Psycholinguistics

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basic vocab

- NP = noun phrase ("the rabbit")
- VP = verb phrase ("read the book")
- relative pronoun / relativizer ("which", "that", "who")
- complementizer (Peter said **that** he is tired.)
- reduced relative clause (The article written yesterday was difficult.)
- active / passive (Peter robbed / Peter was robbed)

Psycholinguistics

Linguistics-related areas:

- phonetics / phonology

Explanation

How does the brain process and understand speech sounds?
segmenting the speech stream; learning meaningful units / categories;
dealing with noisy input

Psycholinguistics

Linguistics-related areas:

- phonetics / phonology
- morphology

Explanation

Formation of words; relatedness of words
examples: *government; usability; bank*

Psycholinguistics

Linguistics-related areas:

- phonetics / phonology
- morphology
- syntax

Explanation

How are words combined to make sentences?
what makes a syntactic structure more difficult to process than another one?

Psycholinguistics

Linguistics-related areas:

- phonetics / phonology
- morphology
- syntax
- semantics

Explanation

Semantics = Meaning of a word
Ambiguity in meaning; predictability of a word; compositionality of concepts

Psycholinguistics

Linguistics-related areas:

- phonetics / phonology
- morphology
- syntax
- semantics
- pragmatics

Explanation

role of context in the interpretation of meaning
example: *The door is open.*

Syntactic structure

- Phrase Structure
- Dependency Structure

- The fox ate the rabbit.

- The rabbit was eaten by the fox.

- The fox that liked rabbits went on a diet.

Examples of difficult sentences

Which one is more difficult?

a) The reporter who attacked the senator disliked the editor.

b) The reporter who the senator attacked disliked the editor.

Examples of difficult sentences

Which one is more difficult?

a) The reporter who attacked the senator who hates my dog disliked the editor.
b) The reporter who the senator who my dog hates attacked disliked the editor.

Examples of difficult sentences

Which one is more difficult?

a) The reporter who attacked the senator disliked the editor.

b) The reporter who the senator attacked disliked the editor.

Observations:

→ a) seems easier.

→ a) is a subject relative clause while b) is an object relative clause

→ a) and b) differ in syntactic structures, in particular dependencies.

Examples of difficult sentences

Which one is more difficult?

a) The reporter who attacked the senator disliked the editor.
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Which one is more difficult?

a) The reporter who everyone that I met trusts disliked the editor.
b) The reporter who the senator who John met attacked disliked the editor.

Examples of difficult sentences

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Which one is more difficult?

a) The reporter who everyone that I met trusts disliked the editor.
b) The reporter who the senator who John met attacked disliked the editor.

Observations:

→ a) is easier.
→ the difference lies only in the type of NPs.

DLT – Integration Cost

Key idea: predicts difficulty based on

- difficulty of integrating two words when they are far from one another
- entities that occurred between the words may lead to interference effects

Dependencies for Subject / Object relative clauses

SRC

The reporter who *t* attacked the senator admitted the error.
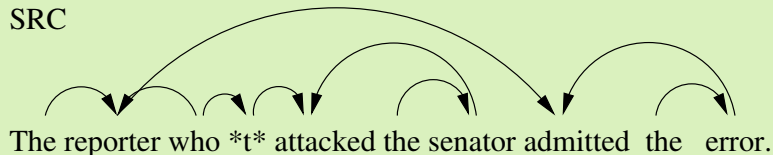
[Gibson 1998, 2000]

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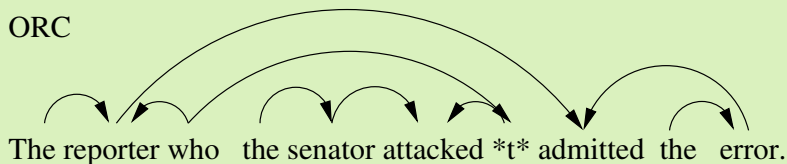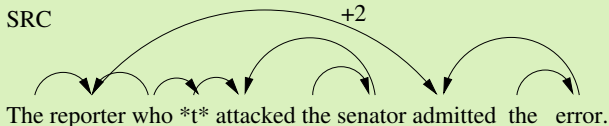
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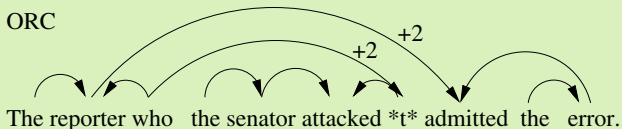Dependencies for Subject / Object relative clauses

SRC

+2

The reporter who *t* attacked the senator admitted the error.

	The	reporter	who	*t*	attacked	the	senator	admitted	the	error.
DR:	0	1		0	1	0	1	1	0	1
IC:	0	1		0	1	0	1	3	0	1

ORC

+2

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The reporter who the senator attacked *t* admitted the error.

	The	reporter	who	the	senator	attacked	*t*	admitted	the	error.
DR:	0	1		0	0	1	1		1	0	1

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Center embedding

Center embedding

a) The rat that the cat that the dog chased bit ate the cheese.
b) The dog chased the cat that bit the rat that ate the cheese.

Center embedding

Center embedding

a) The rat that the cat that the dog chased bit ate the cheese.
b) The dog chased the cat that bit the rat that ate the cheese.

Observations:

- a) is much more difficult to understand than b).
- a) requires holding too many incomplete substructures in memory.

left   center   right

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Ambiguity

Examples for ambiguous sentences

- Peter made her duck.
- Fruit flies like a banana.
- The girl in the car that needed water is waiting.
- Somewhere in Britain, some woman has a child every thirty seconds.

Types of ambiguity

- lexical ambiguity
- syntactic ambiguity
- scope ambiguity

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Garden path sentences

- The old man the boat.

Garden path sentences

- The old man the boat.

- The horse raced past the barn fell.

Garden path sentences

- The old man the boat.

- The horse raced past the barn fell.

- While Mary bathed the baby who was cute and smiley played on the floor.

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Surprisal [Hale 2001, 2003; Levy 2008]

- Information-theoretic measure: How informative is a word?
- Hypothesis: processing difficulty proportional to the amount of information conveyed by a word.
- $Surprisal(w_{k+1}) = \log P(w_{k+1}|w_k, w_{k1}, ..., w_1)$

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- **Example 1:** *Peter hit the nail on the head.*
  If a word is very predictable, the probability before and after processing it are very similar $\rightarrow$ unsurprising, easy to process.

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- **Example 1:** *Peter hit the nail on the* *head*.
  If a word is very predictable, the probability before and after processing it are very similar $\rightarrow$ unsurprising, easy to process.

- **Example 2:** *The boy kicked the ball* *kicked* *the ball.*
  Sentence's probability much higher before the second *kicked* than after
  $\rightarrow$ second *kicked* is surprising, and difficult.