Linguistic Creativity

- Sentences never heard before...
  - “Some purple gnats are starting to tango on the microwave.”
- Sentences of prodigious length...
  - “Bill said that he thought that the esteemed leader of the house had it in mind to tell the unfortunate vice president that the calls that he made from the office in the White House that he thought was private ...”

Outline

- Linguistic Creativity: *Discrete infinity*
- Sentence Structure
- Cross-language variation
- Children’s knowledge of grammar
- Neo-Whorfianism: expressive power of syntax

Creativity

- Ability to combine signs with simple meanings to create utterances with complex meanings
- Novel expressions
- *Infinitely many*

Syntax

Introductory article

Calin Phillips, University of Maryland, College Park, Maryland, USA

**Contents**

- Basic of syntactic theory
  - Paradigmatic and syntactic theory
  - Constraints on independence
- Cross-language similarities and differences
- Variety of syntactic theory
- Challenges of future projects

**Goals of Syntactic Theory**

Syntax theory aims to provide an account of how people combine words to form sentences. A common feature of all human language is that sentences differ and a finite set of morphemes are ordered in a unique way to form a sentence. This unique ordering allows us to create a potentially infinite set of sentences. This property of three-dimensional syntax allows speakers to express and understand complex meanings that have never been uttered before. In other words, the creativity of possible word combinations is often referred to as the “principle of attraction.”

An account model of a speaker’s knowledge of his or her language should account for the ability to generate all and only the possible sentences of the language. In other words, it should account for the ability to generate a finite number of sentences in an infinite number of ways or simplify a potentially infinite set of sentences in a finite number of ways. The property of three-dimensional syntax allows speakers to express and understand complex meanings that have never been uttered before. In other words, the creativity of possible word combinations is often referred to as the “principle of attraction.”

An Account that Won’t Work

- “You just string words together in an order that makes sense” in other words...

Syntax is determined by *Meaning*
Syntax is More than Meaning (I)

• Nonsense sentences with clear syntax

1a. Colorless green ideas sleep furiously. (Chomsky)
1b. A verb crumpled the milk.
1c. I gave the question a scuba-diving egg.

2a. *Furiously sleep ideas green colorless.
2b. *Milk the crumpled verb a.
2c. *The question I an egg scuba-diving gave.

Syntax is More than Meaning (I)

• Nonsense sentences with clear syntax

‘Twas brillig and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogroves,
And the mome raths outgrabe
Beware the Jabberwock, my son!
The jaws that bite, the claws that catch!
Beware the Jujub bird, and shun
The frumious Bandersnatch!”

Lewis Carroll, Jabberwocky

Syntax is More than Meaning (I)

• Nonsense sentences with clear syntax

‘Toves slithy the and brillig ‘twas
wabe the in gimble and gyre did...
Syntax is More than Meaning (III)

• Cross-language Variation
  If syntax was entirely determined by meaning, then we should not expect to find syntactic differences between languages of the world.

  6a. English: John sees that book.
               Chun that book see

  7a. English: John speaks with Bob.
               Chun Bob with speak

Syntax is More than Meaning (III)

• Cross-language Variation
  If syntax was entirely determined by meaning, then we should not expect to find syntactic differences between languages of the world.

  8a. English: Bob put the money in the cupboard.
  8b. Selayerese: Lataroi doe injo ri lamari injo i Baso.
                 put money the in cupboard the Baso

Objectives

• Build a grammar that generates all possible sentences of English
  
  Generative Grammar
• Explain cross-language universals and cross-language variation
• Explain how children successfully attain adult grammatical knowledge

A Template

• A sentence consists of a Noun Phrase followed by a Verb Phrase
• S → NP VP

A Template

• A sentence consists of a Noun Phrase followed by a Verb Phrase
• S → NP VP
A Template

- Noun Phrase
  Fred
  the cat
  seven Peruvian llamas
  Samantha
  a feeling
  the strangest story that you ever did hear

- Verb Phrase
  slept
  fed the dog
  tiptoed through the tulips
  left
  said that he thought that the weather was turning out better than expected
  kicked the bucket

36 combinations

A Tiny Grammar

- 5 Rules
- 9 Words

S --> NP VP
NP --> Det N
NP --> N
VP --> V NP
VP --> V

Det: the, four, some
N: dogs, cats, slugs
V: understood, ate, approached

How Many Sentences?

A Tiny Grammar

- 5 Rules
- 9 Words

S --> NP VP
NP --> Det N
NP --> N
VP --> V NP
VP --> V

Det: the, four, some
N: dogs, cats, slugs
V: understood, ate, approached

468

A Tiny Grammar

- 5 Rules
- 30 Words

S --> NP VP
NP --> Det N
NP --> N
VP --> V NP
VP --> V

Det: 10
N: 10
V: 10

122,100

Explaining Grammaticality

- English Sentences require a subject
  8a. Wallace ate the cheese.
  8b. *Ate the cheese.
  9a. Ken hates Bill.
  9b. *Hates Bill.

- English Sentences do not require an object
  10a. Wallace slept.
  10b. Miranda sang.
  10c. The visitors left.
Embedded Sentences

- Additional VP Rule
  11a. Wallace thinks Gromit ate the cheese.
  11b. \( VP \rightarrow V \ S \) Sentence-inside-a-sentence Recursion
  11c. Wendolene said Wallace thinks Gromit ate the cheese.
  11d. Preston hoped Wendolene said Wallace thinks Gromit ate the cheese.
  11e. Feathers claimed Preston hoped Wendolene said Wallace thinks Gromit ate the cheese.

Infinitely many sentences can be generated!

Complementizer

- Wendolene realized that Wallace fed Gromit
- \( S' \rightarrow \text{Comp} \ S \)

Justifying Structure - Coordination

- Noun Phrase coordination
  1. The man chased [the dog] and [the cat]
  2. [The man] and [the cat] chased the dog.
- Verb Phrase coordination
  3. The man [chased the dog] and [fed the cat]
- Impossible coordination of [N V]
  4. *The [man chased] and [cat caught] the dog.

Grammar So Far...

- 5 Rules
- Sentences

<table>
<thead>
<tr>
<th>Rule</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S \rightarrow NP \ VP )</td>
<td>The dog chased the cat.</td>
</tr>
<tr>
<td>( NP \rightarrow \text{Det} \ N )</td>
<td>Wallace fed Gromit.</td>
</tr>
<tr>
<td>( NP \rightarrow N )</td>
<td>etc.</td>
</tr>
<tr>
<td>( VP \rightarrow V \ NP )</td>
<td></td>
</tr>
<tr>
<td>( VP \rightarrow V )</td>
<td></td>
</tr>
</tbody>
</table>

Ambiguous Sentences

a. The spy saw the cop with the binoculars.
Ambiguous Sentences

a. The spy saw the cop with the binoculars.
b. The lifeguard rescued the swimmer with a rope.
c. John said Bill left yesterday.
d. Wallace decided to visit Gromit in the bathtub.

Optional & Obligatory Phrases

• Obligatory phrases
  b. *Sue hit.
  c. *Bob mentioned.
  d. *Eliza put the book.
  e. *Fred devoured.
  f. Wallace fed Gromit.
  g. Sue hit the wall.
  h. Bob mentioned his favorite TV show.
  i. Eliza put the book on the table.
  j. Fred devoured the pizza.

Optional Phrases

a. Ella sang a song in the bathtub
b. Boris slept all morning
c. The train arrived at three o’clock

New VP-Rules

• “ditransitive verbs”
  a. VP → V NP NP
  b. VP → V NP PP
  c. *Wallace bought Wendolene a ring.
  d. *Wallace donated the museum a rocket.
  e. *Marilyn mentioned Jack a secret.
Arguments & Modifiers

9. Subjects
   a. *Fed Gromit
   b. *Slept

10. Objects
   a. *Wallace fed (Gromit)
   b. *Wallace gave Gromit (cheese)

Arguments & Modifiers

11. a. The cat sat
    b. The cat sat on the mat

12. a. VP → VP PP
    can apply to itself
    b. The cat sat on the mat in the morning
    c. The cat sat on the mat in the morning on Thursday

Arguments & Modifiers

13. a. NP → NP PP
    can apply to itself
    The dog in the kitchen.
    The man with a beard.

Arguments & Modifiers

The cat sat on the mat in the morning on Thursday
The dog in the park chased the cat

Ambiguity

The cat chased the dog in the park
Wendolene realized that Wallace likes Cheddar in the bathtub

Different VP Rules

Argument: VP → V NP PP
Modifier: VP → VP PP

Verb specific vs. verb independent
Non-recursive vs. recursive
Inside vs. outside minimal VP constituent
Distinguishing Arguments & Modifiers

I. Obligatory phrases are arguments

Wallace fed Gromit in the morning.
Sue put the book on the table after lunch.

II. Implied by ‘core’ meaning of verb

feed
eat
send
think
give

Distinguishing Arguments & Modifiers

III. a. Sue cooked lunch and Joe did so (too).
    
    did so = ‘cooked lunch’

b. *Sue cooked lunch and Joe did so dinner.
    
    *did so = ‘cooked’

c. Sue put a book on the shelf and Joe did so (too).
    
    did so = ‘put a book on the shelf’

d. *Sue put a book on the shelf, and Joe did so on the table.
    
    *did so = ‘put a book’

e. Sue read a book in the morning, and Joe did so in the evening.
    
    did so = ‘read a book’

f. *Sue read a book in the morning, and Joe did so a magazine in the evening.
    
    *did so = ‘read’

• Generalization: do so is used to replace a Verb Phrase

Modifiers: Outside minimal VP constituent

Arguments: Inside minimal VP constituent
Next slides from Lisa’s class on 4/11/07

Grammar So Far...

• Some of the Rules
  S  --> NP VP
  NP  --> Det N
  NP  --> N
  VP  --> V
  VP  --> V NP
  VP  --> V S
  VP  --> V S’
  S’  --> Comp S

Grammar So Far...

• Some of the Rules
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Grammar So Far...

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  VP  --> V NP
  VP  --> V S
  VP  --> V S’
  S’  --> Comp S

Embedded Sentences

1. Jack stole the goose
   S  --> NP VP
   VP  --> V NP

2. The giant realized that Jack stole the goose.
   VP  --> V S’
   S’  --> Comp S

3. Lily thought the giant realized that Jack stole the goose.
   And we can keep recursing to generate infinitely many sentences!
Optional & Obligatory Phrases

- Obligatory phrases
  a. *Lily fed.
  b. *Jack hit.
  c. *Sir Didymus mentioned.
  d. *Sarah put the book.
  e. *Ludo devoured.
  f. Lily fed the kitten.
  g. Jack hit the castle wall.
  h. Sir Didymus mentioned his fail-proof plan.
  i. Sarah put the book on the tree stump.
  j. Ludo devoured the cupcake.

Optional & Obligatory Phrases

- Optional Phrases
  a. Bullwinkle sang a song in the bathtub
  b. Boris slept all morning
  c. Natasha’s train arrived at three o’clock

An Additional Rule

- Preposition Phrases
  PP -> P NP
  in the kitchen
  at three o’clock
  from New York
  etc...

New VP-Rules

- "ditransitive verbs"
  a. VP -> V NP NP
  b. VP -> V NP PP
  7a. Jack gave the magic beans to his mother.
  7b. Jack gave his mother the magic beans.
  7c. Jack bought Lily a ring.
  8a. *Jack donated the town a bag of gold.
  8b. *Lily mentioned Jack a secret.

Arguments & Modifiers

- Subjects
  a. *Fed the kitten
  b. *Slept

- Objects
  a. *Lily fed (the kitten)
  b. *Jack gave his mother (magic beans)

Arguments & Modifiers

- 11.
  a. The cat sat
  b. The cat sat on the mat

- 12.
  a. VP -> VP PP
      can apply to itself
  b. The cat sat on the mat in the morning
  c. The cat sat on the mat in the morning on Thursday…
Arguments & Modifiers

• 13.
  a. NP → NP PP
      can apply to itself
      The kitten in the kitchen
      The giant with the cudgel

Arguments & Modifiers

• The cat sat on the mat in the morning on Thursday
• The giant on the beanstalk chased Jack.

Different VP Rules

• Argument:
  VP --\(\rightarrow\) V NP PP

• Modifier:
  VP --\(\rightarrow\) VP PP

Verb specific vs. verb independent
Non-recursive vs. recursive
Inside vs. outside minimal VP constituent

Ambiguous Sentences

a. The spy saw the cop with the binoculars.

One sentence with two meanings…

2) The modifier of the NP

Distinguishing Arguments & Modifiers

• Generalization: do so is used to replace a Verb Phrase

“Do So” Practice

Jack put the magic bean in the box before dinner.

1) Jack put the magic bean in the box before dinner, and Lily did so (too).
   [put the magic bean in the box = VP]

2) Jack put the magic bean in the box before dinner, and Lily did so just after her nap.
   [put the magic bean in the box = VP]

3) *Jack put the magic bean in the box before dinner, and Lily did so in her jewelry box just after her nap.
   [put the magic bean = VP]

4) *Jack put the magic bean in the box before dinner, and Lily did so the golden brooch in her jewelry box just after her nap.
   [put = VP]
“Do So” Practice

structures
- Represent the way in which speakers group words in their heads
- Explain word-order regularities

Word Order Differences
- Word-order patterns for different languages can be generated using:
  1. same rules/tree-fragments as English
  2. changing order of rules/tree-fragments

Japanese

a. tomodatini futari
   friends two

b. Tokyo kara
   ‘T. from’

c. Masaga ringoo tabeta
   Masa apple ate

d. Daikoga Ayumiga Kazukoo hometa to itta
   Daiko Ayumi Kazuko praised that said
   ‘Daiko said that Ayumi praised Kazuko.’

Japanese

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