Sentence Processing II

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May 5, 2020

Homework

(1) No head injury is too trival to ignore

(1) No head injury is too trival to ignore

(2) INTERPRETATION 1: **No** head injury should be ignored no matter how trivial

(3) INTERPRETATION 2: **All** head injuries should be ignored no matter how trivial

(4) No donut is too fattening to eat

(5) INTERPRETATION 1: **No** donut should be eaten no matter how fattening

(6) INTERPRETATION 2: **All** donuts should be eaten no matter how fattening

So "No head injury is too trivial to ignore" actually means "All head injuries should be ignored no matter how trivial".

Lexical semantics + world knowledge $\Rightarrow$ Wrong interpretation.

"Goodenough" theory of language comprehension (Fernanda Ferreira)

We process language in a relatively shallow way, doing just enough processing to extract a contextually-relevant meaning, but no more.

An example of complex language

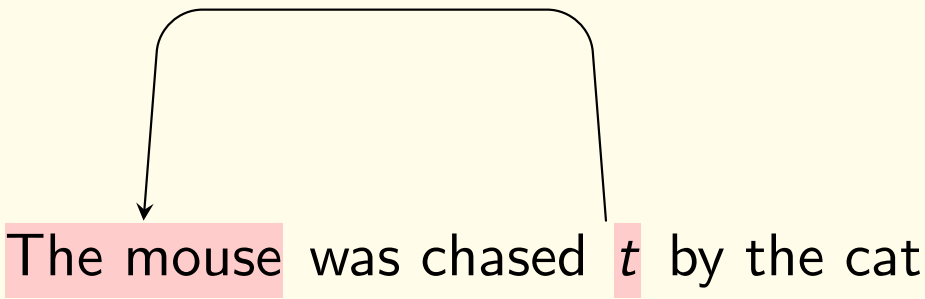
(7) The cat chased the mouse

(8) The mouse was chased by the cat

Which is more complex and why?

An example of complex language

(9)



An example of complex language

Difficulty with passives

1. Semantically non-canonical word order: the patient comes before the agent
2. They are derived via syntactic movement (movement of NP **the mouse** from after the verb **chased**)

Canonicity

'Canonical' = 'typical' / 'standard'

We can refer to **syntactic** and **semantic** canonicity.

In **syntactically canonical** sentences, the subject comes before the object.

(10) The teenager $_{\text{SUBJ}}$ likes parties $_{\text{OBJ}}$

Canonicity

In **semantically canonical** sentences, there is an **alignment** between the Subject and the Agent argument (and Object and Patient)

(11) The man $_{AG}$ ate the donut $_{PAT}$

(12) The dog $_{AG}$ chased the cat $_{PAT}$

Canonicity

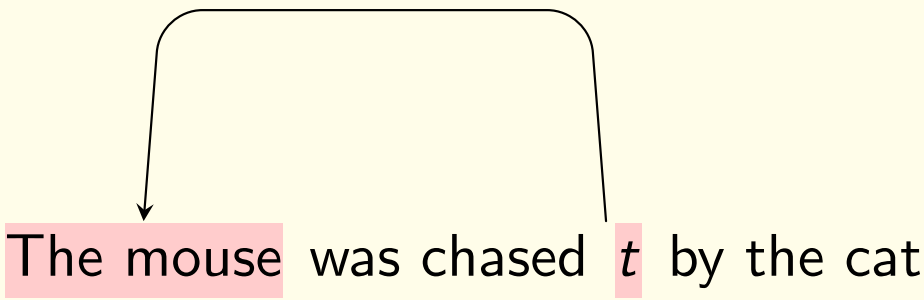
In some cases the subject may not be an Agent, but it will definitely have more agency than the object

(13) The boy $_{AG}$/$_{EXP}$ smelt the rose $_{TH}$

So Subject maps to the most agentive argument, while Object maps onto the least agentive argument.

Canonicity

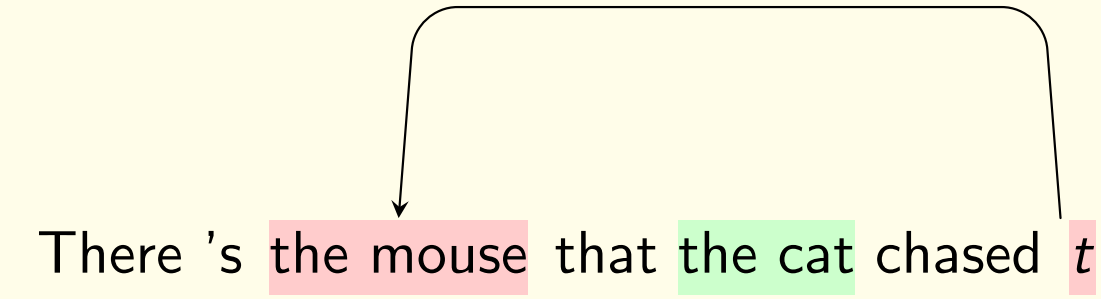
Examples of non-canonical sentences

(14) 

Syntactically canonical - subject comes before verb

Semantically non-canonical - subject maps to least agentive argument

Canonicity

(15) 

Syntactically non-canonical - Object comes before Subject

Semantically canonical - Subject maps to Agent argument

Canonicity

For three place predicates, which is the canonical word order?

1. John gave her $_{Oi}$ a book $_{Od}$ (DITRANSITIVE)
2. John gave a book $_{Od}$ to her $_{Oi}$ (PREPOSITIONAL DATIVE)

Canonicity

For three place predicates, which is the canonical word order?

1. John gave her $_{Oi}$ a book $_{Od}$ (DITRANSITIVE)
2. John gave a book $_{Od}$ to her $_{Oi}$ (PREPOSITIONAL DATIVE)
3. John read a book $_{Od}$ [in the park]
4. John wore a blue blazer $_{Od}$ [for the party]

Prepositional dative assumed to be canonical as its basic structure (V + Od + Prepositional Phrase) is far more frequent

Canonicity

1. English is SVO (40%)
2. Japanese is SOV (35%)
3. Classical Arabic is VSO (15%)
4. Fijian is VOS (10%)
5. Xavante is OSV (<1%)
6. Hixkarayana is OVS (<1%)

Strong tendency for S > O (75% of world's languages) and weaker tendency for V > O (65%)

Canonicity

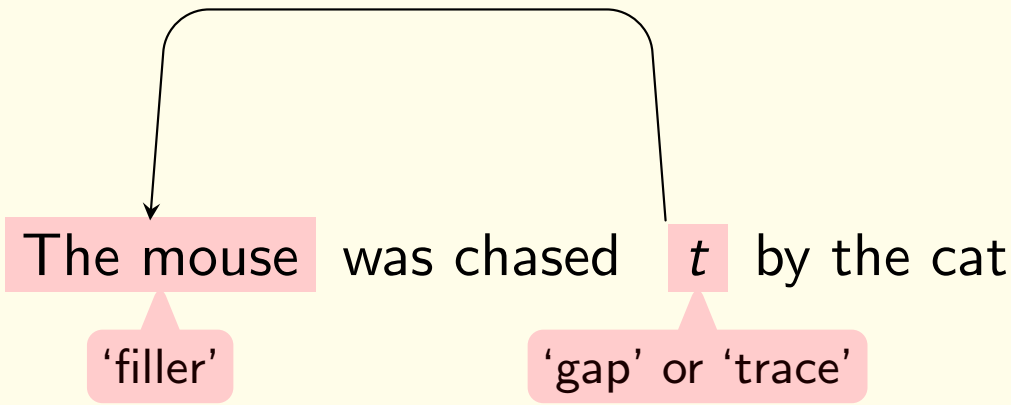
Some languages allow words to come in almost any order, e.g. Latin & Finnish.

However, even these have a preferred word order, e.g. it has been argued that the basic Latin word order is OSV.

Canonicity

Syntactically non-canonical sentences are assumed by many linguists to result from a movement process:

(16)



Canonicity

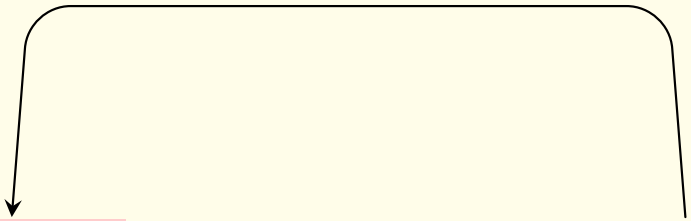
Are the following sentences syntactically canonical? For non-canonical sentences specify the filler and the gap?

1. It was **the boy** that **the girl** pushed
2. **The boy** apparently pushed **the girl** into the puddle
3. **The boy** that **the girl** pushed was upset
4. **The boy** was pushed by **the girl**
5. **The boy** that pushed **the girl** was naughty
6. It was **the boy** that pushed **the girl**

Canonicity

(1) It was **the boy** that the girl pushed *t*

(2) **The boy** apparently pushed **the girl** into the puddle



(3) **The boy** that **the girl** pushed *t* was upset

Canonicity

(4) The boy was pushed *t* by the girl

(5) **The boy** that pushed **the girl** was naughty

(6) It was **the boy** that pushed **the girl**

Canonicity

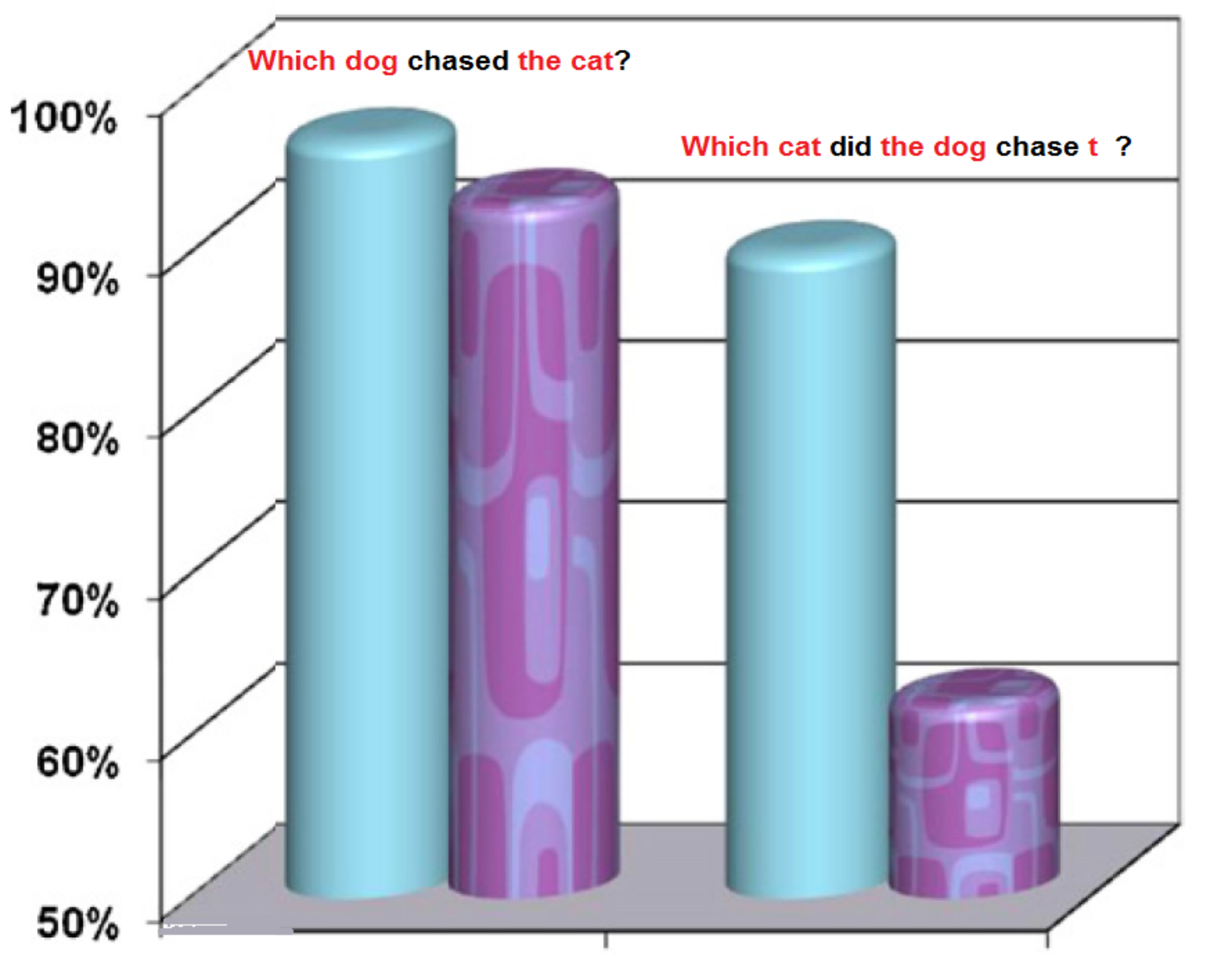
Difficulty affected by movement.

Difficulty is greater when movement is longer.

Effect of difficulty is even greater in language-impaired individuals.

Canonicity

Friedmann & Novogrodsky, 2010



Position of embedding

(17) **The boy** [_ that pushed **the girl**] was naughty

(18) **The boy** pushed **the girl** [_ that was naughty]

Position of embedding

Multiple centre-embedding is a nightmare!

(19) **The girl** [that **the boy** [that **the teacher** scolded _] pushed _] _ hurt her knee

(20) There's **the boy** [that the teacher scolded _] [_ that pushed **the girl**] [that _ fell and hurt her knee].

Position of embedding

How can a sentence be grammatically well-formed but almost impossible to understand?

Miller & Chomsky (1963) - separation between grammatical mechanisms and processing mechanisms.

Representational complexity

LEMMA

Transitive Vb

Laugh + **at** + PERSON / THING

Laugh + **about** + THING

Opposite of ”cry”

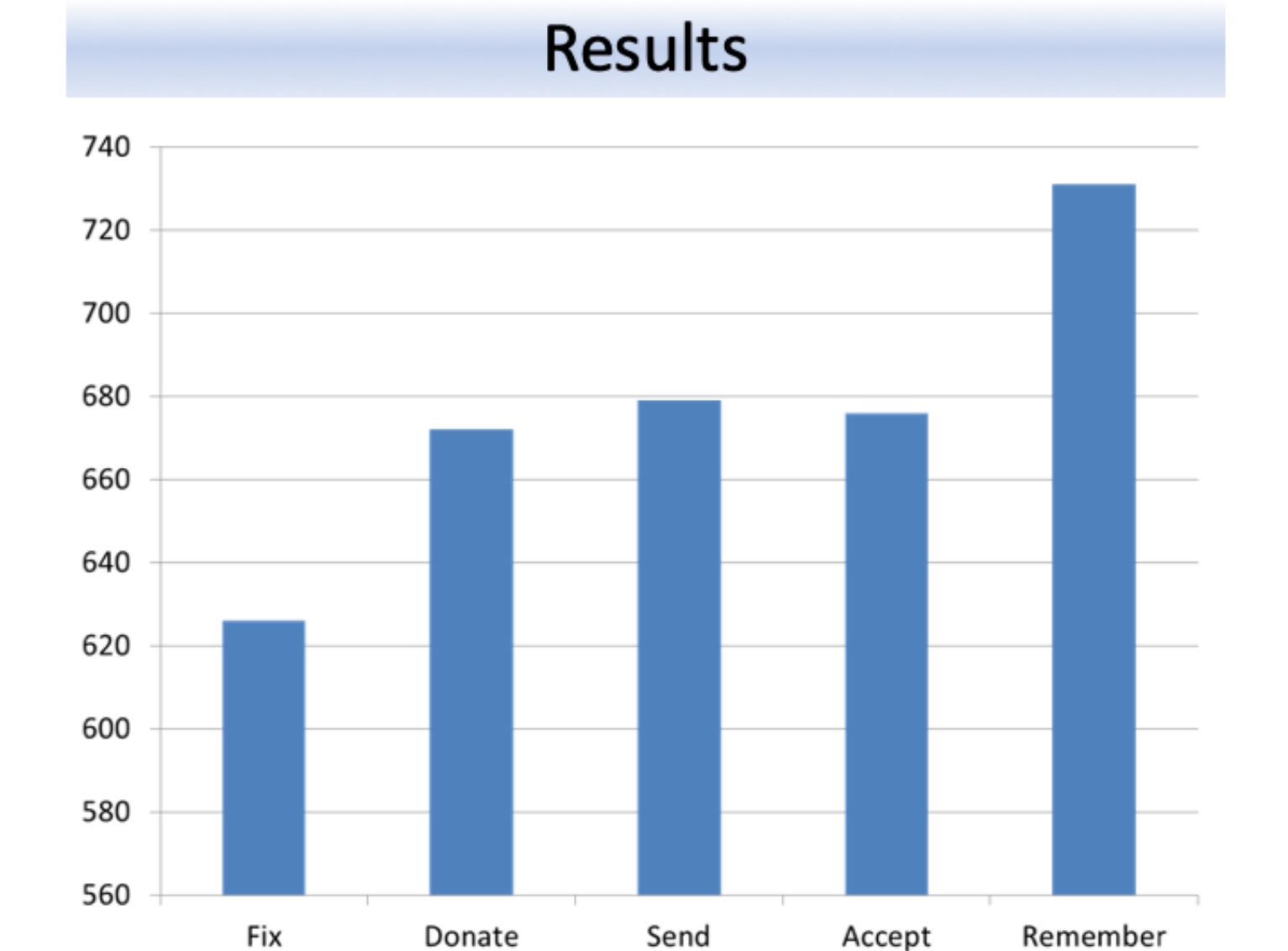
LEXEME /la:f/ `laugh`

Representational complexity

1. Mary fixed **the bike**
2. Ali donated **a book to the library**
3. Ali donated **a book**
4. Angie gave **Peter a book**
5. Angie gave **a book to Peter**
6. Angie gave **a book**
7. Janet said **her prayers**
8. Janet said **that she was sorry**
9. Erica asked **a question**
10. Erica asked **about the interview**
11. Erica asked **Mary a question**
12. Erica asked **whether Mary was tired**
13. Erica asked **Mary to be quiet**

Representational complexity

Shapiro et al. (1987) used a lexical decision task to test processing difficulty after the verb.



Representational complexity

1. Ali remembered **the milk**
2. Ali remembered **that she had to buy the milk**
3. Ali remembered **to buy the milk**
4. Ali remembered **how to make ice milk lollies**
5. Ali remembered **his mother making him ice milk lollies**
6. Ali remembered **when his mother used to make him ice milk lollies**

Representational complexity

Effect of number of arguments, or subcategorisation complexity?

Animacy

Because animate entities (people, animals) have volition, they make good agents.

Agents typically occur in subject position.

(21) **The boy** ate the sausage

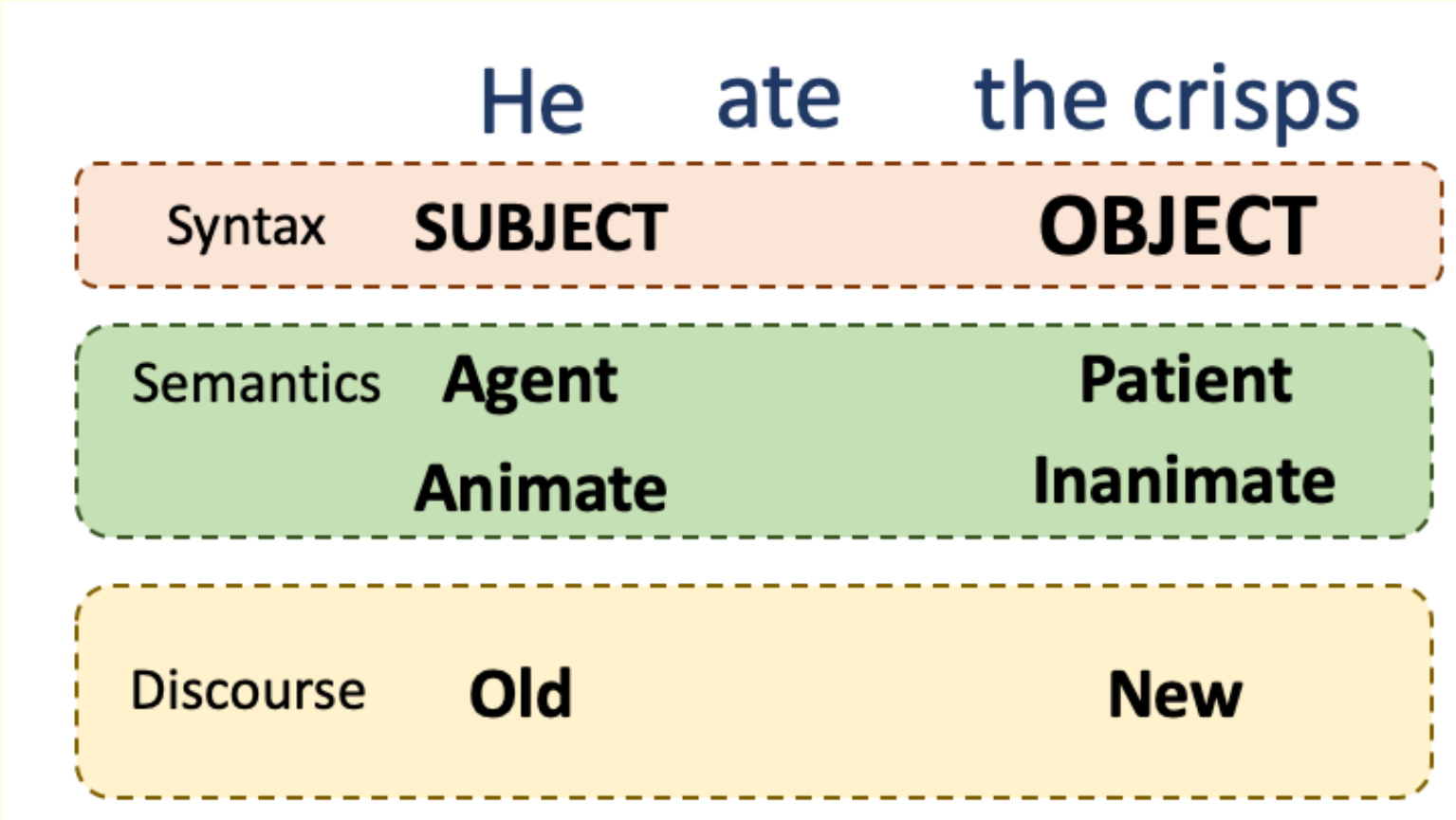
Animacy

Because inanimate entities (e.g. objects) do not have volition, they do not make good agents.

Non-agents typically occur in object position.

(22) The boy ate **the sausage**

Animacy



Animacy

Because of these correspondences, animacy cues can help children determine who did what to whom, e.g.

Which are easiest?

1. **The boy** that **the rock** squashed _ was large
2. **The car** that **the man** drove _ was fast
3. **The cow** that **the pig** chased _ was spotted

Discourse I - properties of NPs

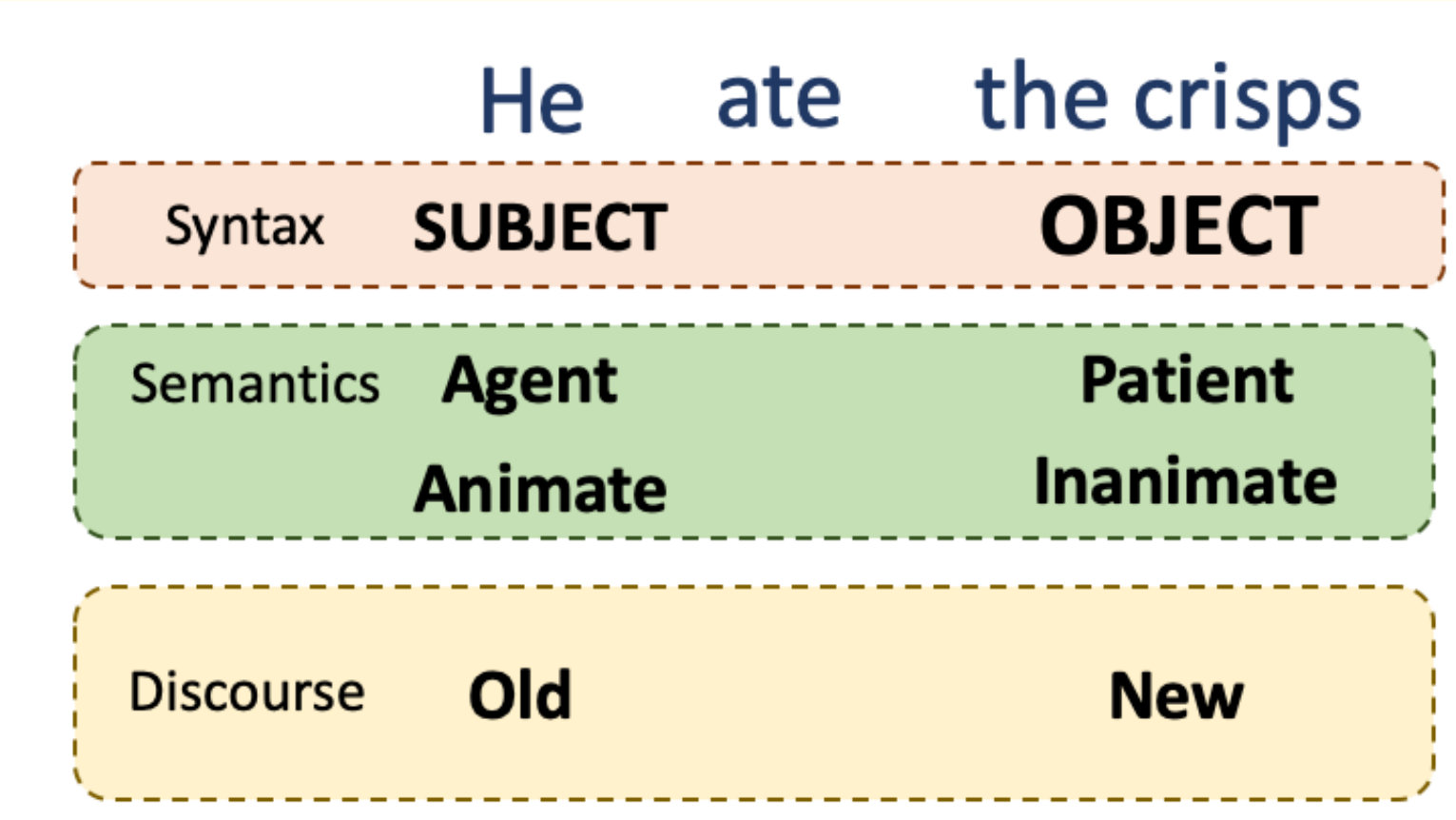
Different argument slots also have particular discourse properties. The subject position often contains discourse-old information, e.g.

(23) I like John. **He**'s a nice guy.

Discourse I - properties of NPs

(24) Have you heard about John? He won the **lottery**

Discourse I - properties of NPs



Discourse I - properties of NPs

Complex structures are a lot easier to process when subjects have typical discourse properties (i.e. they are pronominal)

(25) There's **the dog** **he** chased _

Subject is pronominal = EASY

(26) There's **the dog** **the boy** chased _

Subject is a full Noun Phrase = DIFFICULT

Discourse I - properties of NPs

(27) **Which dog** was **he** chasing _ ?

Subject is pronominal = EASY

(28) **Which dog** was **the boy** chasing _ ?

Subject is a full Noun Phrase = DIFFICULT

Putting animacy and discourse together

We can manipulate difficulty be combining animacy and discourse cues

(29) There's **the hammer** **he** dropped _

Supportive animacy and discourse cues

(30) There's **the boy** that the girl chased _

Unsupportive animacy and discourse cues

Putting animacy and discourse together

Animacy and discourse can actually "trump" syntactic complexity, e.g.

(31) There's **the hammer** **he** dropped _

Noncanonical structure, but supportive animacy/discourse cues

(32) There's **the girl** that _ chased **the boy**

Canonical structure, but unsupportive animacy/discourse cues

Kidd et al. (2007) found that kids were actually better at repeating (31) than (32)

Discourse II - structure of preceding utterances

Syntactic priming

- REPEAT "The car was hit by the lorry"
- Now describe the picture below

- REPEAT "The woman gave the flowers to the boy"
- Now describe the picture below

Discourse II - structure of preceding utterances

Syntactic priming

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Discourse II - structure of preceding utterances

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Discourse II - structure of preceding utterances

We have a natural tendency to recycle the structure of preceding utterances. This is demonstrated by structural priming studies.

1. The participant hears a structure
2. The participant describes a picture which can either be produced with the preceding structure or a different structure

Participants use preceding structures at above-chance level.

Discourse II - structure of preceding utterances

Syntactic priming is a much studied phenomenon.

Consequence of an implicit structural learning mechanism (Peter et al. 2015).

Structural priming is widely employed in intervention (Leonard, 2011).

However, language-impaired children may be less susceptible to structural priming (Kidd, 2012)

You can manipulate the complexity of sentences via the following:

1. Length of movement
2. Position of embedding (centre or final)
3. Representational properties of verbs
4. Animacy
5. Discourse properties of arguments (Noun or Pronoun)
6. Properties of preceding sentences (structural priming)

We can therefore create difficutly gradients. But how do we use these in clinics?

Complete the following sentences

1. It's a game of two _ _ _ _ _ _ _ _ _ _
2. Her presentation was all over _ _ _ _ _ _ _ _ _
3. What's a nice girl like you _ _ _ _ _ _ _ _ _
4. Who'd a _ _ _ _ _ _ _ _ _ ?

How many possibilities were there? What kind of factors influenced your completions?

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Kidd, E., Brandt, S., Lieven, E., & Tomasello, M. (2007). Object relatives made easy: A cross-linguistic comparison of the constraints influencing young children's processing of relative clauses. Language and Cognitive Processes, 22(6), 860–897.

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