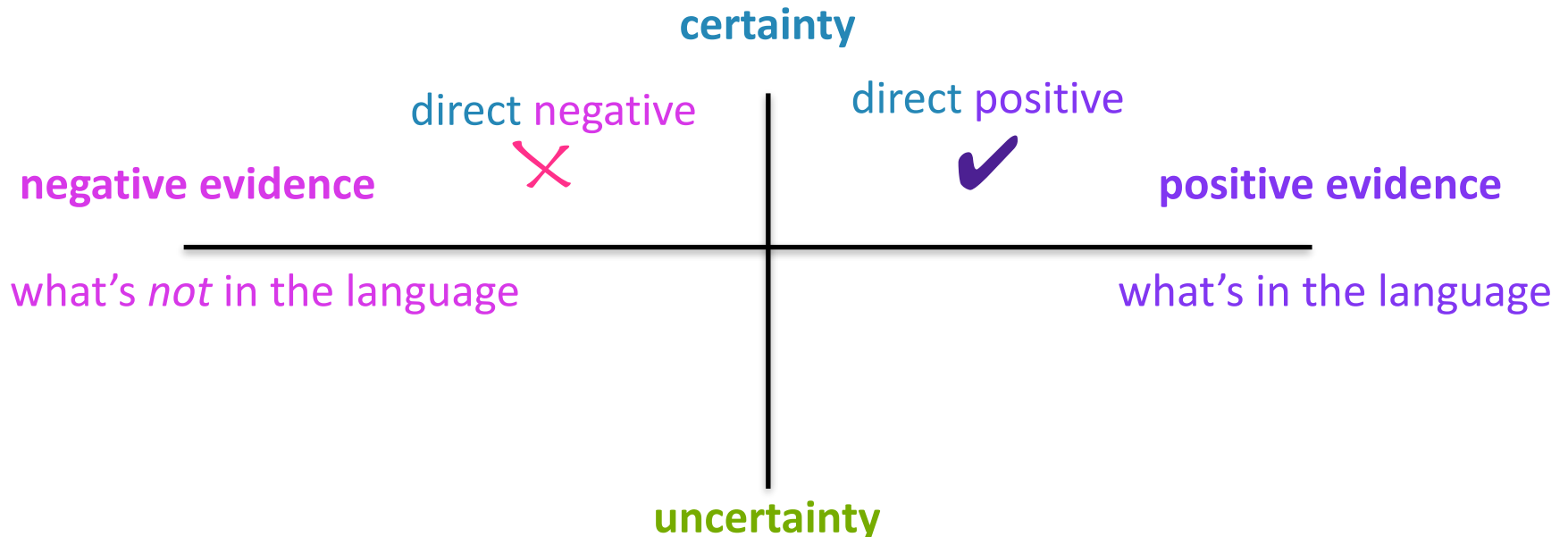
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Pearl & Mis 2016

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



Evidence that children seem to use

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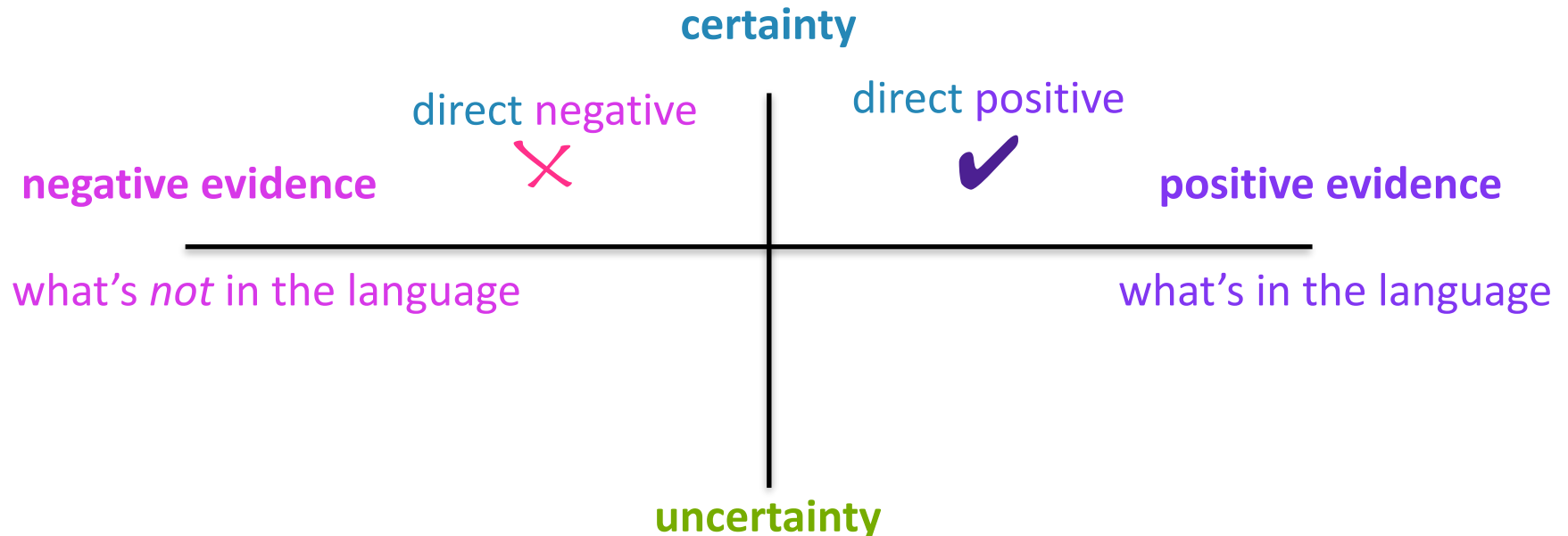
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Uncertainty about a data point can occur when a child makes an inference about it — perhaps because other data in the language **indirectly** indicate something about it (because they are similar to it in some way).



Evidence that children seem to use

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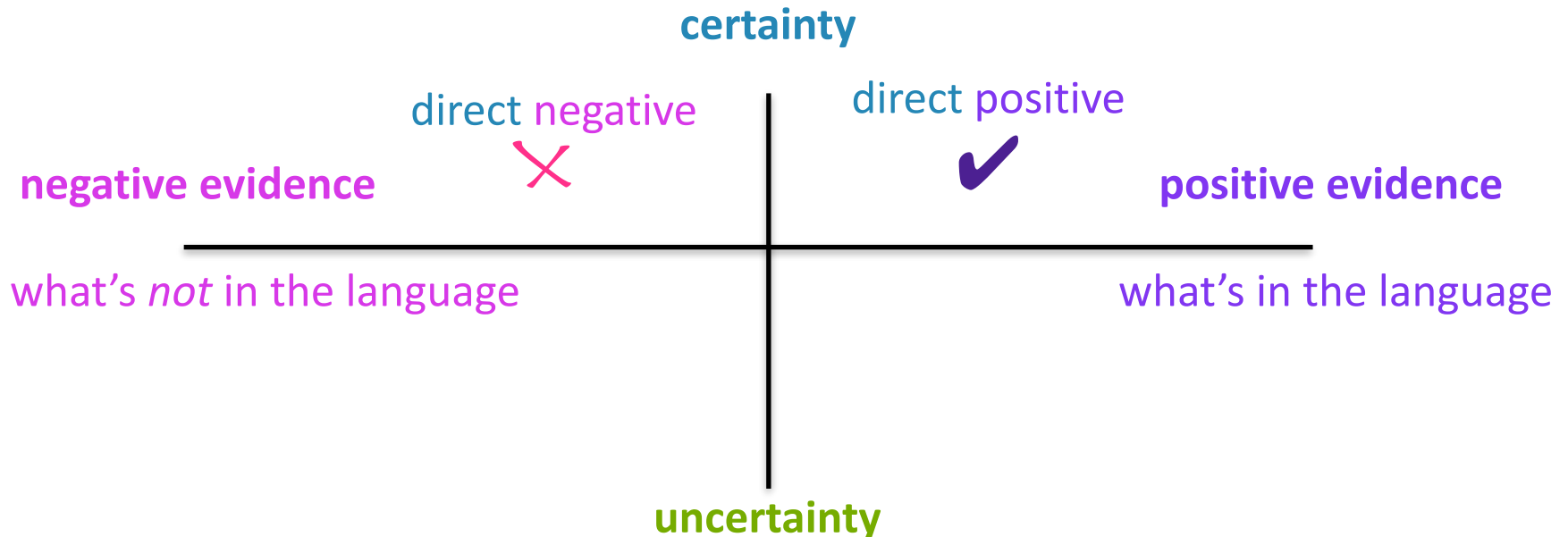
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Indirect negative evidence: A child **expects** a data point to be in the input, but **it keeps *not* being in the input**.



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Pearl & Mis 2016

Example with anaphoric *one*

Indirect negative evidence

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



certainty

direct negative

direct positive



negative evidence

positive evidence

what’s *not* in the language

what’s in the language

uncertainty

Evidence that children seem to use

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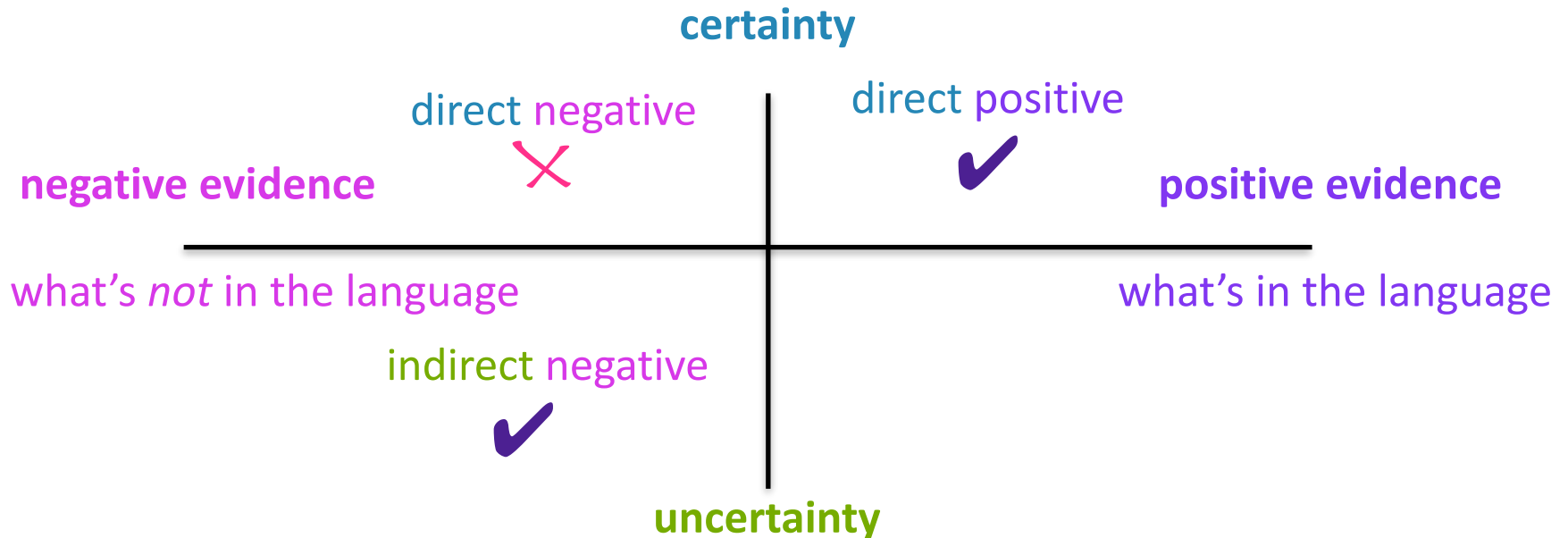
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Indirect negative evidence: Children seem capable of using this kind of evidence.



Evidence that children seem to use

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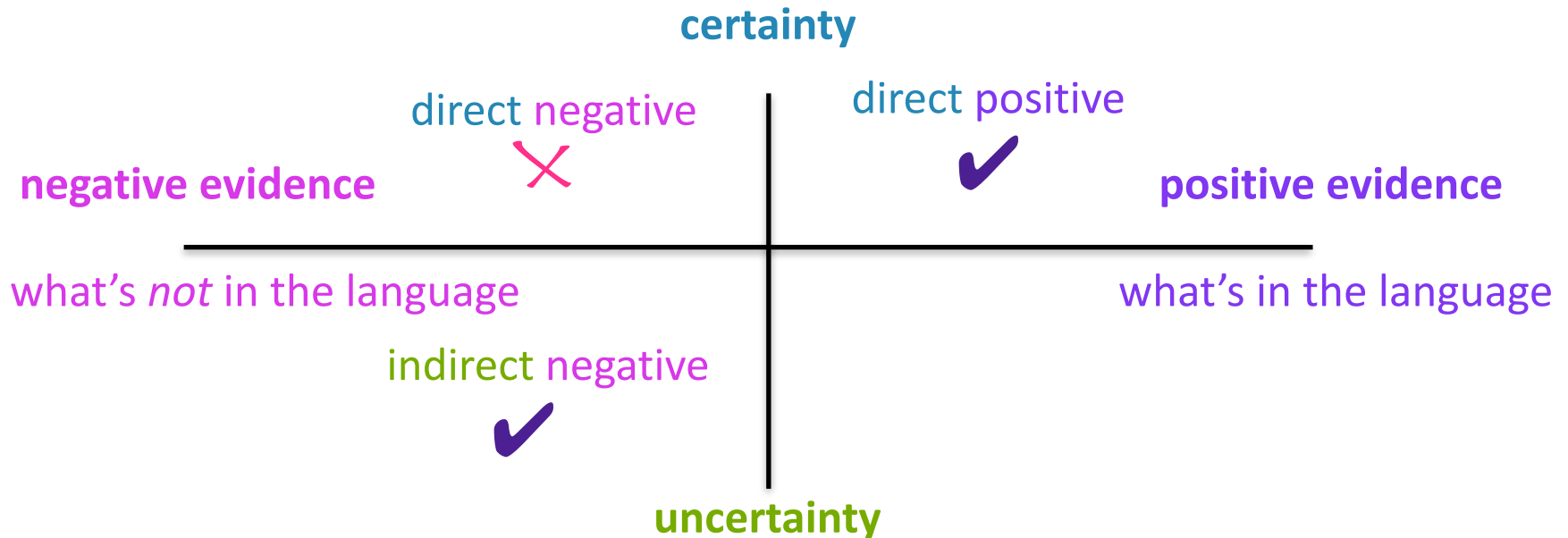
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Indirect positive evidence: Children, based on their **expectations** about how language items relate to each other, notice that other similar data to the data point in question are **in the language**.



Evidence that children seem to use

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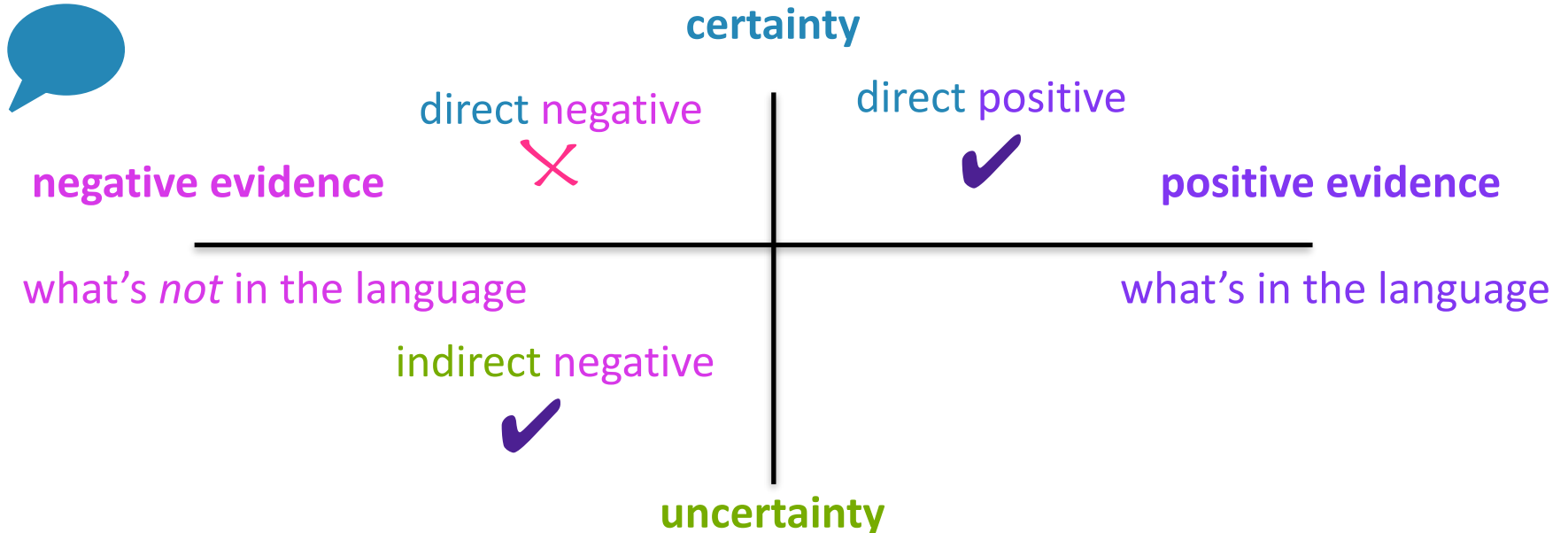


Pearl & Mis 2016

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.



Evidence that children seem to use

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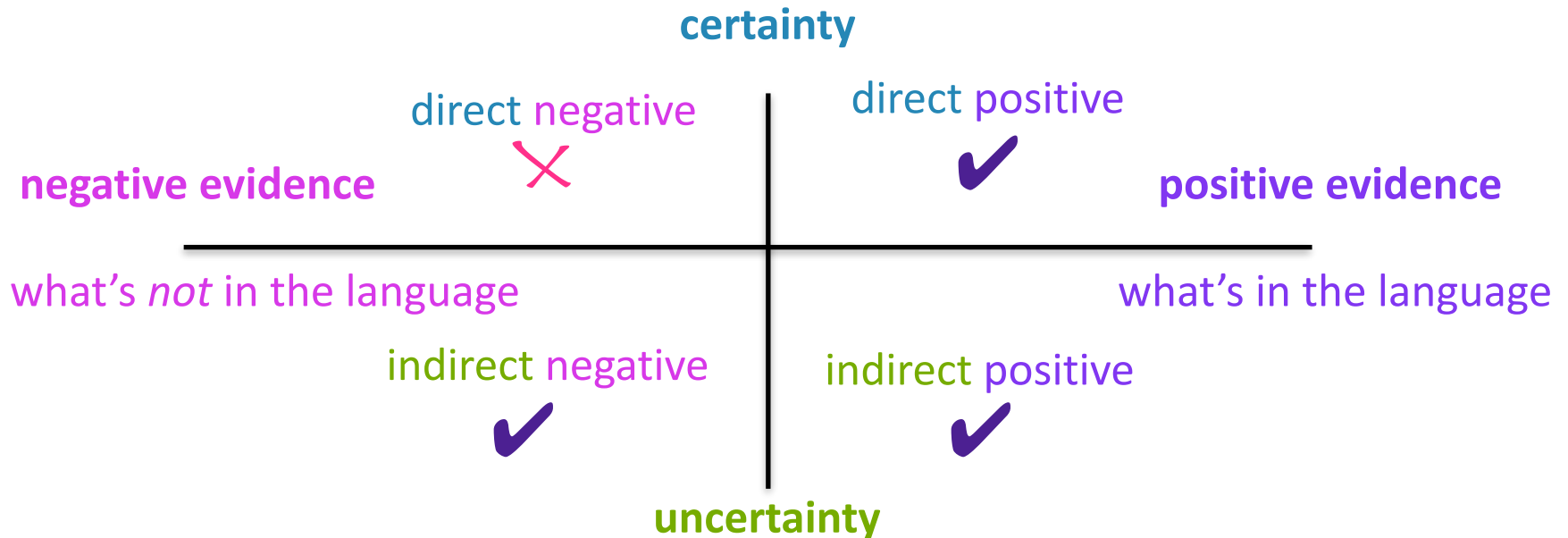
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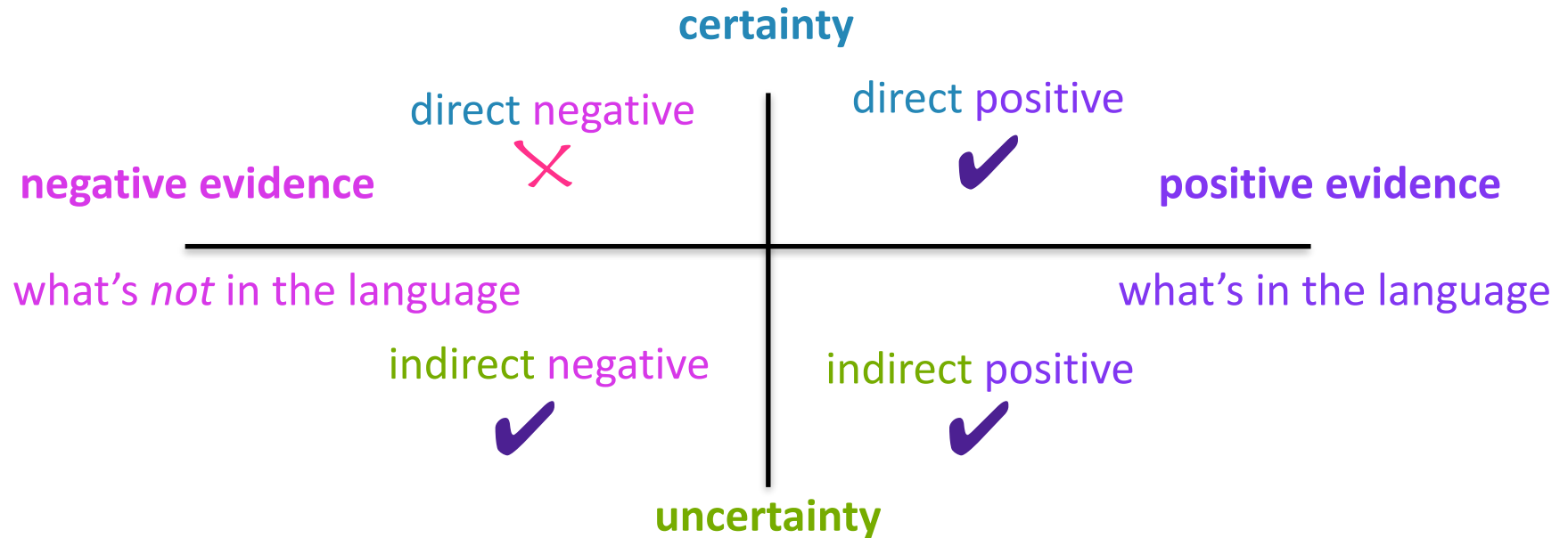


Pearl & Mis 2016

Indirect positive evidence: Children seem to use this too.



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?

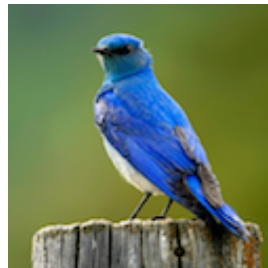
What's so hard about that?

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



???

“birdie”



“Look at that **birdie!**”

So how exactly do children learn all this?

What's so hard about that?

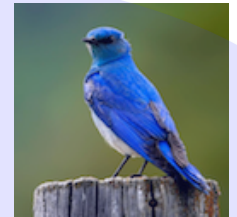
There are often **many ways to generalize beyond the input**, and most of them aren't right.



How to generalize beyond the input?

???

“birdie”



So how exactly do children learn all this?

What's so hard about that?

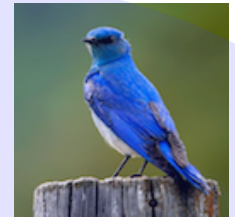
There are often **many ways to generalize beyond the input**, and most of them aren't right.



One hypothesis

+blue

“birdie”



So how exactly do children learn all this?

What's so hard about that?

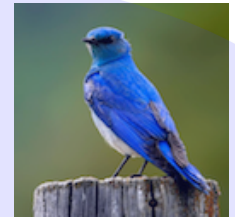


There are often **many ways to generalize beyond the input**, and most of them aren't right.

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.

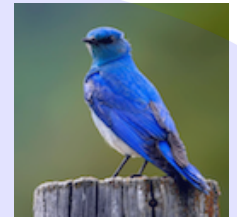


The right hypothesis



+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

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

Language acquisition = Solving a lot of induction problems.

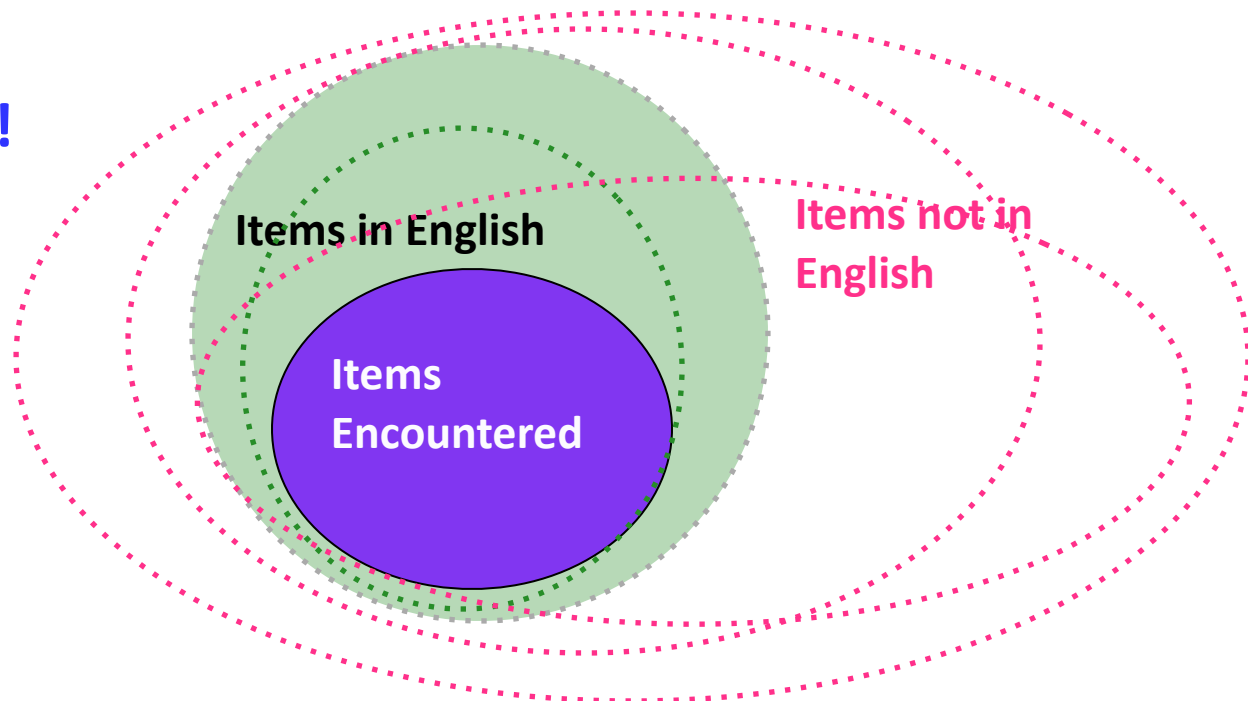
Induction problems

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

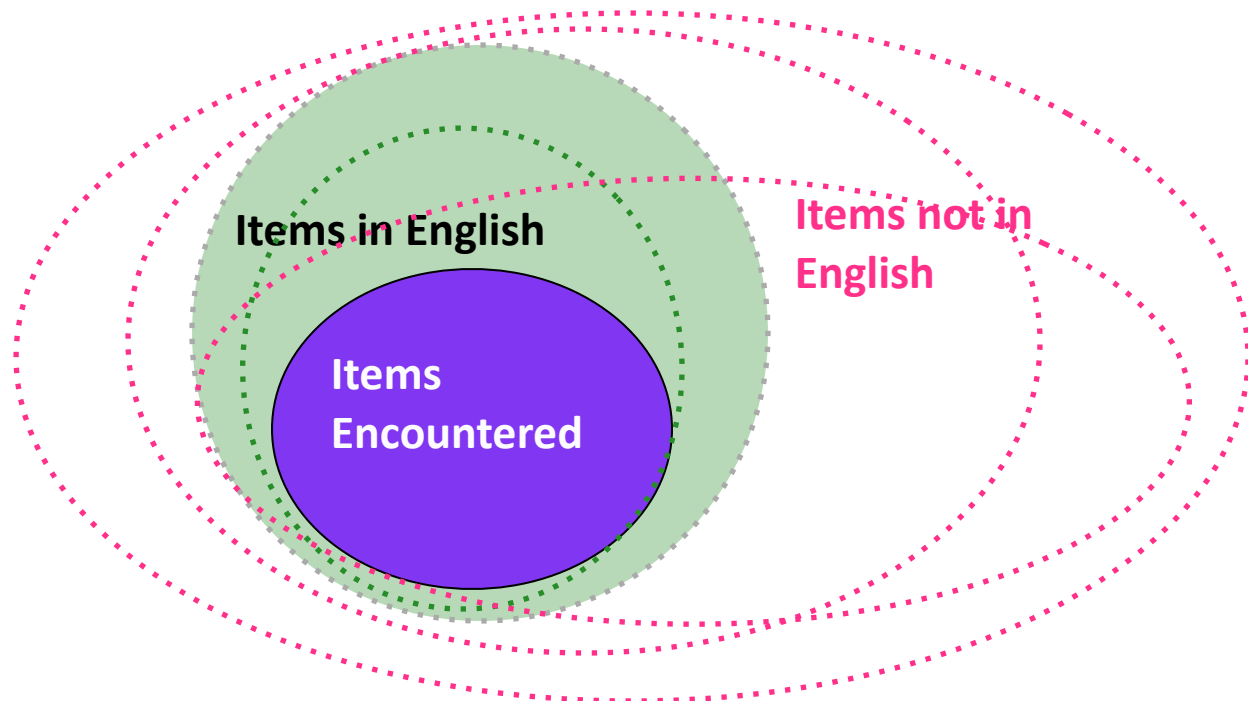
Children **don't encounter all the items** that are part of the language (they have finite time to learn, after all).



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

But how far?

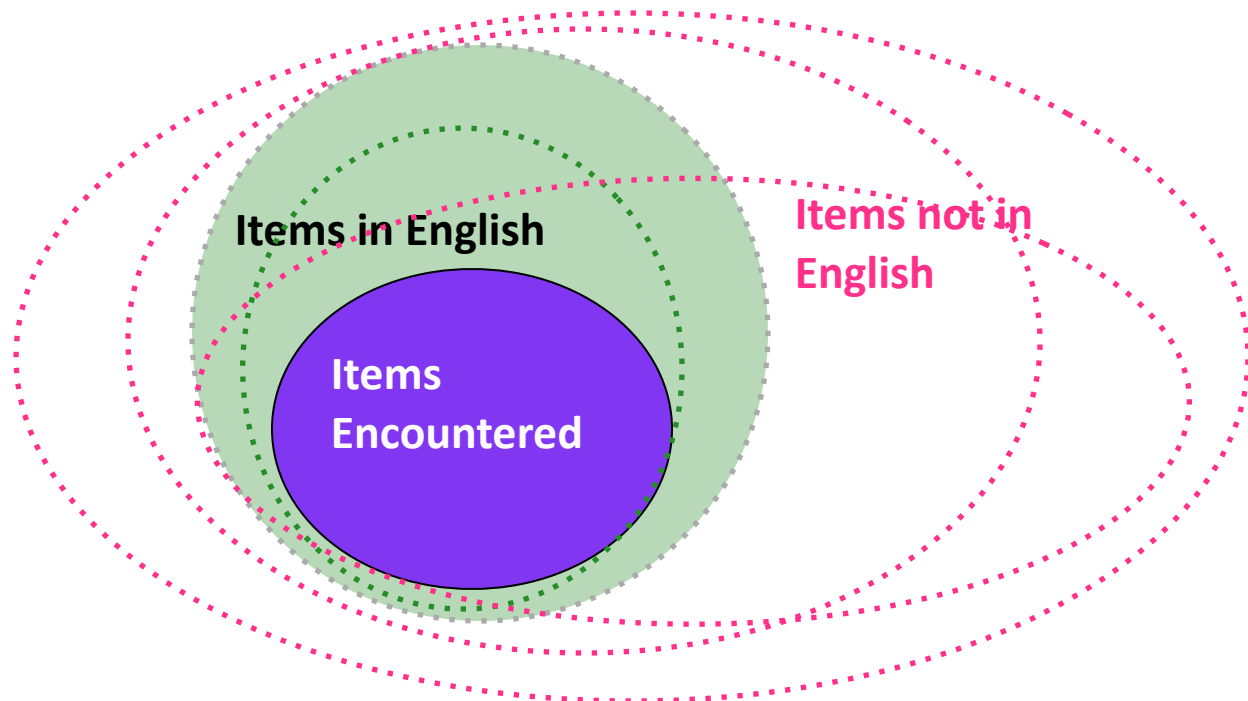
There are a lot of options...the exact number depends on the hypotheses the child is entertaining.



Induction problems



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.

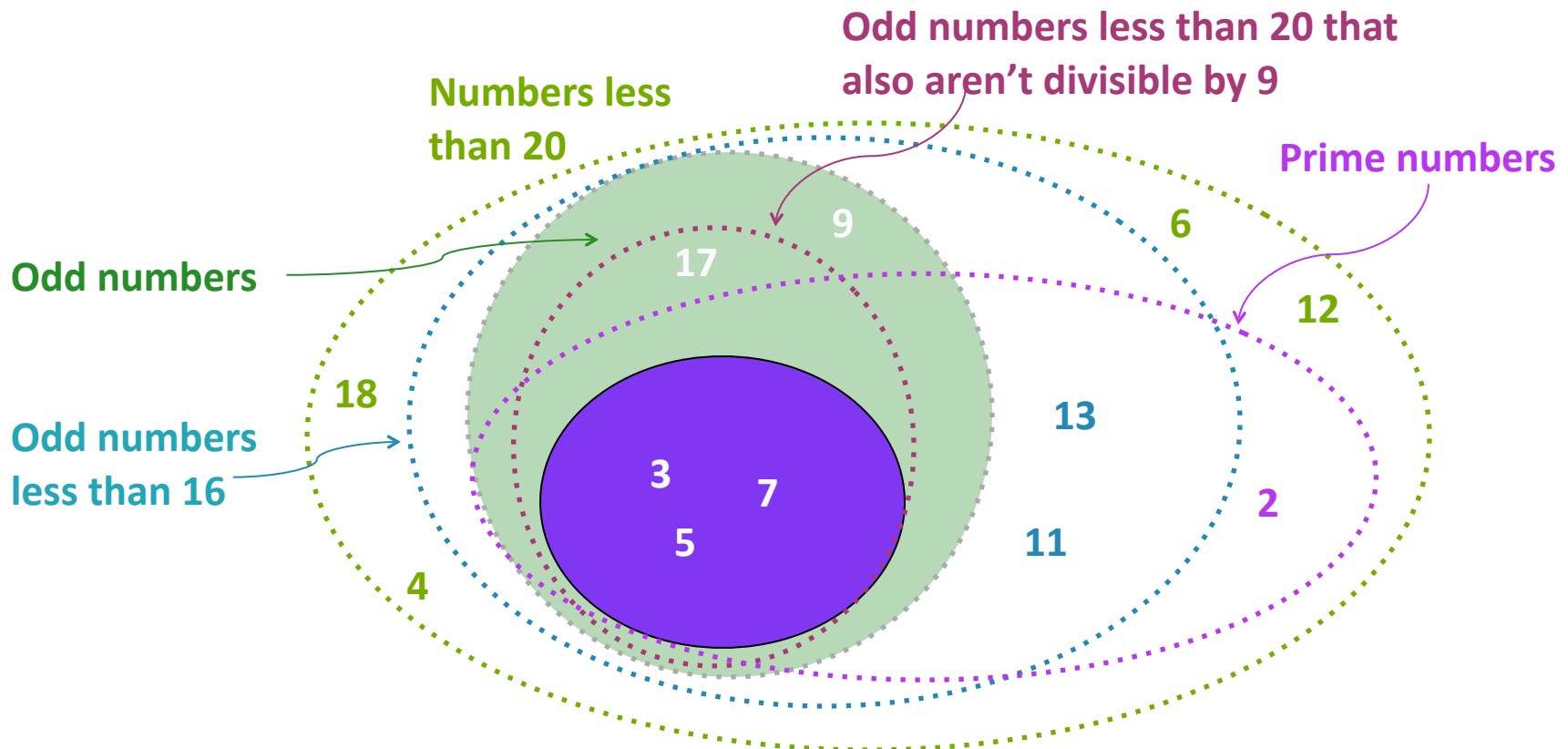


Induction problems

A numerical analogy

Suppose you encounter the numbers 3, 5, and 7.

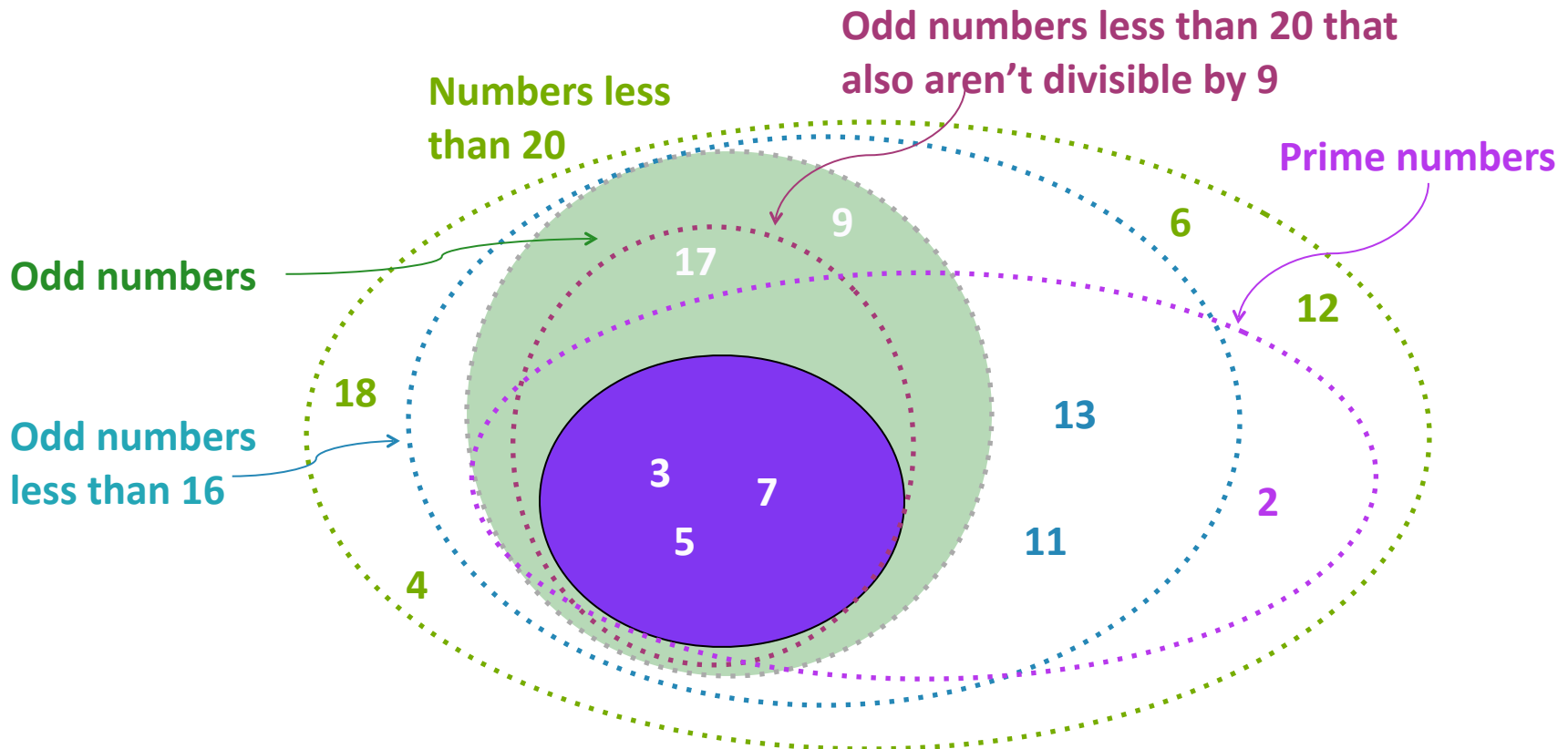
What set are these numbers drawn from? That is, what is the right “number rule” for this language that will allow you to predict what numbers will appear in the future?



Induction problems

A numerical analogy

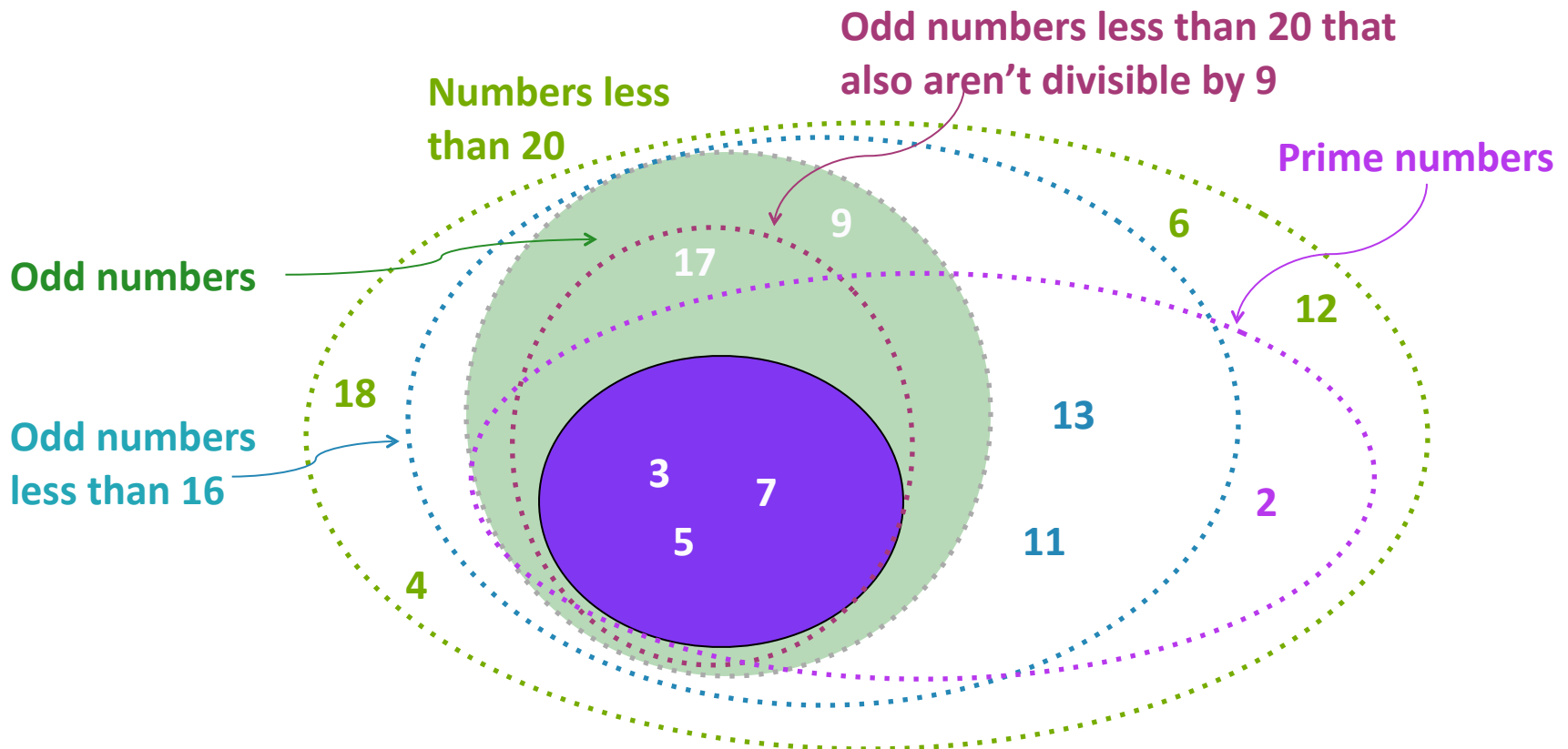
Some of these hypotheses seem more likely than others priori (this would appear in the prior you'd assign these hypotheses). This has to do with the **biases you bring to the induction problem** — all these hypotheses are compatible with the data you've seen. So the data alone don't help you decide.



Induction problems

A numerical analogy

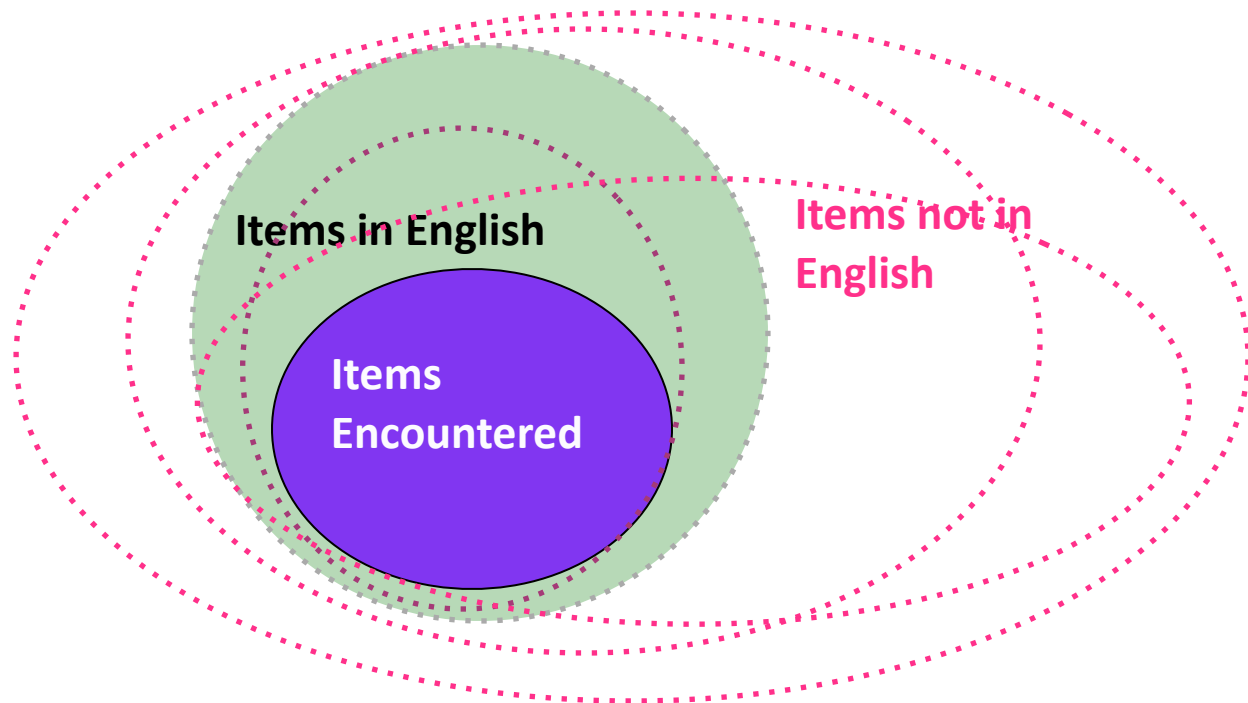
The data alone don't help you decide: This is an induction problem because the data are "impoverished" in this sense. This is referred to as the poverty of the stimulus.



Poverty of the stimulus



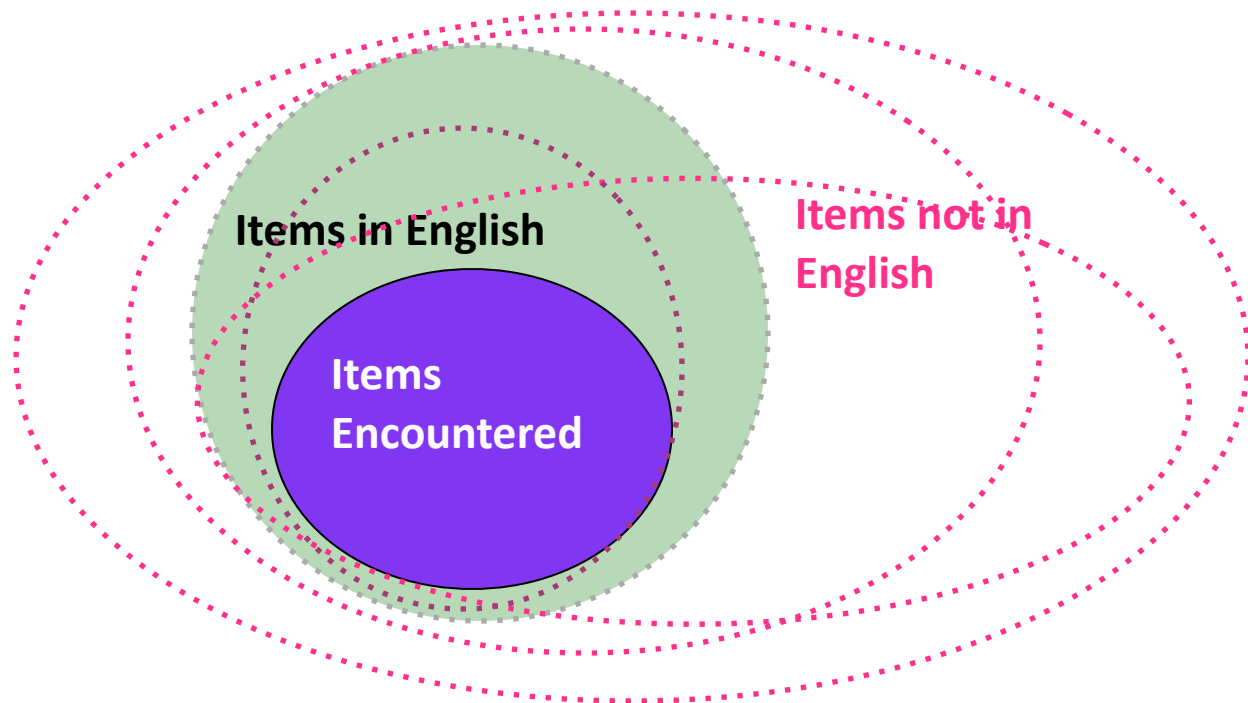
Children encounter data that are compatible with many hypotheses about the correct rules and patterns of the language.



Poverty of the stimulus



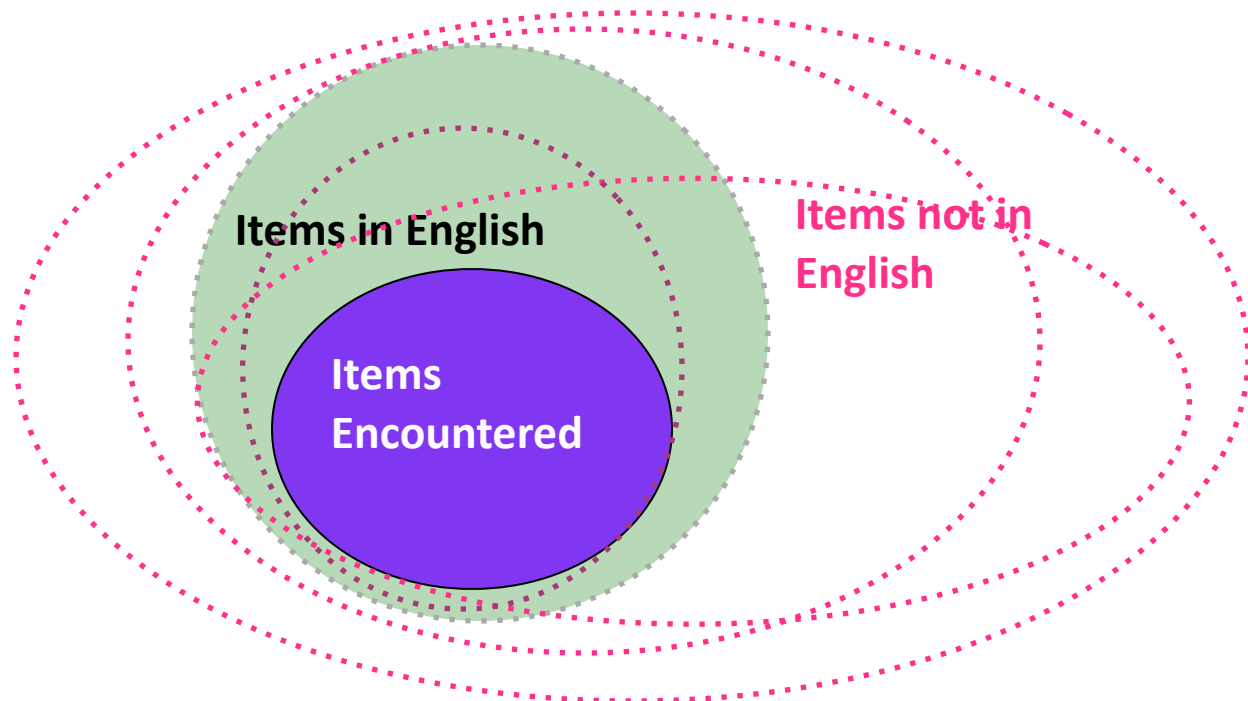
Specifically, the **data encountered** are compatible with both the **correct hypothesis** and **other incorrect hypotheses** about the rules and patterns of the language.



Poverty of the stimulus



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.

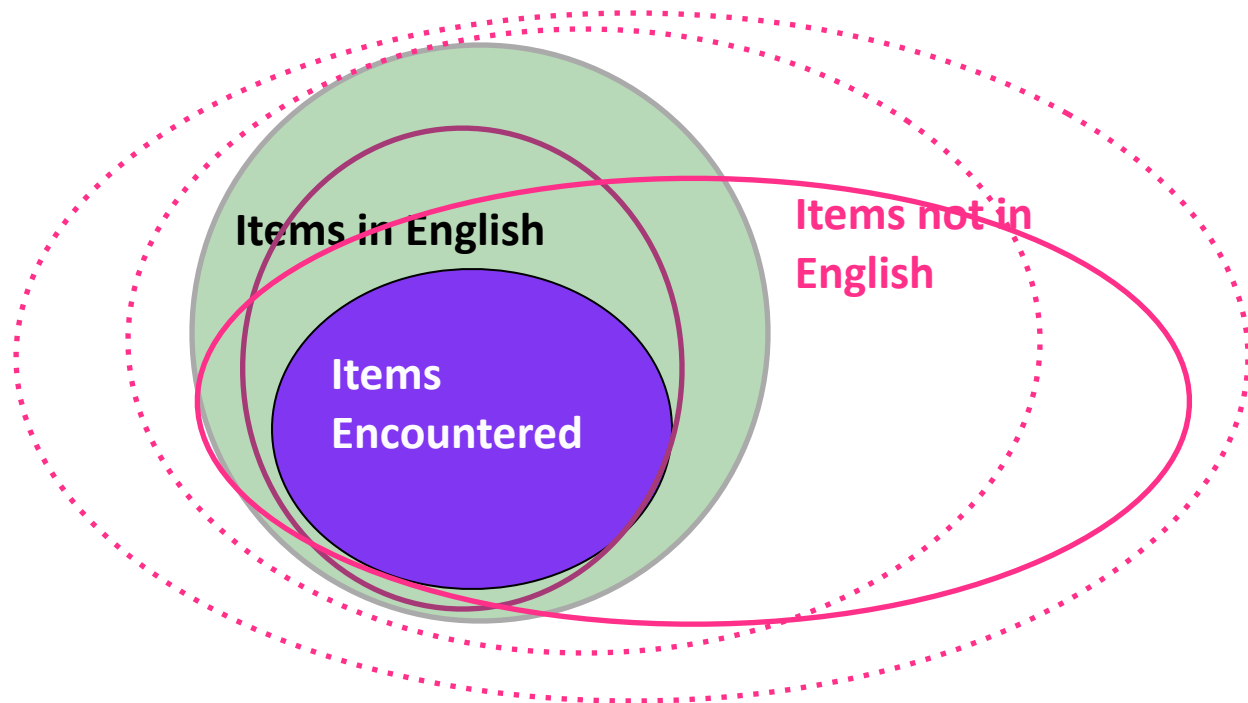


Poverty of the stimulus implications

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

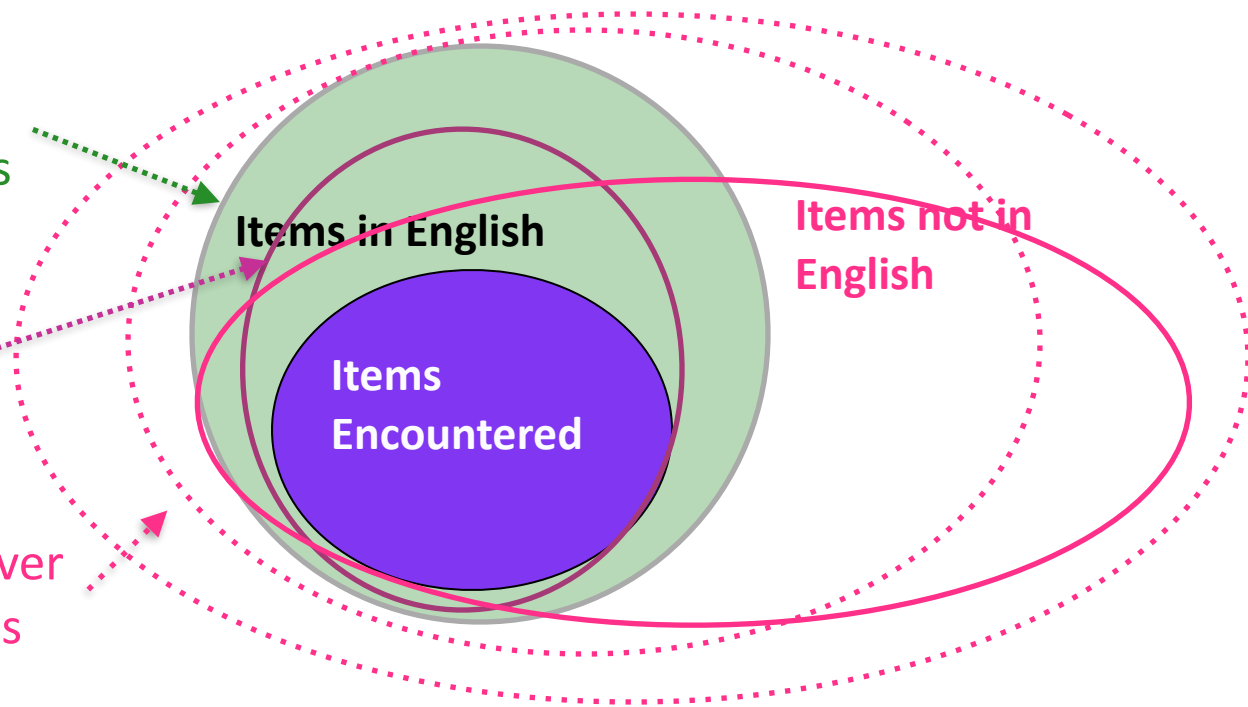


Implication: children have **some prior knowledge** that causes them never to consider (some of) the incorrect hypotheses. Instead, they only consider some of the possible hypotheses for what the rules and patterns of the language might be.

Prior knowledge restricts children's hypothesis to this

or maybe this

but they never consider this



Poverty of the stimulus implications

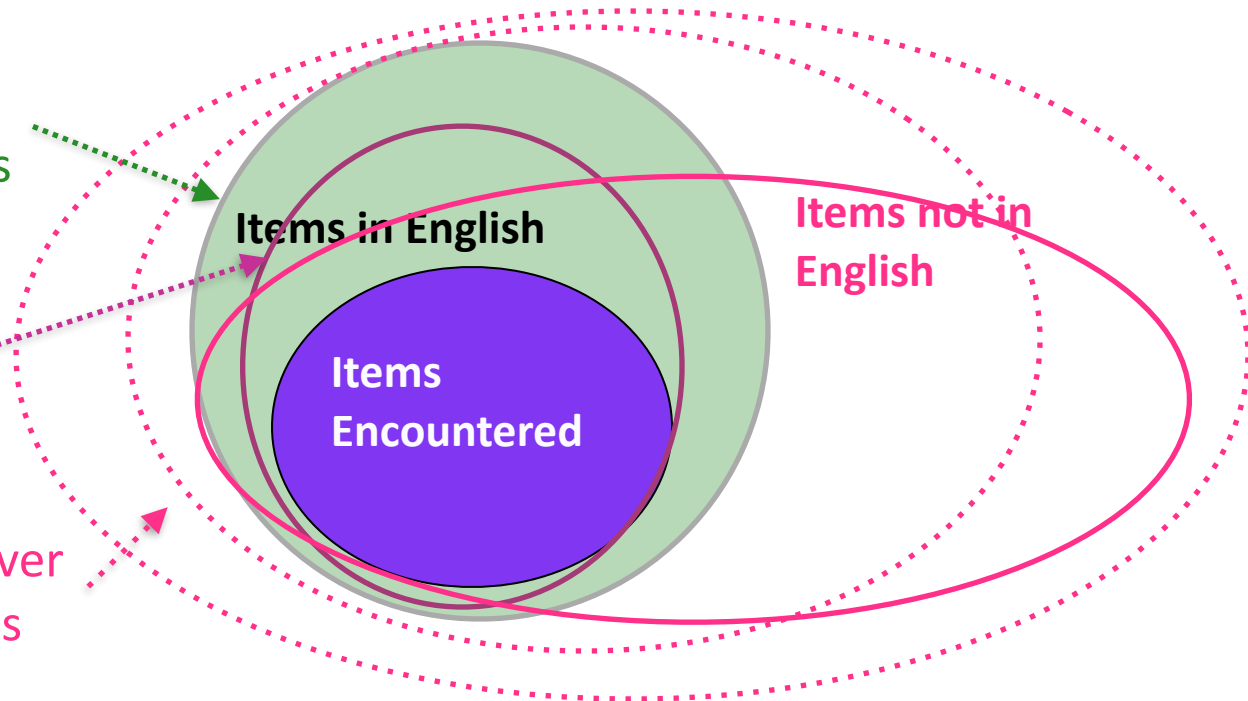
Let's look at a concrete example of this situation.



Prior knowledge restricts children's hypothesis to this

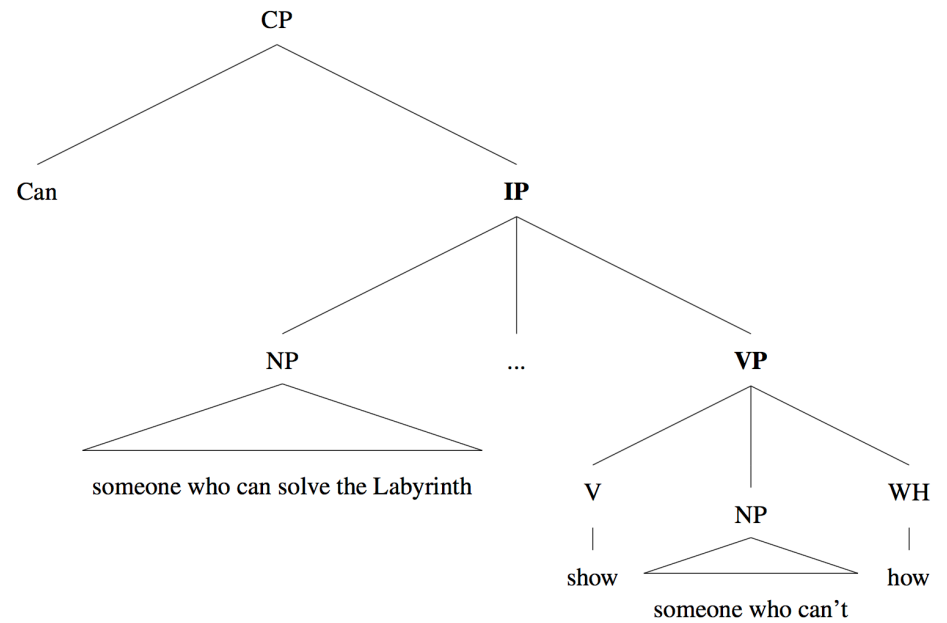
or maybe this

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?



- X 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
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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

Main objects

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

Main verb phrase

Main objects

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

Main subject

Main verb phrase

Main objects

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

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

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

Main verb phrase

Main objects

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

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**

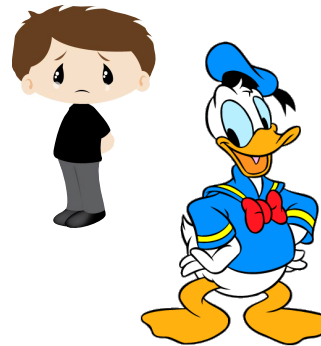
Yes/No question formation in English



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



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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.”



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(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."*



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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



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Common errors that occurred:

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

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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.**



Jareth can alter time.



Can Jareth alter time?

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



Structure dependence

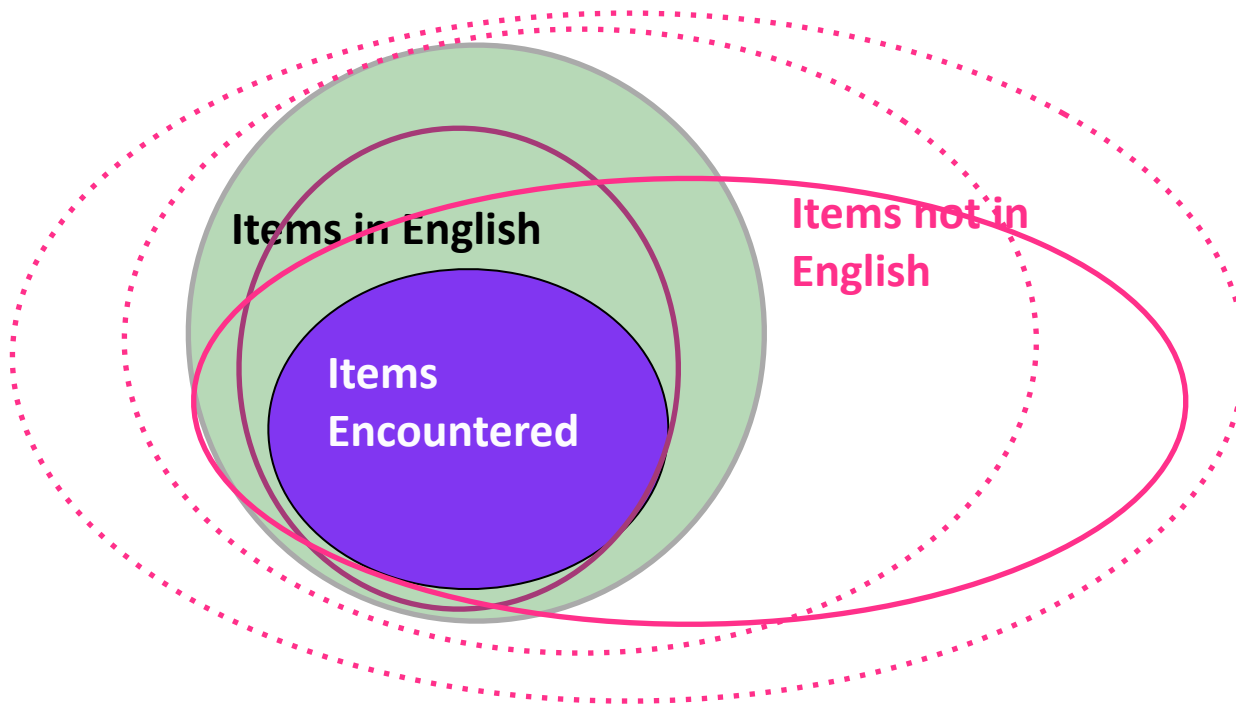
Rules for word order **depend on linguistic structure**

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**?



Jareth **can** alter time.



Can Jareth alter time?



Structure dependence

Rules for word order **depend on linguistic structure**

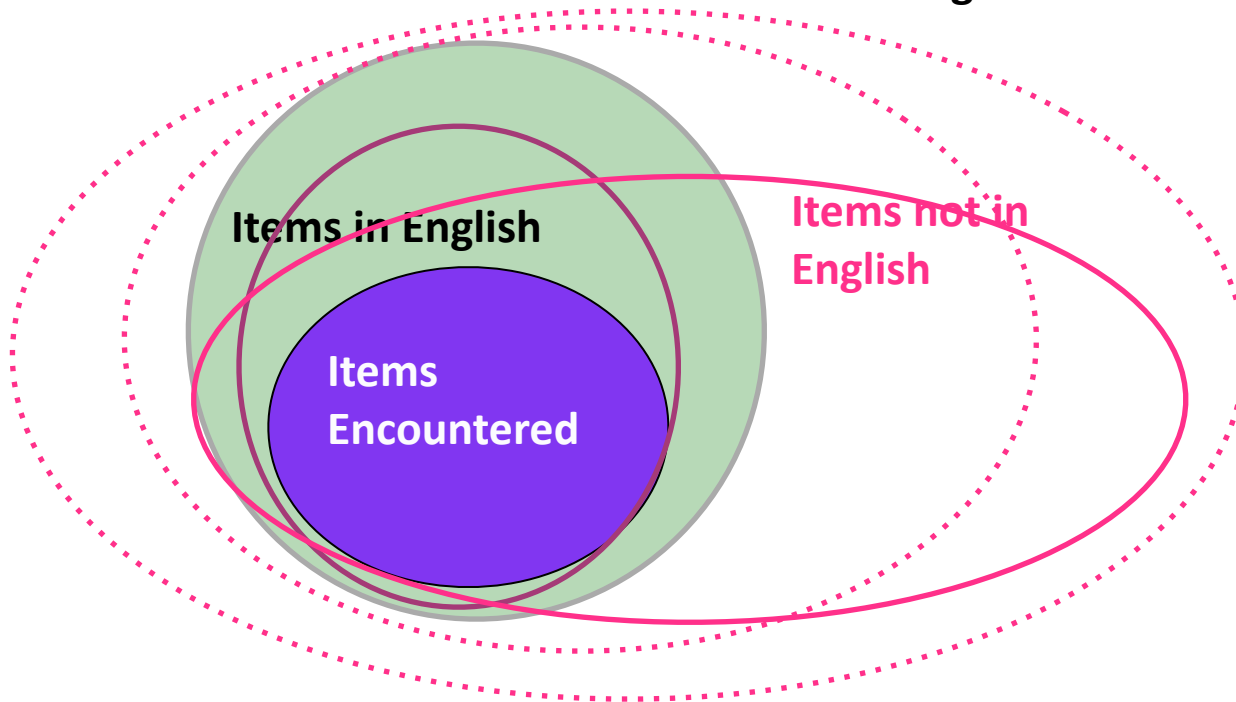
Yes/No question formation in English

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?

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**

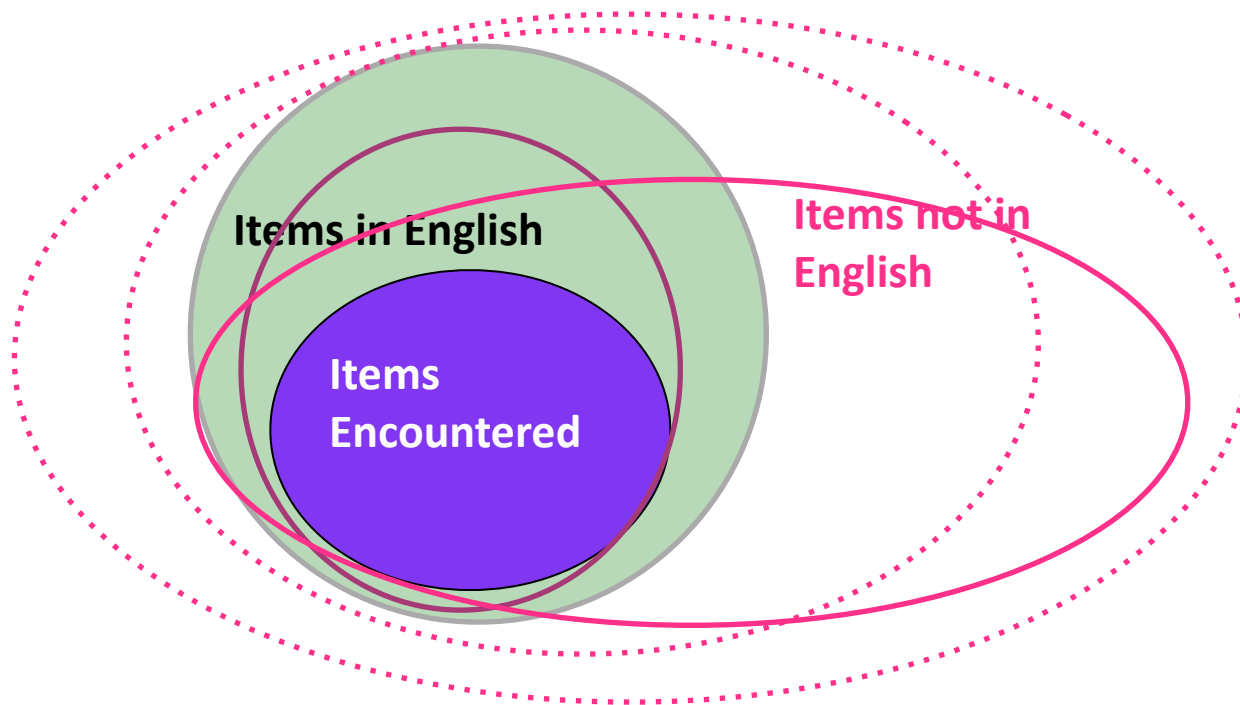
Yes/No question formation in English

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

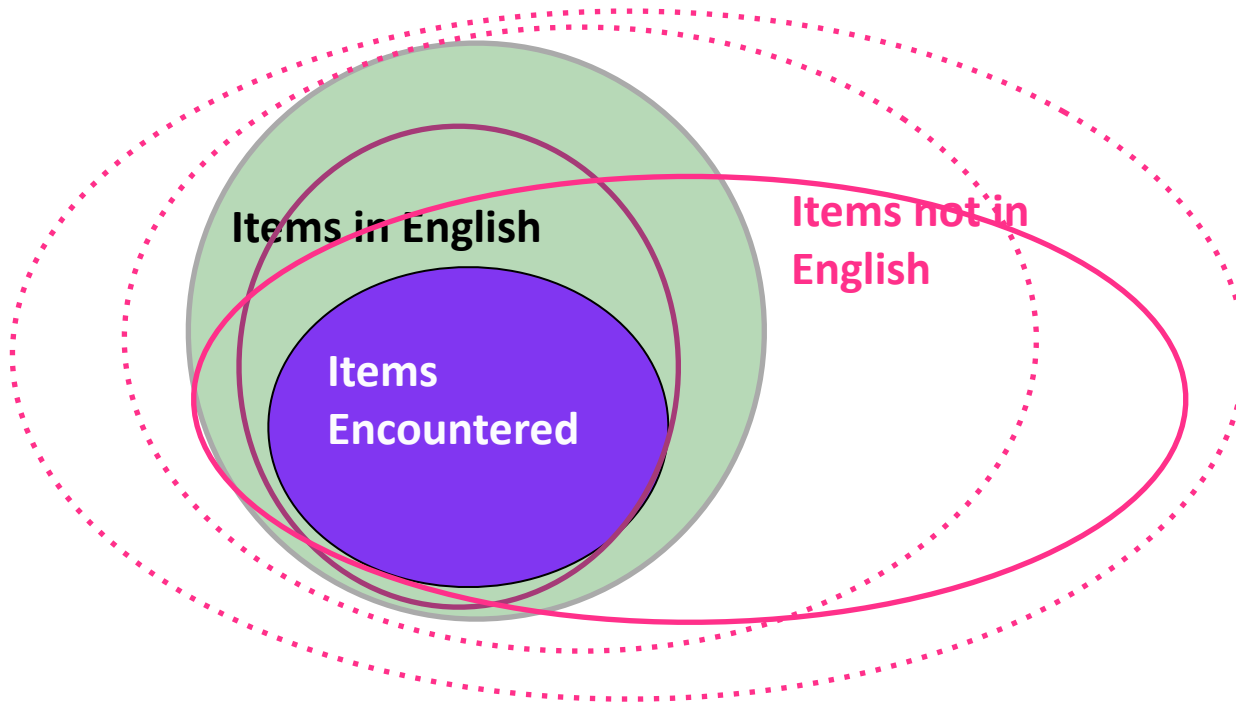
Rules for word order **depend on linguistic structure**

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



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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** ✓

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

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



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

Possible generalization: Can put pronoun
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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

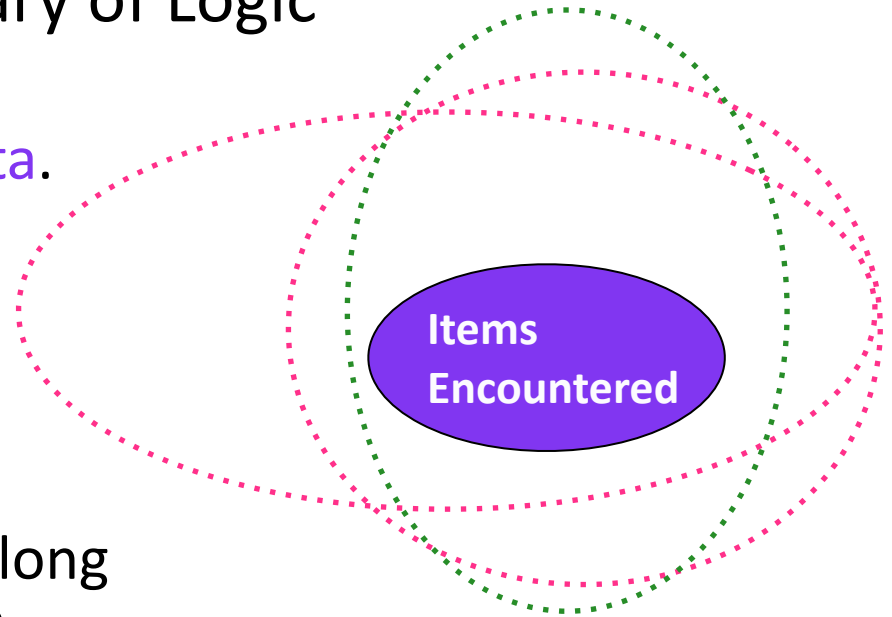
1) Suppose there are some **data**.



Items
Encountered

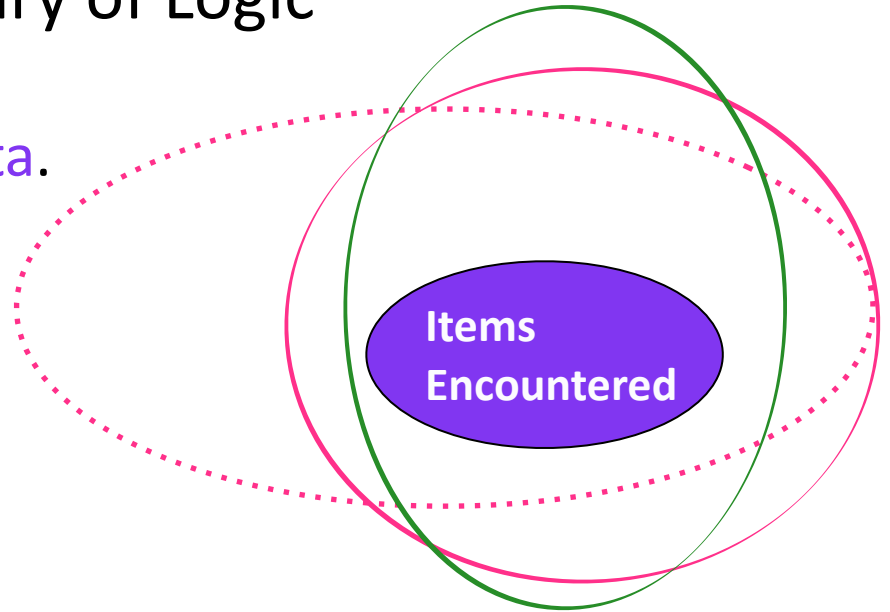
Poverty of the stimulus + constrained generalization
leads to prior knowledge about language:
Summary of Logic

- 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

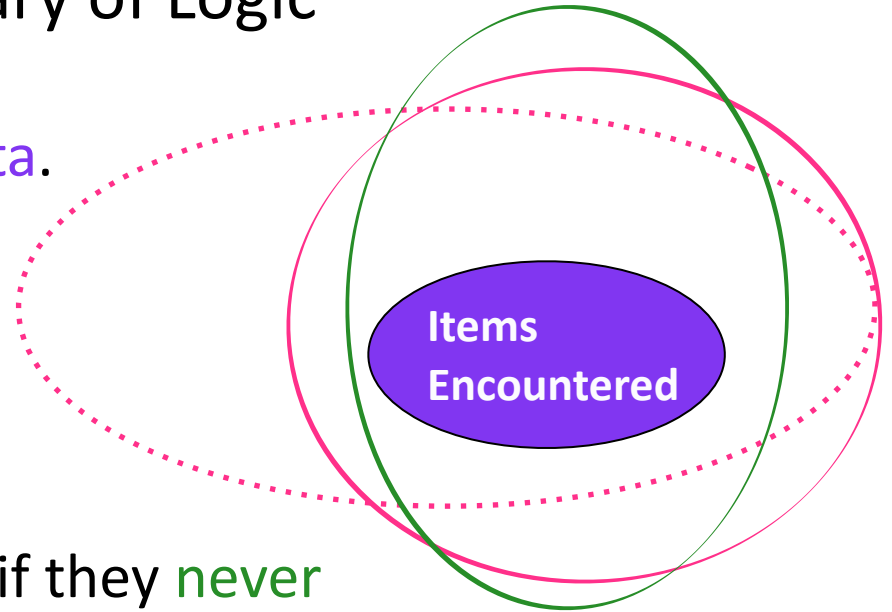
- 1) Suppose there are some **data**.
- 2) Suppose there are some **incorrect hypotheses compatible with the data**.
- 3) Suppose children **behave** as if they **never entertain some of the incorrect hypotheses**.
That is, they make **constrained generalizations**.



Poverty of the stimulus + constrained generalization
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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.