

LSci 51/CogS 56L: Acquisition of Language

Lecture 15 Syntactic acquisition II

Development of comprehension



Clever non-syntactic strategies

Clever comprehension strategies children use:

Recognized words in utterance: “Hoggle”, “Jareth”, “scared”

Use **world knowledge** to figure out likely sequence of events (Blything et al. 2015, Wagner & Holt 2023).

Works really well for sentences that are **predictable from world knowledge** (in a world where Jareth is often doing the scaring and Hoggle is often being scared):

“**Jareth scared Hoggle.**”

...but not so well for ones where the events are **not predictable from world knowledge**:

“**Hoggle scared Jareth.**”



Clever non-syntactic strategies

Clever comprehension strategies children use:

Recognized words in utterance: “cowered”, “threw”, “disguise”, “Hoggle”, “Jareth”

Use the **order** of words to predict who did what to whom
(Clark 1971, DeRuiter et al. 2018, Wagner & Holt 2023): first mention is what happened first.

Works really well for sentences where order-of-mention is the order of action:

“Jareth threw off his disguise before Hoggle cowered.”

Actual event: Jareth-throw-disguise, then Hoggle-cower.
[Matches word order.]



Clever non-syntactic strategies

Clever comprehension strategies children use:

Recognized words in utterance: “cowered”, “threw”, “disguise”, “Hoggle”, “Jareth”

Use the **order** of words to predict who did what to whom
(Clark 1971, DeRuiter et al. 2018, Wagner & Holt 2023): first mention is what happened first.

...but not so well for ones where it's not:

“**Hoggle cowered** **after** **Jareth** **threw** **off** **his** **disguise**.”

Actual event: **Jareth-throw-disguise**, then **Hoggle-cower**.

[Does not match word order]



Clever non-syntactic strategies

Clever comprehension strategies children use:

Recognized words in utterance: “knight”, “dwarf”, “bump”

Use the **order** of words to predict who did what to whom: first mention is the one doing the action, second mention is the one the action is done to.

Works really well for **active** sentences:

“**The knight bumped the dwarf.**”

Actual event: **knight-bumps-dwarf**

[Matches word order]



knight

dwarf

Clever non-syntactic strategies

Clever comprehension strategies children use:

Recognized words in utterance: “knight”, “dwarf”, “bump”

Use the **order** of words to predict who did what to whom: first mention is the one doing the action, second mention is the one the action is done to.

...but not so well for **passives**:

“**The knight was bumped by the dwarf.**”

Actual event: **dwarf-bumps-knight**

[Does not match word order]



knight

dwarf

Passives



<http://arnoldzwicki.org/2012/02/22/misfired-indirection/>

[Extra] Passives

<http://www.thelingspace.com/episode-39>

<https://www.youtube.com/watch?v=NJ5ILNBabGc>

1:59 - 4:45



Passives

Passives are tricky because the subject of the sentence is the “done-to” of the action (rather than the “doer” as it is in active sentences).

Active sentence:

Sarah saved Toby.

Subject Verb Object

Passive equivalent:

Toby was saved by Sarah.

Subject Verb

semantically “light” verb

doer “by” phrase

Passives

English-speaking children usually start producing passives when around age 3.

Some example passives & the ages when they were produced:

“Do you think the flower’s supposed to **be picked** by somebody?” (2;10)

“So it can’t **be cleaned**?” (3;2)

“I don’t want the bird to **get eaten**.” (3;7)

“She brought her inside so she won’t **get all stinked up** by the skunk.” (4;1)



Passives

English-speaking three-year-olds also seem to comprehend **novel passives** when they're given enough time to process the sentences (Messenger & Fisher 2018). This suggests English-speaking three-year-olds do understand the structure.



“The girl is getting **snedded** by the boy!”

Boy-agent event



Girl-agent event



Passives

In fact, children seem to over-produce passives, applying a “passive” rule to verbs that (some) adults wouldn’t make passive.

Passive rule = ~ be/get + VERB + en/ed

Some example “over-produced” passives:

“...they won’t **get staled**.” (3;6)

“The tiger will come and eat David and then he will **be died**.” (4;0)

“Why **is** the laundry place **stayed** open all night?” (4;3)

Passives

Still, despite producing passives spontaneously, children seem to have persistent trouble understanding some passive sentences.

Standard comprehension task with
reversible passive:

Hoggle was hugged by Sarah.



reversible passive:

Makes sense either way, so kids
can't rely on world knowledge

Hoggle-hug-Sarah or Sarah-hug-Hoggle



Passives

Still, despite producing passives spontaneously, children seem to have persistent trouble understanding some passive sentences.

Standard comprehension task with
reversible passive:



4 years old

✓ Hoggle was *pushed* by Sarah.

✗ Hoggle was *remembered* by Sarah.



Passives

Still, despite producing passives spontaneously, children seem to have persistent trouble understanding some passive sentences.

Nguyen & Pearl 2018, 2019, 2021, Liter & Lidz 2021, Agostino, Gavarró, & Sanots 2024: This seems like it has to do with the **semantic features** of the verbs. Certain features are more salient at different ages.



4 years old

carry, push, kiss

+actional

✓ Hoggle was *pushed* by Sarah.

✗ Hoggle was *remembered* by Sarah.

+mental state

where the **subject experiences**
the mental state in an active sentence
and nothing really “happens” to the **object**

Sarah VERBed Hoggle.

forget, know, believe



Passives

Eventually, children learn to notice the more subtle signals of a passive sentence – the light verb, the participle (-en/-ed) ending, and sometimes the “doer” by phrase.



“Hoggle **was** remembered **ed** **by** Sarah”

But it *does* take awhile...(sometimes up till 9 years old!)

Passives

Eventually, children learn to notice the more subtle signals of a passive sentence – the light verb, the participle (-en/-ed) ending, and sometimes the “doer” by phrase.



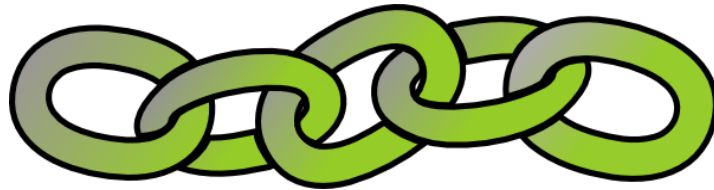
“Hoggle was remembered by Sarah”

Interestingly, passive usage doesn't differ much in frequency between child-directed speech and children's books (Altmiller, Corriveau, & Arunachalam 2022). So, just being exposed to “more sophisticated” book language, the way older children are, isn't likely to help a lot.

A more general acquisition problem: Learning how verbs behave

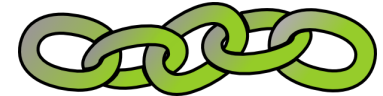
The Linking Problem:

Children must learn how verbs behave — that is, how **verbs and verb arguments of their language link up** to create meaning.



The Linking Problem

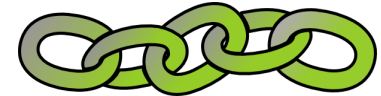
What is this likely to mean?



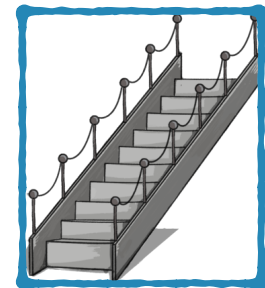
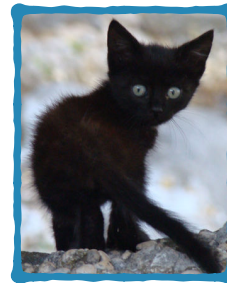
The little girl *blicked* the kitten on the stairs.

The Linking Problem

What is this likely to mean?



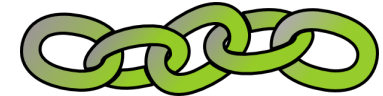
The little girl *blicked* the kitten on the stairs.



Event participants

The Linking Problem

What is this likely to mean?



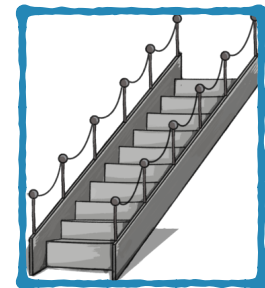
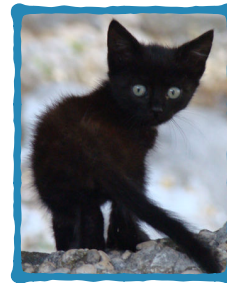
Syntactic positions

Subject

Object

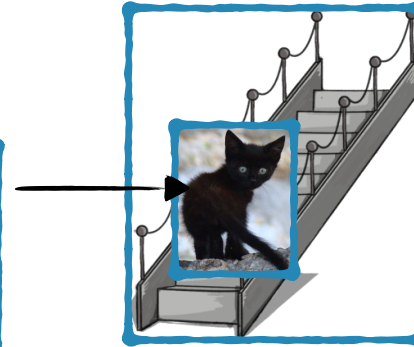
Oblique
Object

The little girl *blicked* the kitten on the stairs.



Event participants

The Linking Problem



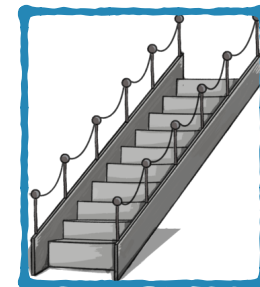
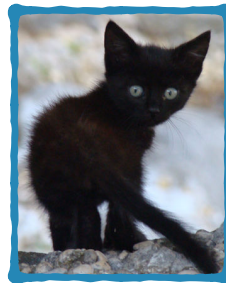
Syntactic positions

Subject

Object

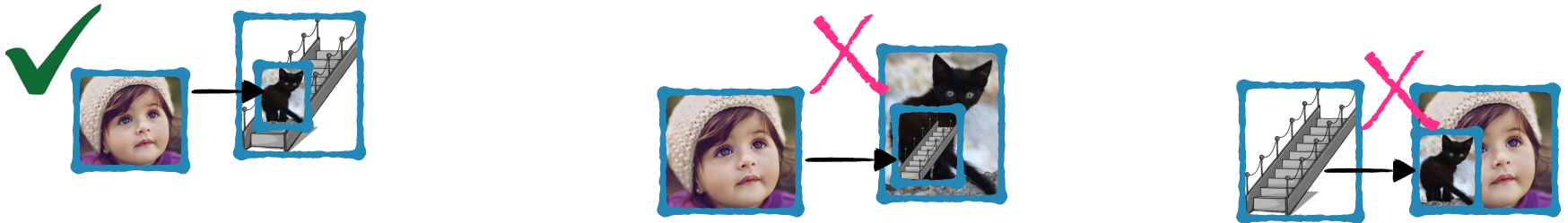
Oblique
Object

The little girl *blicked* the kitten on the stairs.



Event participants

The Linking Problem



...compared to these.



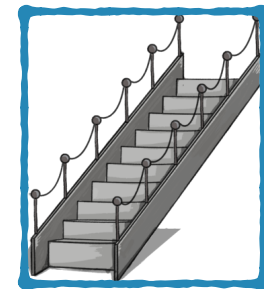
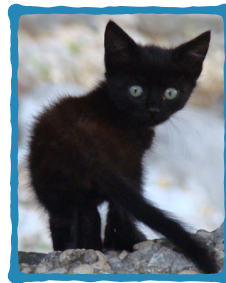
Syntactic positions

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Oblique
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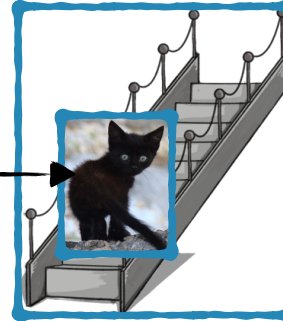
The little girl *blicked* the kitten on the stairs.



Event participants

The Linking Problem

Why?



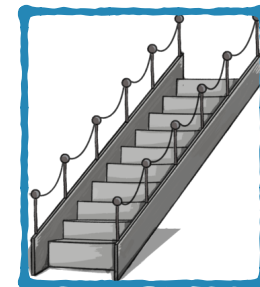
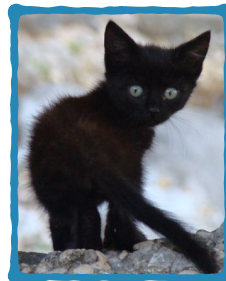
Syntactic positions

Subject

Object

Oblique
Object

The little girl *blicked* the kitten on the stairs.

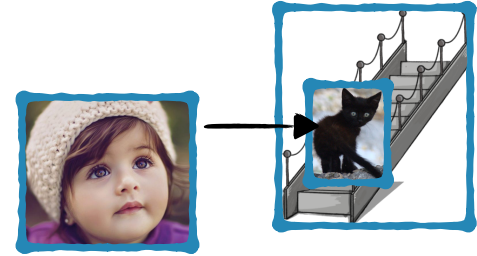


Event participants

The Linking Problem solved



We as adults have **linking theories** that help us interpret verbs in combination with their arguments.



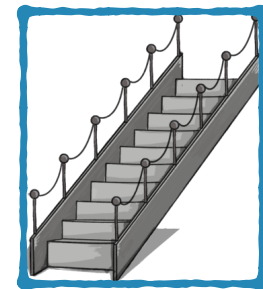
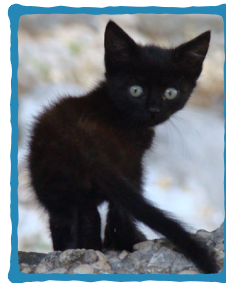
Syntactic positions

Subject

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Oblique
Object

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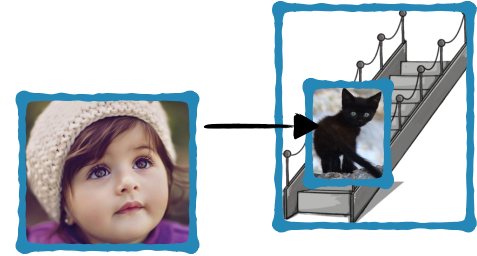


Event participants

The Linking Problem solved



We can also use these **linking theories** to produce verbs in combination with their arguments when we want to express a particular meaning.



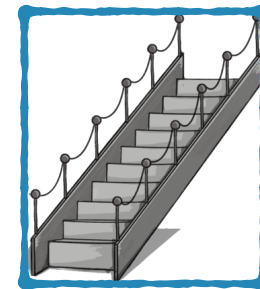
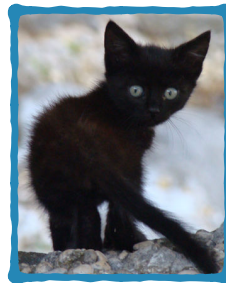
Syntactic positions

Subject

Object

Oblique
Object

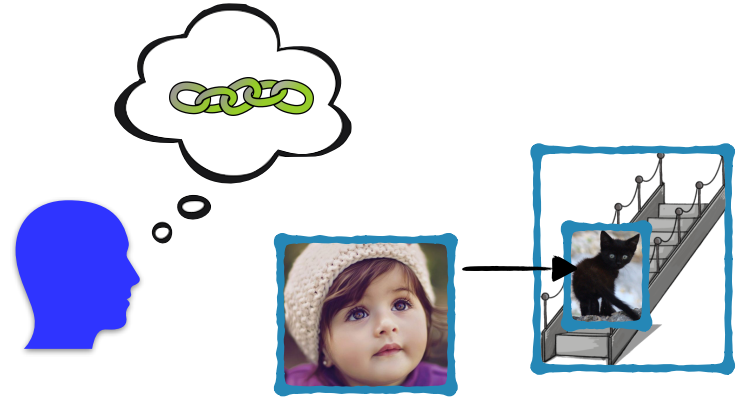
The little girl *blicked* the kitten on the stairs.



Event participants

The Linking Problem solved

These **linking theories** are mental representations that we as adults have developed. They let us **link event participants** and **syntactic positions**, so we know how to **interpret an utterance** — even when we don't know what the verb means.



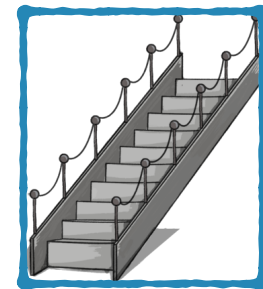
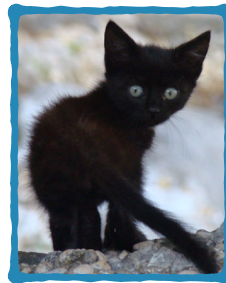
Syntactic positions

Subject

Object

Oblique
Object

The little girl *blicked* the kitten on the stairs.



Event participants

[Extra]

Verbs, their arguments, & linking meaning to structure

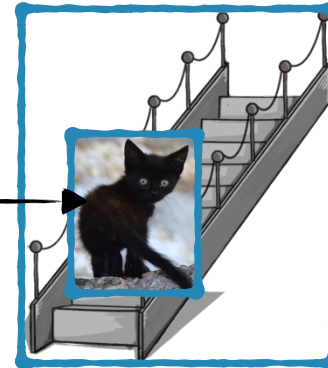
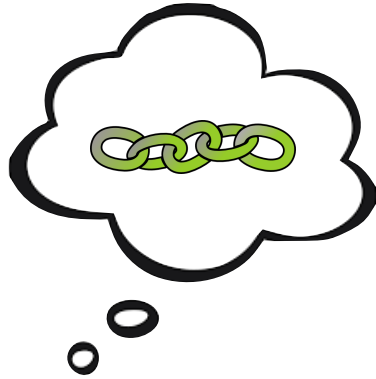
<https://www.youtube.com/watch?v=thFkoo1YmW0>

3:30-6:15



The Linking Problem solved

Children have to **develop** the appropriate **linking theories** as part of their knowledge of their native language.



The little girl *blicked* the kitten on the stairs.

Linking theories



What does a **linking theory** look like?

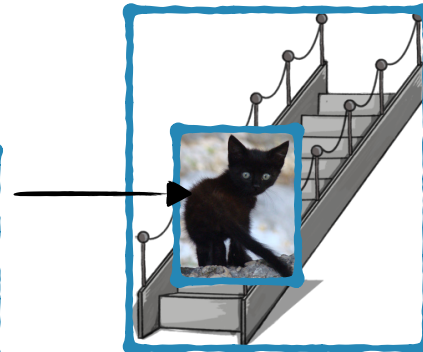


Subject

Object

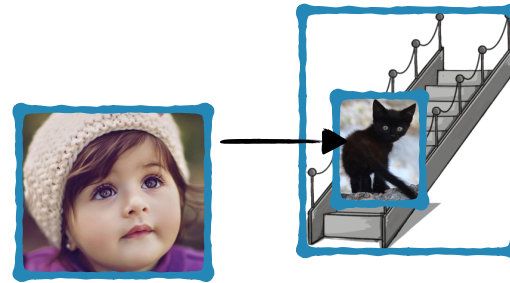
Oblique
Object

The little girl *blicked* the kitten on the stairs.



Linking theories

A **linking theory** links **syntactic positions** and **thematic roles**, which are **participants in the event** described.



The little girl *blicked* the kitten on the stairs.

Syntactic positions

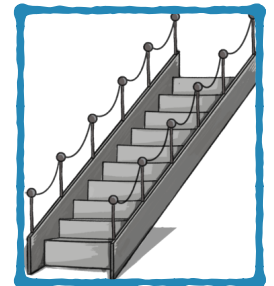
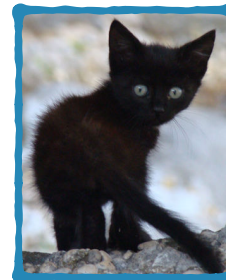
Subject

Object

Oblique
Object

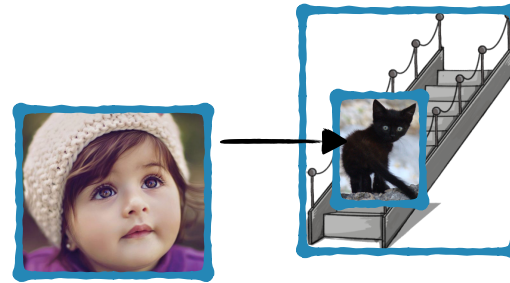


Event participant roles
=
Thematic roles



Linking theories

A **linking theory** links **syntactic positions** and **thematic roles**, which are **participants** in the **event** described.



The little girl *blicked* the kitten on the stairs.

Syntactic positions

Subject

Object

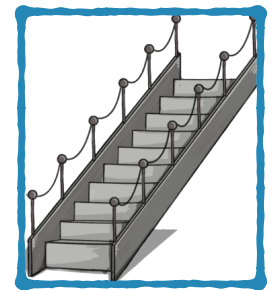
Oblique
Object



Event participant roles

=

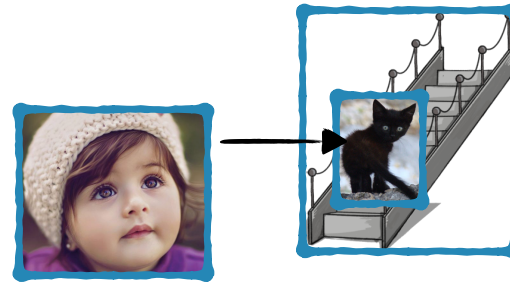
Thematic roles



Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Linking theories

Current **linking theory** proposals involve mapping to an **intermediate representation** before mapping to the syntactic positions.



The little girl *blicked* the kitten on the stairs.

Syntactic positions

Subject

Object

Oblique
Object



Intermediate
representations

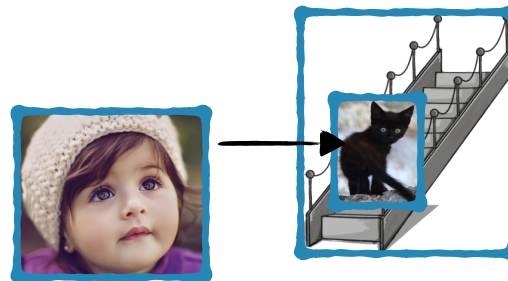
Event participant roles

=

Thematic roles

Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals



The little girl *blicked* the kitten on the stairs.

Syntactic positions

Subject

Object

Oblique
Object



Intermediate
representations

One idea: UTAH

The **U**niformity of **T**heta **A**ssignment **H**ypothesis

Baker 1988, Baker 1997, Dowty 1991, Fillmore 1968, Grimshaw 1990, Jackendoff 1987, Perlmutter & Postal 1984, Speas 1990

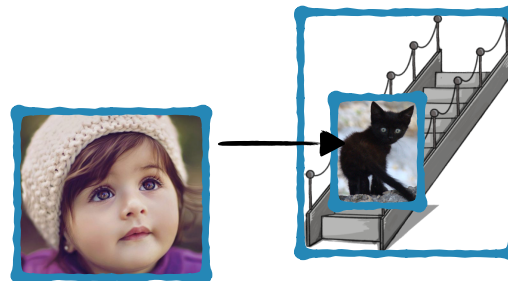
Event participant roles

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Thematic roles

Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals



The little girl *licked* the kitten on the stairs.

Syntactic positions

Subject

Object

Oblique
Object



Intermediate
representations

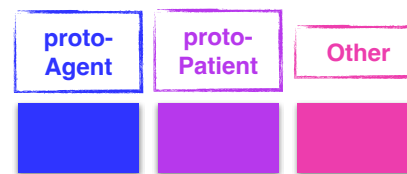
Event participant roles

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Thematic roles

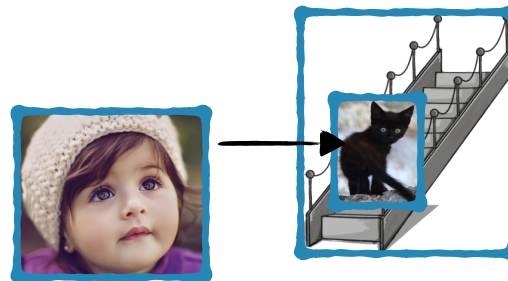
UTAH

Thematic roles map to one of
three **fixed macro-roles**.



Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals



The little girl *blicked* the kitten on the stairs.

Syntactic positions

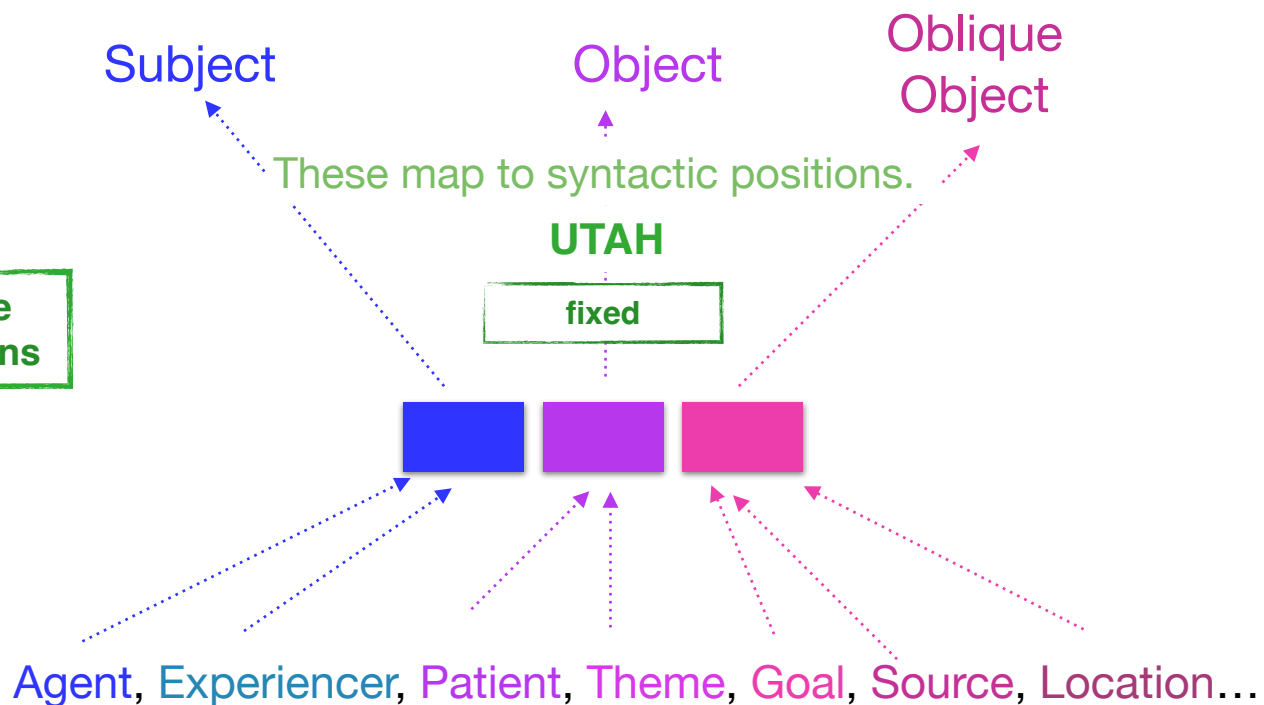


Intermediate
representations

Event participant roles

=

Thematic roles

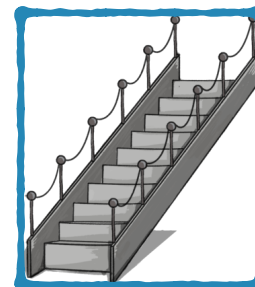
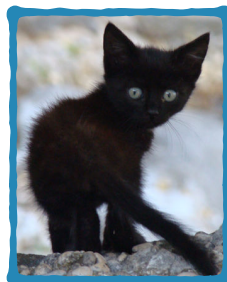


Some linking theory proposals

UTAH in action



The little girl *blicked* the kitten on the stairs.



Some linking theory proposals

UTAH in action

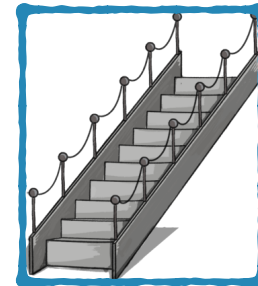
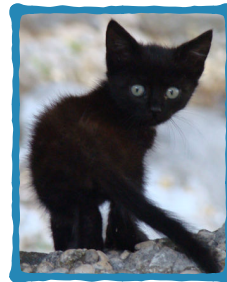


The little girl *blicked* the kitten on the stairs.

Subject

Object

Oblique
Object



Some linking theory proposals

UTAH in action



The little girl *blicked* the kitten on the stairs.

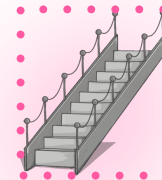
Subject



Object



Oblique
Object



Some linking theory proposals

UTAH in action



The little girl *blicked* the kitten on the stairs.

Subject



Object



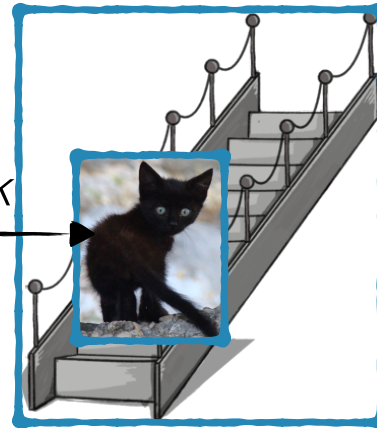
Oblique
Object



Predicted by UTAH



blick



Some linking theory proposals

UTAH in action

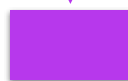


The little girl *licked* the kitten on the stairs.

Subject



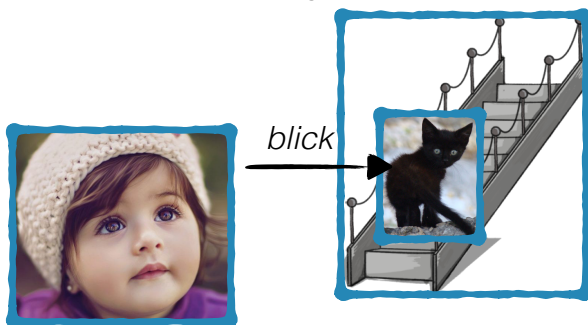
Object



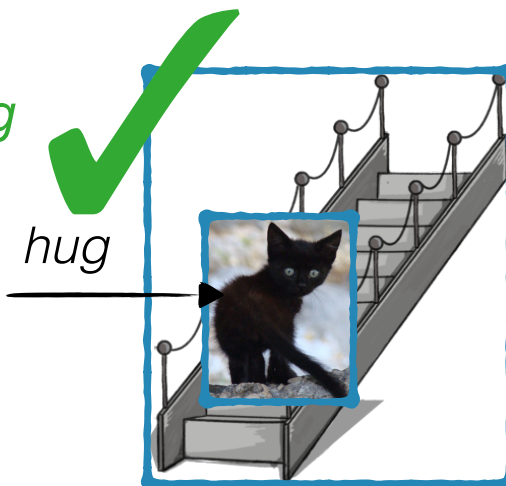
Oblique
Object



Predicted by UTAH



Actual for *hug*



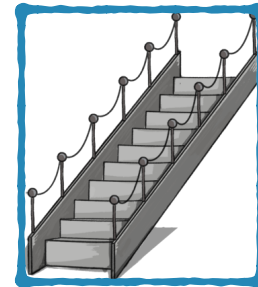
Some linking theory proposals

UTAH in action

...though sometimes there are **exceptions**, like the **English passive**. Children would have to learn these exceptions, which is maybe why the passive takes them awhile to figure out.



The kitten *was blicked* on the stairs.



Some linking theory proposals

UTAH in action

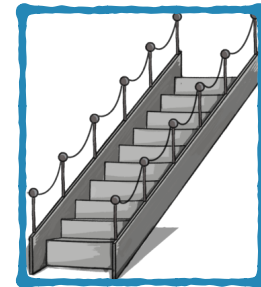
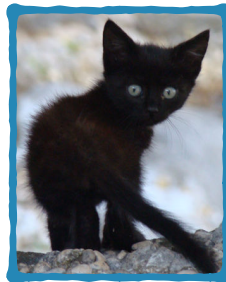
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Oblique
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Some linking theory proposals

UTAH in action

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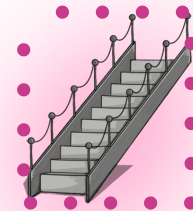


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Oblique
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Some linking theory proposals

UTAH in action

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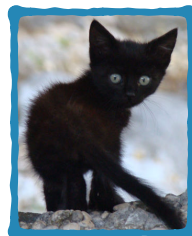
Subject



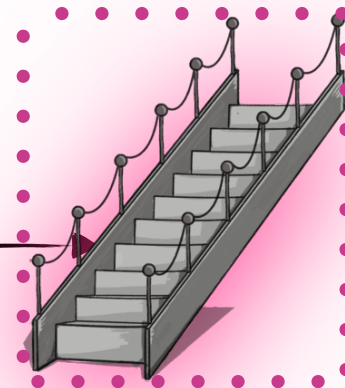
Oblique
Object



Predicted by UTAH



blick



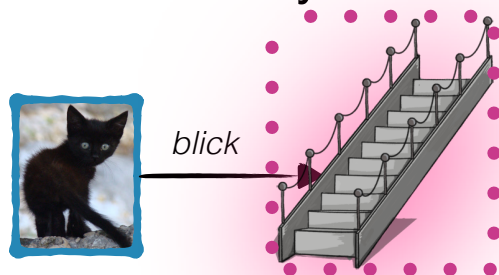
Some linking theory proposals

UTAH in action

...though sometimes there are **exceptions**, like the **English passive**. Children would have to learn these exceptions, which is maybe why the passive takes them awhile to figure out.

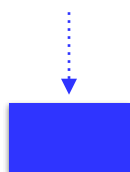


Predicted by UTAH



The kitten *was blicked* on the stairs.

Subject



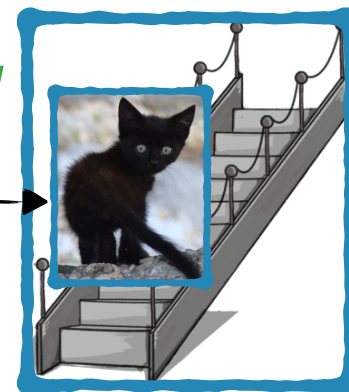
Oblique
Object



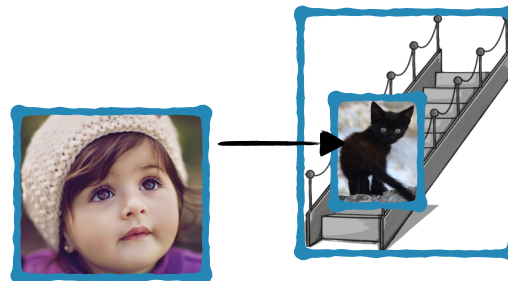
Actual for *hug*



hug



Some linking theory proposals



The little girl *blicked* the kitten on the stairs.

Syntactic positions

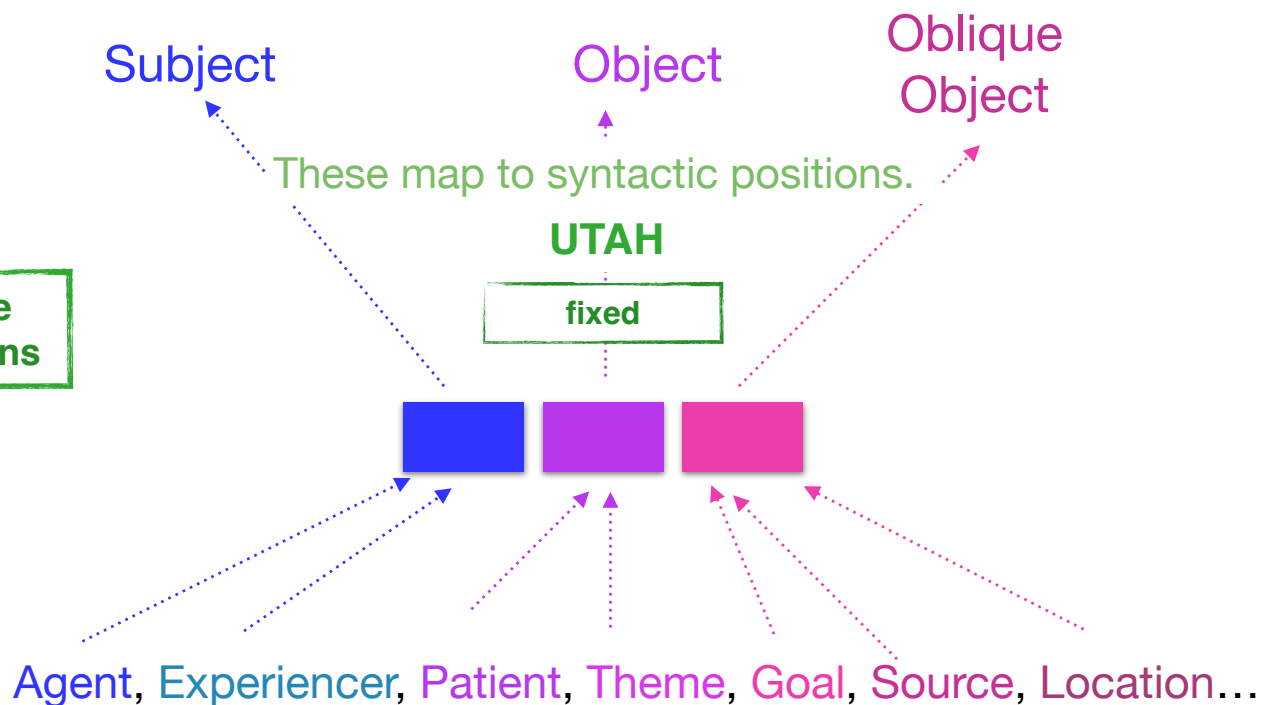


Intermediate
representations

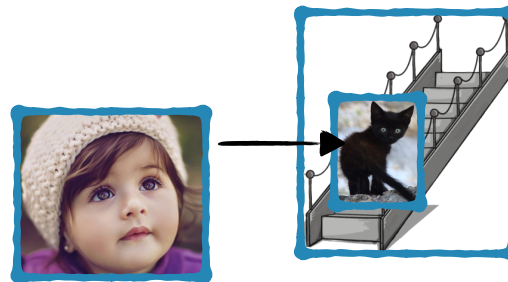
Event participant roles

=

Thematic roles



Some linking theory proposals



The little girl *blinked* the kitten on the stairs.

Syntactic positions



Intermediate
representations

Subject

Object

Oblique
Object

UTAH

fixed

Another proposal

The (relativized) **UTAH**

Larson 1988, Larson 1990

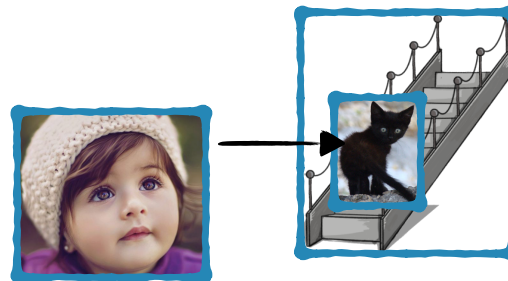
Event participant roles

=

Thematic roles

Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals



The little girl *blinked* the kitten on the stairs.

Syntactic positions



Intermediate
representations

Subject

Object

Oblique
Object

UTAH

fixed

rUTAH

Thematic roles are **ordered**
relative to each other.

Agent > Experiencer >
Theme > Patient >
(Source, Goal, Location)

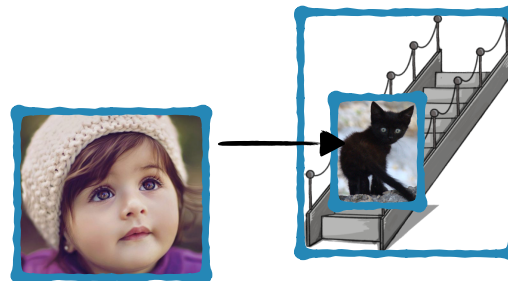
Event participant roles

=

Thematic roles

Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals



The little girl *licked* the kitten on the stairs.

Syntactic positions

Subject

Object

Oblique
Object



Intermediate
representations

UTAH

fixed

rUTAH

relative

Whichever ones are present **map in order**
to the available syntactic positions.

Agent > Experiencer >
Theme > Patient >
(Source, Goal, Location)

Event participant roles

=

Thematic roles

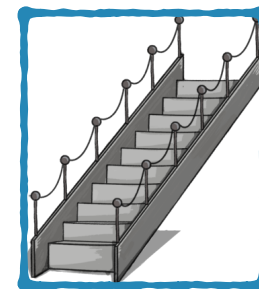
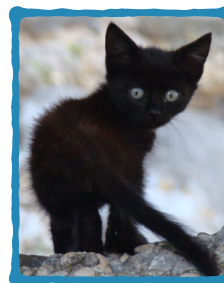
Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals

rUTAH in action



The little girl *blicked* the kitten on the stairs.



Some linking theory proposals

rUTAH in action

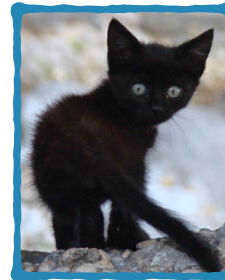


The little girl *blicked* the kitten on the stairs.

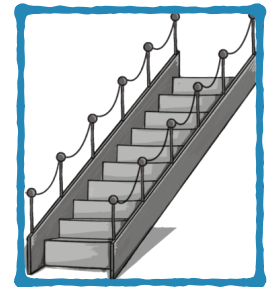
1st



2nd



3rd



Some linking theory proposals

rUTAH in action



The little girl *blicked* the kitten on the stairs.

1st

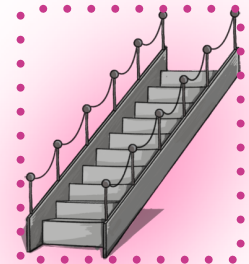
2nd

3rd

Agent > Experiencer >

Theme > Patient >

(Source, Goal, Location)



Some linking theory proposals

rUTAH in action



one prediction by rUTAH

The little girl *blicked* the kitten on the stairs.

1st

2nd

3rd

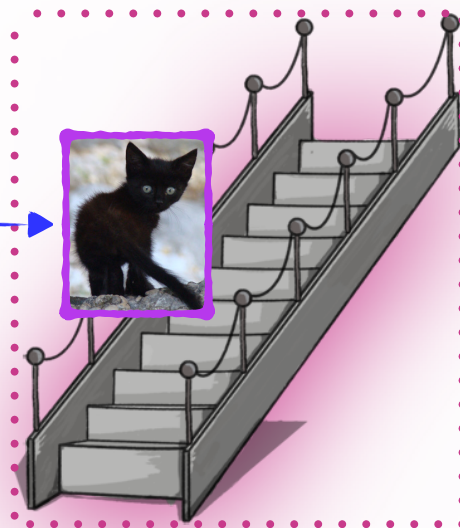
Agent > Experiencer >

Theme > Patient >

(Source, Goal, Location)



blick



Some linking theory proposals

rUTAH in action



The little girl *blicked* the kitten on the stairs.

1st

2nd

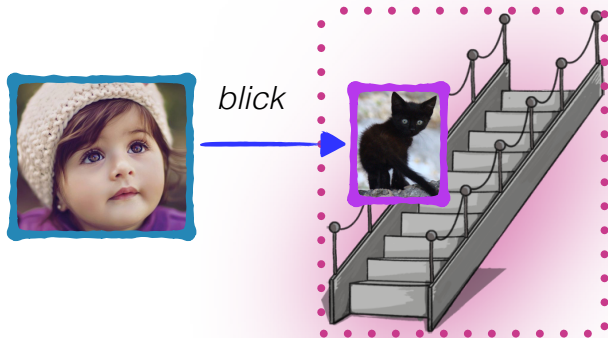
3rd

Agent > Experiencer >

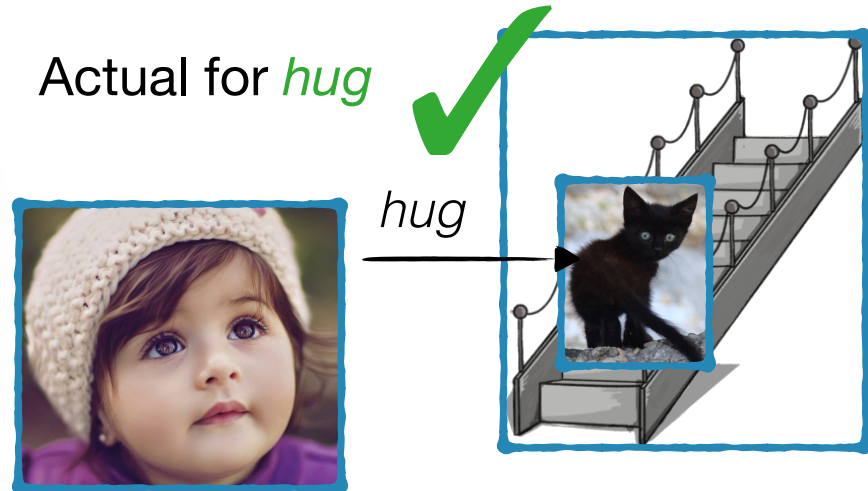
Theme > Patient >

(Source, Goal, Location)

one prediction by rUTAH



Actual for *hug*



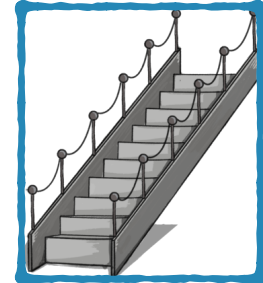
Some linking theory proposals

rUTAH in action

...has fewer exceptions because of its flexibility. For instance, it can handle some forms of the English passive.



The kitten *was blicked* on the stairs.



Some linking theory proposals

rUTAH in action

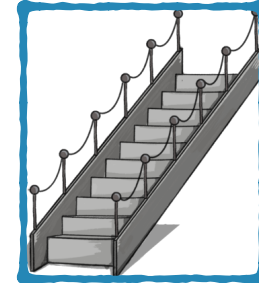
...has fewer exceptions because of its flexibility. For instance, it can handle some forms of the English passive.

The kitten *was blicked* on the stairs.

1st



2nd



Some linking theory proposals

rUTAH in action

...has **fewer exceptions** because of its flexibility. For instance, it can handle some forms of the **English passive**.

The kitten *was blinked* on the stairs.

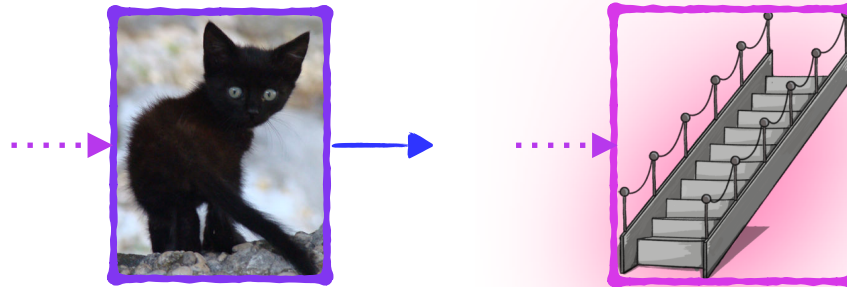
1st

2nd

Agent > Experiencer >

Theme > Patient >

(Source, Goal, Location)



Some linking theory proposals

rUTAH in action

...has fewer exceptions because of its flexibility. For instance, it can handle some forms of the English passive.

The kitten *was blicked* on the stairs.

1st

2nd

Agent > Experiencer >

Theme > Patient >

(Source, Goal, Location)



one prediction by rUTAH

blick



Some linking theory proposals

rUTAH in action

...has fewer exceptions because of its flexibility. For instance, it can handle some forms of the English passive.



The kitten *was blinked* on the stairs.

1st

2nd

Agent > Experiencer >

Theme > Patient >

(Source, Goal, Location)

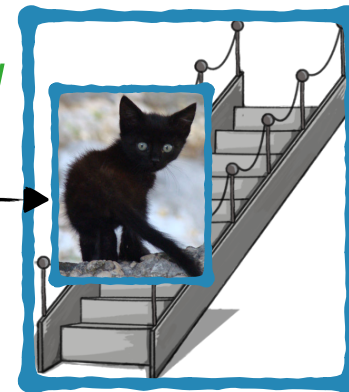
one prediction by rUTAH



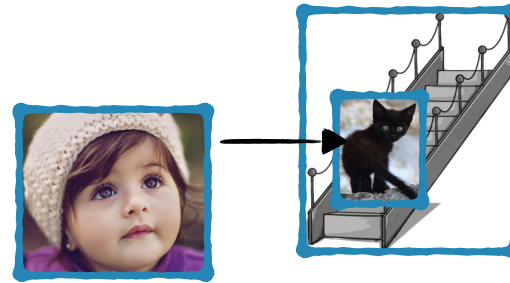
Actual for *hug*



hug



Some linking theory proposals: Recap



The little girl *blicked* the kitten on the stairs.

Syntactic positions



Intermediate
representations

Event participant roles

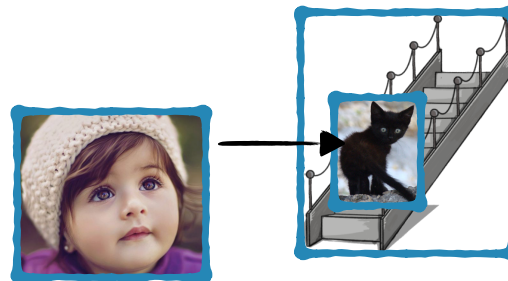
=

Thematic roles

Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals: Recap

UTAH has a mapping to three fixed thematic categories, which then map to syntactic positions.



The little girl *blicked* the kitten on the stairs.

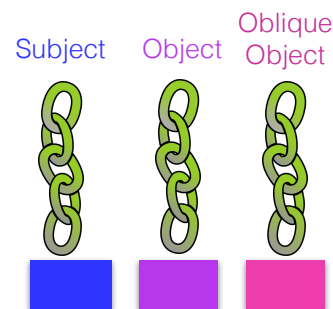
Syntactic positions



Intermediate
representations

UTAH

fixed



Event participant roles

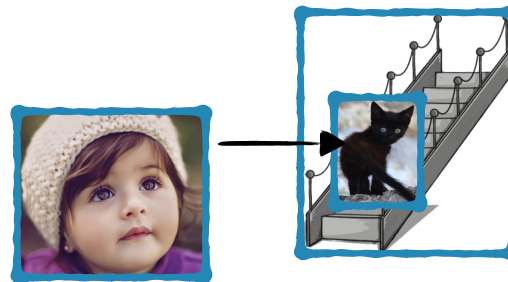
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Thematic roles

Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Some linking theory proposals: Recap

rUTAH has a relative ordering of thematic roles, and maps those **in relative order** to syntactic positions.



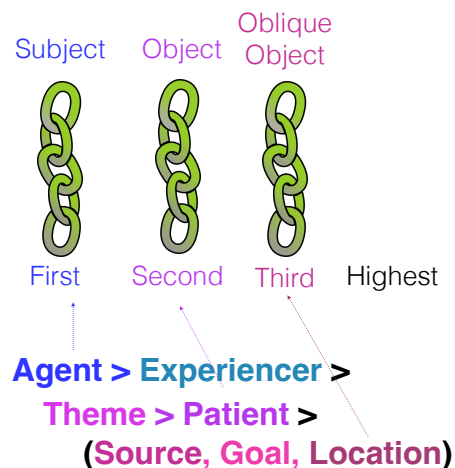
The little girl *blicked* the kitten on the stairs.

Syntactic positions



Intermediate
representations

relative



Event participant roles

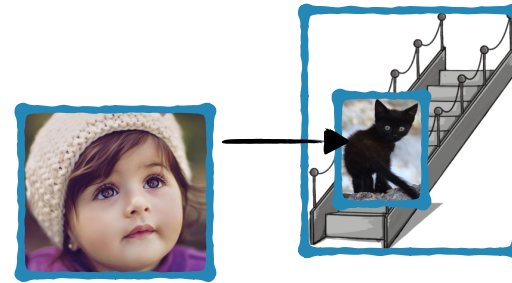
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Thematic roles

Agent, Experiencer, Patient, Theme, Goal, Source, Location...

Linking theory acquisition

Pearl & Sprouse 2021: the relative linking theory of **rUTAH** is easier to learn from English children's input.



The little girl *blicked* the kitten on the stairs.

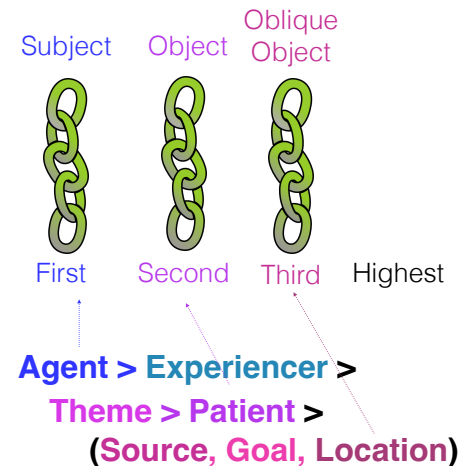
Syntactic positions



Intermediate
representations



relative



Event participant roles

=

Thematic roles

Agent, Experienter, Patient, Theme, Goal, Source, Location...

Recap

Children rely on different strategies that often are helpful for figuring out a sentence's meaning, even before children know the syntactic rules of their language (world knowledge, order of mention).

However, sometimes these strategies don't work (ex: passives).

Children have to learn the syntactic rules for how verbs combine with their arguments (like subjects and objects) in different configurations, like the passive. This takes time, and is affected by the verb's meaning.

More generally, children need to learn how a verb links its argument to the event participants — this is what linking theories do. Current evidence suggests children may find it easier to learn a relative linking theory like rUTAH, compared to one with fixed linking categories, like UTAH.

Questions?



You should be able to do up through question 15 on the review questions for syntactic acquisition, and up through question 8 on HW5.