Semantic Decomposition

- Markers
  - HORSE
  - RED
  - the red horse

- Functions
  - SEE(x,y)
  - the man saw the (red) horse
  - SEE(x,HORSE)
  - SEE(THE MAN,THE HORSE)
  - SEE(X1, Y1)
  - (What is the value? predicates?)

Five Semantic Functions

- GO
- BE
- STAY
- LET
- CAUSE

GO – Change of location

The train traveled from Detroit to Cincinatti.
The hawk flew from its nest to the ground.
An apple fell from the tree to the ground.
The coffee filtered from the funnel into the cup.

\[
\text{GO (x,y,z)} \quad \text{THROUGH THE AIR/DOWNWARD}
\]

\[
\text{THEME GOES FROM SOURCE, TO GOAL}
\]
Mapping from Syntax to Semantics

\[ /\text{fli}/ \]
\[ + \text{ V} \]
\[ + [\text{NP}^1 \text{ (from NP}^2 \text{) (to NP}^3 \text{)}] \]
\[ \text{GO (NP}^1,\text{NP}^2,\text{NP}^3) \]
\[ \text{THROUGH THE AIR} \]

BE – Stationary location

Max is in Africa.
The vine clung to the wall.
The dog is on the left of the cat.
The circle contains/surrounds the dot?

BE(x,y)
THEME IS AT LOCATION

BE (THE DOG, LEFT OF (THE CAT))

STAY – Durational stationary location

The bacteria stayed in his body.
Stanley remained in Africa.
Bill kept the book on the shelf.

STAY(x,y)
THEME IS AT LOCATION for a duration

STAY (STANLEY, AFRICA) (for two years)

Locational modes: POSIT, POSS, ID

The train traveled from Detroit to Cincinatti.

GO (x,y,z)
POSIT

Harry gave the book to the library.

GO (x,y,z)
POSS

The book belonged to the library..

BE (x,z)
POSS
**Locational modes: POSIT, POSS, ID**

*The bacteria* stayed in his *body.*

\[
\text{STAY} (x,z) \quad \text{POSIT}
\]

*The library* kept the *book.*

\[
\text{STAY} (x,z) \quad \text{POSS}
\]

---

**Causation and Permission**

**CAUSE** and **LET**

*The rock* fell from the *roof* to the *ground.*

\[
\text{GO}_{\text{POSIT}} (x,y,z)
\]

*Linda lowered the rock* from the *roof* to the *ground.*

\[
\text{CAUSE} (a, \text{GO}_{\text{POSIT}} (x,y,z))
\]

*Linda dropped the rock* from the *roof* to the *ground.*

\[
\text{LET} (a, \text{GO}_{\text{POSIT}} (x,y,z))
\]

---

**Locational modes: POSIT, POSS, ID**

*The coach* changed from a *handsome young man* to a *pumpkin.*

\[
\text{GO}_{\text{IDENT}} (x,y,z)
\]

*Princess Mia* changed from an *ugly duckling* into a *swan.*

\[
\text{GO}_{\text{IDENT}} (x,y,z)
\]

*Universal grammar?*

---

**INSTRUMENTS**

*Linda lowered the rock* from the *roof* to the *ground* with a *cable.*

\[
\text{CAUSE} (a, \text{GO}_{\text{POSIT}} (x,y,z))
\]

Inst: \(i\)

Instruments only occur with causation. **CAUSE** always has an *event* second argument.

*Dollie caused Martin to be happy.*

Let go = causation, Odd?
### Lexical Conceptual Structure

<table>
<thead>
<tr>
<th>Concept</th>
<th>POSIT</th>
<th>POSS</th>
<th>IDENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GO</td>
<td>go</td>
<td>receive</td>
<td>become</td>
</tr>
<tr>
<td>motional</td>
<td>fall</td>
<td>inherit</td>
<td>change</td>
</tr>
<tr>
<td>BE</td>
<td>be</td>
<td>have</td>
<td>be</td>
</tr>
<tr>
<td>punctual</td>
<td>contain</td>
<td>own</td>
<td>seem</td>
</tr>
<tr>
<td>STAY</td>
<td>stay</td>
<td>keep</td>
<td>stay</td>
</tr>
<tr>
<td>durational</td>
<td>remain</td>
<td>keep</td>
<td>remain</td>
</tr>
<tr>
<td>CAUSE(a, GO)</td>
<td>bring, take</td>
<td>obtain, give</td>
<td>make, elect</td>
</tr>
<tr>
<td>CAUSE(a, STAY)</td>
<td>keep, hold</td>
<td>keep, retain</td>
<td>keep</td>
</tr>
<tr>
<td>LET(a, GO)</td>
<td>drop, release</td>
<td>accept, fritter</td>
<td>leave</td>
</tr>
<tr>
<td>LET(a, BE)</td>
<td>leave, allow</td>
<td>permit</td>
<td></td>
</tr>
</tbody>
</table>

### Rules of inference

CAUSE(a, event) -> event.

### Feature-based Lexicalized Tree-Adjoining Grammars

- Elementary trees
  - Initial trees
  - Auxiliary trees
- Two operations
  - Substitution
  - Adjunction

### Same event - different syntactic frames

- **John broke windows.**
  - SUBJ VERB OBJ
- **Windows broke.**
  - SUBJ VERB
Syntactic Parses

Elementary Trees

Substituting Trees

Trees w/ Semantic Features