LING 388: Language and Computers

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Lecture 24
Last Time

• Added passives to the Japanese grammar

?- s(Parse,[hon, ga, taroo, ni, kawaremashita],[]).
Parse = s(np(nn(hon))-ga, vp(np(nnp(taroo))-ni, vp(np(trace), vbd(buy+passive+formal+past)))) ;
false.

?- s(Parse,[hon, ga, taroo, ni, kawareta],[]).
Parse = s(np(nn(hon))-ga, vp(np(nnp(taroo))-ni, vp(np(trace), vbd(buy+passive+past)))) ;
false.
s(s(NP-Case,VP)) → np(NP,notwh), nomcase(Case), vp(VP,notwh).
s(sq(NP-Case,VP,q(ka))) → np(NP,Q1), nomcase(Case), vp(VP,Q2), sf(Q1,Q2).
s(sq(NP-Case,VP,q(ka))) → np(NP,notwh), nomcase(Case), vp(VP,notwh), [ka].

s(s(NP-Case,S)) → np(NP,notwh), acccase(Case), s_scrambled(S,notwh).
s(s(NP-Case,S,q(ka))) → np(NP,notwh), acccase(Case), s_scrambled(S,notwh), [ka].
s(sq(NP-Case,S,q(ka))) → np(NP,Q2), acccase(Case), s_scrambled(S,Q1), sf(Q1,Q2).
s(s(NP-Case,VP)) → np(NP,notwh), nomcase(Case), vp_passive(VP,notwh).
s(s(NP-Case,VP),q(ka)) → np(NP,notwh), nomcase(Case), vp_passive(VP,notwh), [ka].
s(s(NP-Case,VP,q(ka))) → np(NP,Q2), nomcase(Case), vp_passive(VP,Q1), sf(Q1,Q2).
s_scrambled(s(NP-Case,VP),Q) → np(NP,Q), nomcase(Case), vp_scrambled(VP).
vp_scrambled(vp(np(trace),V))  -->  v(V).
vp(vp(NP-Case,V),Q)  -->  np(NP,Q), acccase(Case), v(V).
vp_passive(vp(np(trace),V),notwh)  -->  v_passive(V).
vp_passive(vp(NP-Case,vp(np(trace),V)),Q)  -->  np(NP,Q), datcase(Case), v_passive(V).

% sentence-final particle
sf(wh,notwh)  -->  [ka].
sf(notwh,wh)  -->  [ka].
sf(wh,wh)  -->  [ka].
% Lexicon
nomcase(ga) --> [ga].
nomcase(ga) --> ['が'].
accase(o) --> [o].
accase(o) --> ['を'].
datcase(ni) --> [ni].
datcase(ni) --> ['に'].

\[ v(vbd(buy+formal+past)) --> [kaimashita]. \]
\[ v(vbd(buy+past)) --> [katta]. \]
\[ v(vbd(buy+formal+past)) --> ['買った']. \]
\[ v(vbd(buy+past)) --> ['かった']. \]

% np(Parse, {wh|notwh})
np(np(nn(hon)), notwh) --> [hon].
np(np(nn(hon)), notwh) --> ['本'].
np(np(nn(np(taro))), notwh) --> [taro].
np(np(nn(np(taro))), notwh) --> ['太郎'].
np(np(nn(np(john))), notwh) --> [john].
np(whnp(wp(nani)), wh) --> [nani].
np(whnp(wp(nani)), wh) --> ['何'].
np(whnp(wp(dare)), wh) --> [dare].
np(whnp(wp(dare)), wh) --> ['だれ'].
Today’s Topic

– We’ll want to build a less-language dependent parse
  • hon-ga taroo-ni kawaremashita ka
  • Was a book bought by Taroo?

– Use a more abstract representation
  • predicate argument structure
  • thematic roles

– next step towards our translator
Predicate-Argument Structure

• **Example:**
  – John ate the sandwich
  – *eat*: predicate
  – *eat* has two **arguments**: eater, something that is eaten
  – eater = John
  – something to be eaten = *the sandwich*

• **A Possible Representation**
  – *in Prolog term-like notation*
  – eat(<eater>,<something to be eaten>)
  – eat(john,sandwich)

• **Linguists generally try to choose more general labels for the arguments**
  – *less verb-specific*
  – eat(<agent>,<patient>)
  – <agent> someone/something who performs some action
  – <patient> undergoes change of state etc.
  – eat(<agent>,<theme>)
  – <theme> something applies to this argument but doesn’t undergo change of state
It can be difficult to precisely specify the meaning of the arguments via thematic labels of this sort.

- **http://en.wikipedia.org/wiki/Thematic_relations**
- **Here is a list of the major thematic relations.**

  - **Agent:**
    - deliberately performs the action
    - (e.g. Bill ate his soup quietly)
  - **Experiencer:**
    - receives sensory or emotional input
    - (e.g. The smell of lilies filled Jennifer’s nostrils).
  - **Theme:**
    - undergoes the action but does not change its state
    - (Sometimes used interchangeably with patient)
    - (e.g. Bill kissed Mary).
  - **Patient:**
    - undergoes the action and has its state changed
    - (Sometimes used interchangeably with theme)
    - (e.g. The falling rocks crushed the car)
  - **Instrument:**
    - used to carry out the action
    - (e.g. Jamie cut the ribbon with a pair of scissors).

- **Natural Cause:**
  - mindlessly performs the action
  - (e.g. An avalanche destroyed the ancient temple).

- **Location:**
  - where the action occurs
  - (e.g. Johnny and Linda played carelessly in the park).

- **Goal:**
  - what the action is directed towards
  - (e.g. The caravan continued on toward the distant oasis).

- **Recipient:**
  - a special kind of goal associated with verbs expressing a change in ownership, possession.
  - (e.g. I sent John the letter)

- **Source:**
  - where the action originated
  - (e.g. The rocket was launched from Central Command).

- **Time:**
  - the time at which the action occurs
  - (e.g. The rocket was launched yesterday)

- **Beneficiary:**
  - the entity for whose benefit the action occurs
  - (e.g. I baked Reggie a cake)
Predicate-Argument Structure

- **Passives**
  - The sandwich was eaten by John
  - John ate the sandwich
  - eat(<eater>,<object to undergo eating>)
  - eat(<agent>,<patient>)
  - eat(john,sandwich)

  - The sandwich was eaten
  - eat(_,sandwich)
  - an incomplete or underspecified predicate argument structure

- **Not all Noun Phrases seem to have a meaningful thematic relation associated with them**
  - It rains
  - It is likely that John ate the sandwich
  - John is likely to eat the sandwich
  - It seems that John ate the sandwich
  - John seemed to eat the sandwich
  - There seems to be a sandwich over there
  - A sandwich seems to be over there
Stanford Typed Dependencies

- John ate the sandwich
  - eat(john,sandwich)
  - the sandwich was eaten by John
    - eat(john,sandwich)

- the sandwich was eaten
  - eat(_,sandwich)
  - eat(john,sandwich)
**Ingestion**

**Definition:**

An **Ingestor** consumes food or drink (**Ingestibles**), which entails putting the **Ingestibles** in the mouth for delivery to the digestive system. This may include the use of an **Instrument**. Sentences that describe the provision of food to others are NOT included in this frame.

**FEs:**

**Core:**

- **Ingestibles [Ingible]**: The **Ingestibles** are the entities that are being consumed by the **Ingestor**.
- **Ingestor [Ing]**: The **Ingestor** is the person eating or drinking.

**Non-Core:**

- **Degree [Degr]**: The extent to which the **Ingestibles** are consumed by the **Ingestor**.
  - The wolves **DEVoured** the carcass **completely**.
- **Duration [Dur]**: The length of time spent on the ingestion activity.
  - They've been **EATING** for hours!
Framenet

Duration [Dur]
The length of time spent on the ingestion activity.
They've been **EATING** for hours!

Instrument [Ins]
Semantic Type: Physical_entity

Manner [Manr]
Semantic Type: Manner

Means [Mns]
Semantic Type: State_of_affairs

The **Instrument** with which an intentional act is performed.

Manner of performing an action.

An act performed by the **Ingestor** that enables them to accomplishes the whole act of ingestion.

The thing **ATE** by snaking its long tongue out and grabbing with it.

Place [Place]
Semantic Type: Locative_relation

Purpose [pur]
Semantic Type: State_of_affairs

Source [Src]
Semantic Type: Source

Time [Time]
Semantic Type: Time

Where the event takes place.

The action that the **Ingestor** hopes to bring about by ingesting.

Place from which the **Ingestor** takes the **Ingestibles**

When the event occurs.
Framenet

Frame-frame Relations:

Inherits from: Ingest_substance, Manipulation
Is Inherited by:
Perspective on:
Is Perspectivized in:
Uses: Cause_motion
Is Used by: Food, Tasting
Subframe of:
Has Subframe(s):
Precedes:
Is Preceded by:
Is Inchoative of:
Is Causative of:
See also:

Lexical Units:

breakfast.v, consume.v, devour.v, dine.v, down.v, drink.v, eat.v, feast.v, feed.v, gobble.v, gulp.n, gulp.v, guzzle.v, have.v, imbibe.v, ingest.v, lap.v, lunch.v, munch.v, nibble.v, nosh.v, nurse.v, put away.v, put back.v, quaff.v, sip.n, sip.v, slurp.n, slurp.v, snack.v, sup.v, swig.n, swig.v, swill.v, tuck.v
Predicate-Argument Structure

• **More Examples**
  - I made John eat the sandwich
  - cause(<agent>,<event to happen>)
  - eat(john,sandwich)
  - cause(i,eat(john,sandwich))

  Typed dependencies, collapsed
  
  nsubj(made-2, I-1)
  root(ROOT-0, made-2)
  nsubj(eat-4, John-3)
  ccomp(made-2, eat-4)
  det(sandwich-6, the-5)
  dobj(eat-4, sandwich-6)

• **More Examples**
  - John persuaded Bill to leave
  - I believe that John ate the sandwich

• **More Examples**
  - John is happy
  - happy: predicate
  - John: in state described by the predicate
  - what thematic relation does John have here?
  - happy(john)
Framenet

• Lexical unit index:
  – https://framenet.icsi.berkeley.edu/fndrupal/index.php?q=luIndex

Let’s take a look at LU *eat*
Framenet

Ingestion

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FEs:

Core:

Ingestibles [Ingible]  The Ingestibles are the entities that are being consumed by the Ingestor.

Ingestor [Ing]  The Ingestor is the person eating or drinking.

Semantic Type: Sentient
Non-Core:

Degree [Degr]  The extent to which the Ingestibles are consumed by the Ingestor.

Semantic Type: Degree

The wolves DEVoured the carcass completely

Duration [Dur]  The length of time spent on the ingestion activity.

They’ve been EATING for hours!
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