Ling 566
Oct 21, 2009
Review
Overview

• Information movement in trees
• Exercise in critical thinking
• Homework tips
• SPR and COMPS
• Technical details (lexical entries, trees)
• Analogies to other systems you might know
• Your questions...
Another Example

S

NP

D

the

NOM

N

photos

PP

of

NP

D

the

NP

N

suspect

VP

V

disappeared

ADV

yesterday
Head Features from Lexical Entries

The tree diagram shows the syntactic structure of the sentence:

```
S
  /\  \\
NP  VP
  /\  /
[HEADdet] [HEADnoun] [HEADverb] [HEADadverb]
    /\  /
  the photos disappeared yesterday
    /\  /
  of [HEADdet] [HEADnoun]
    /\    /
  the suspect
    /
```
Head Features from Lexical Entries, plus HFP

[HEAD det]
- the

[HEAD noun]
- photos

[HEAD prep]
- of

[HEAD det]
- the

[HEAD noun]
- suspect

[HEAD verb]
- disappeared

[HEAD adverb]
- yesterday
Valence Features: Lexicon, Rules, and the Valence Principle

Key
- Lexicon
- Val. Prin.
- Rules

The diagram illustrates the structure of a sentence using valence features. The sentence is:

"the photos of the suspect disappeared yesterday"
Required Identities: Grammar Rules

S

[1] NP

[2] D

the

[3] PP

photos

[4] NP

of

[5] D

the

[6] V

disappeared

[7] ADV

yesterday

[SPR [1]]

[SPR [2]]

[SPR [3]]

[SPR [4]]

[SPR [5]]

[SPR [6]]
Two Semantic Features: the Lexicon & SIP

MODE prop
INDEX s3

MODE ref
INDEX j

MODE ref
INDEX j

MODE none
INDEX j

MODE ref
INDEX j

MODE prop
INDEX s3

MODE none
INDEX s4

the

photos

of

MODE ref
INDEX k

MODE ref
INDEX k

disappeared

yesterday

MODE ref
INDEX k

MODE none
INDEX k

the

suspect
RESTR Values and the SCP

A ⊕ B ⊕ C ⊕ D ⊕ E ⊕ F ⊕ G

A ⊕ B ⊕ C ⊕ D ⊕ E

F ⊕ G

[RELN the BV j]

the

B ⊕ C ⊕ D ⊕ E

[RELN photo INST j CONTENT k]

photos

C( )

D ⊕ E

[RELN disap. SIT s3 D-ER j]

disappeared

[RELN yest. ARG s3]

yesterday

D

[RELN the BV k]

the

E

[RELN suspect INST k]

suspect
An Ungrammatical Example

What's wrong with this sentence?
An Ungrammatical Example

What’s wrong with this sentence?

So what?
An Ungrammatical Example

The Valence Principle

*S

NP

[CASE acc] them

VP

[SPR ⟨1⟩ ]

V

sent

NP

[SPR ⟨1⟩ NP[nom]]

NP

us

NP

D

a

N

letter
An Ungrammatical Example

HeadSpecifierRule

*S

NP [CASE acc]

NP [CASE acc] them

VP [SPR ⟨1⟩]

V [SPR ⟨1⟩NP[nom]]

V sent

NP NP

NP us

NP [CASE nom]

D N

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Exercise in Critical Thinking

- Our grammar has come a long way since Ch 2, as we've added ways of representing different kinds of information:
  - generalizations across categories
  - semantics
  - particular linguistic phenomena: valence, agreement, modification

- What else might we add? What facts about language are as yet unrepresented in our model?
Homework tips/requests

• Type whenever possible

• Answer each part of each question separately

• Be sure to answer each part of each question, and follow the directions!

• Look over the problems early and ask questions

• Check your work

• Monitor GoPost

• WORK TOGETHER
SPR value on AP/PP?

- Kim grew fond of baseball.
- Kim and Sandy ate lunch in the park.
- Kim and Sandy are in the park.
Which grammar does this tree go with?

NP
  D  NOM
   the  N
     cat
What’s wrong with this?

\[
\langle \text{out, } \left[ \begin{array}{c}
\text{word} \\
\text{HEAD} \\
\text{prep} \\
\text{VAL} \\
\text{SPR} \\
\text{COMPS}
\end{array} \right] \langle \text{VP} \rangle \langle \text{(PP | NP)} \rangle \rangle
\]
What’s wrong with this?

\[
\langle \text{out,} \rangle \left[ \begin{array}{c}
\text{word} \\
\text{HEAD} \\
\text{VAL}
\end{array} \right] \begin{array}{c}
\text{prep} \\
\left[ \begin{array}{c}
\text{SPR} \\
\text{COMPS}
\end{array} \right] \langle \rangle \\
\langle (\text{NP}) (\text{PP}) \rangle \rangle
\]
What’s wrong with this?

\[
\langle \text{out,} \left[ \begin{array}{c}
\text{word} \\
\text{HEAD} \\
\text{prep} \\
\text{VAL} \\
\text{COMPS} (\text{NP} \mid \text{PP})
\end{array} \right] \rangle
\]
What's wrong with this?

⟨ grew, \\
  HEAD \begin{bmatrix} word \\
  AGR \ 3\text{sing} \\
  SPR \ \langle \text{NP} \rangle \\
  \text{COMPS} \ \langle \text{AP} \rangle \\
\end{bmatrix} \rangle
What’s wrong with this?

\[
\langle \text{out}, \begin{bmatrix}
\text{word} \\
\text{HEAD} \\
\text{preposition} \\
\text{VAL} \\
\text{COMPS} \\
\end{bmatrix} \rangle
\]

\[
\text{SPR} \quad \langle \emptyset \rangle
\]

\[
\langle ( \text{NP} \mid \text{PP} ) \rangle
\]
What’s wrong with this?

\[\langle \text{there,} \begin{bmatrix} \text{phrase} \\ \text{HEAD} \\ \text{VAL} \end{bmatrix} \begin{bmatrix} \text{prep} \\ \text{SPR} \\ \text{COMPS} \end{bmatrix} \rangle\]
Tags & lists

• What’s the difference between these two?

\[
\begin{align*}
\text{SPR} & \quad \text{[1]} \langle \text{NP} \rangle \\
\text{SPR} & \quad \langle \text{[1]} \text{NP} \rangle
\end{align*}
\]

• When does it matter?
What’s wrong with this tree?

NP

D

the

N

[COMPS ⟨ (PP) ⟩ ]

1PP

photos

of the suspect
What’s wrong with this tree?

I rely on Kim.
What’s wrong with this tree?

I rely on Kim.
What’s wrong with this tree?

What's wrong with this tree?
What’s wrong with this tree?

What’s wrong with this tree?

What’s wrong with this tree?

What’s wrong with this tree?

What’s wrong with this tree?
What’s wrong with this tree?

I rely on Kim
What's wrong with this?

\[
\langle \text{hundred}, \text{,} \rangle
\]

\[
\text{SYN}
\]

\[
\text{VAL}
\]

\[
\text{COMPS}
\]

\[
\text{SEM}
\]

\[
\text{RELN}
\]

\[
\text{MULTIPLIER}
\]

\[
\text{ADDEND}
\]

\[
\text{HUND-VALUE}
\]
And this?

\[ \langle \text{hundred}, \text{,} \rangle \]

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<th>HEAD</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAL</td>
<td>SPR</td>
<td>\langle [HEAD number] \rangle</td>
</tr>
<tr>
<td>COMPS</td>
<td>COMPS</td>
<td>\langle [HEAD number] \rangle</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>INDEX</th>
<th>i</th>
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<tbody>
<tr>
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<table>
<thead>
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<td>k</td>
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<tr>
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<td>k</td>
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<tr>
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<td></td>
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<tr>
<td>FACTOR2</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>RELN</td>
<td>plus</td>
<td>i</td>
</tr>
<tr>
<td>RESULT</td>
<td>i</td>
<td></td>
</tr>
<tr>
<td>TERM1</td>
<td>j</td>
<td></td>
</tr>
<tr>
<td>TERM2</td>
<td>k</td>
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<table>
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<th>constant</th>
</tr>
</thead>
<tbody>
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<td>INST</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>VALUE</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

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How about this?

\[
\langle \text{hundred} \, , \\
\text{SYN} \\
\text{VAL} \\
\text{COMPS} \\
\text{INDEX} \\
\text{MODE} \\
\text{SEM} \\
\text{RESTR} \\
\langle \text{RELN} \, \text{times} \, \text{RESULT} \\
\text{FACTOR1} \\
\text{FACTOR2} \\
\text{RELN} \, \text{plus} \, \text{RESULT} \\
\text{TERM1} \\
\text{TERM2} \\
\rangle \\
\langle \text{RELN} \, \text{constant} \, \text{INST} \, \text{VALUE} \, 100 \\
\rangle
\]
Better version

\(\langle \text{hundred}, \rangle\)

\[
\text{SEM} \quad \text{RESTR} \quad \langle \text{RELN} \quad \text{plus} \quad \text{RESULT} \quad i \quad \text{TERM1} \quad j \quad \text{TERM2} \quad k \rangle,
\]

\[
\text{SEM} \quad \text{MODE} \quad \text{ref} \quad \langle \text{RELN} \quad \text{times} \quad \text{RESULT} \quad k \rangle,
\]

\[
\text{SYN} \quad \text{VAL} \quad \text{VAL} \quad \langle \text{RELN} \quad \text{constant} \rangle,
\]

\[
\text{SYN} \quad \text{VAL} \quad \text{VAL} \quad \langle \text{RELN} \quad \text{plus} \quad \text{RESULT} \quad i \rangle,
\]

\[
\text{SYN} \quad \text{VAL} \quad \langle \text{RELN} \quad \text{times} \quad \text{RESULT} \quad k \rangle,
\]

\[
\text{SYN} \quad \text{VAL} \quad \langle \text{RELN} \quad \text{times} \quad \text{RESULT} \quad k \rangle,
\]

\[
\text{SYN} \quad \text{VAL} \quad \langle \text{RELN} \quad \text{times} \quad \text{RESULT} \quad k \rangle,
\]
Type hierarchy analogies

• How is this formalism like OOP?
• How is it different?
• How is the type hierarchy like an ontology?
• How is it different?
• How is this formalism like the MP’s formalism?
• How is it different?
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