Verb Classes and Alternations

Word and VerbNets for Semantic Processing

DAAD Summer School in Advanced Language Engineering,
Kathmandu University, Nepal

Day 2
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Recap

1. What is the meaning of words?
2. How do entities take part in an event?
3. What event structure does a verb have?

Important aspects of semantic parsing

Today

- Look at syntactic alternations for English
- Examine English verb classes established by Levin (1993)
Motivation

Syntactic alternations are important for NLP

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<thead>
<tr>
<th>Syntax:</th>
<th>John</th>
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Motivation

Syntactic alternations are important for NLP

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Outline

1. Verb alternations

2. Verb classes
Today

1. Verb alternations

2. Verb classes
Syntactic alternations vary greatly across languages
Speakers can make extremely subtle judgements about them
Judgements also extend to novel constructions, e.g. for denominal verbs
Speaker judgements very often agree
An example

Hale and Keyser (1987): Usage of the verb *to gally*

- Archaic verb form for *to frighten, to worry*
- If people thought of the verb as a form of *to see*, it could not partake in the middle alternation:
  
  (1) a. The sailors gally the whales.
   
   b. *The whales gally (see).*

- In the meaning of *to frigthen*, the verb allows the middle alternation:
  
  (2) a. The sailors gally the whales.
   
   b. The whales gally easily.
An example

Hale and Keyser (1987): Usage of the verb *to gally*

- Archaic verb form for *to frighten, to worry*
- If people thought of the verb as a form of *to see*, it could not partake in the middle alternation:
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- In the meaning of *to frigthen*, the verb allows the middle alternation:
  (4) a. The sailors gally the whales.
     b. The whales gally easily.

→ The syntactic realization of verb arguments is to a large extend determined by its meaning.
Transitivity Alternations

Generally: Object of Transitive = Subject of Intransitive

The causative/inchoative alternation:
(5) a. The boy broke the vase.
   b. The vase broke.
(6) a. John cut the bread.
   b. *The bread cut.

- The use of the transitive can be (roughly) paraphrased as “X causes Y to V-intransitive”

English data on alternations mostly from Levin (1993)
Transitivity Alternations

Generally: Object of Transitive = Subject of Intransitive

Causativization in Urdu:

(7) anjūm  b\textsuperscript{h}\textit{ag-i}
   Anjum.F.Sg.Nom run-Perf.F.Sg
   ‘Anjum ran.’

(8) anjūm=ne coha=ko  b\textsuperscript{h}\textit{ag-a-ya}
   Anjum.F.Sg=Erg mouse.M.Sg=Acc run-Caus-Perf.M.Sg
   ‘Anjum chased the mouse away (made the mouse run).’

(9) anjūm=ne (ravi=se) coha=ko  b\textsuperscript{h}\textit{ag-va-ya}
   Anjum.F.Sg=Erg Ravi.M.Sg=Instr mouse.M.Sg=Acc run-ICaus-Perf.M.Sg
   ‘Anjum (made Ravi) chase the mouse away.’
Transitivity Alternations

Proposition drop alternation:

(10) a. Martha climbed up the mountain.
    b. Martha climbed the mountain.

(11) a. Sharon came into the room.
    b. *Sharon came the room.

- The transitive frame is derived from the intransitive frame by dropping the preposition
Alternations Involving Arguments Within the VP

Generally: Internal arguments of the verb are expressed differently.

The dative alternation:

(12) a. John sold a car to Tom.
    b. John sold Tom a car.

(13) a. Bill sent a package to Tom/London.
    b. Bill sent Tom/*London a package.

English: $NP_1 \text{ V } NP_2 \text{ to } NP_3 \rightarrow NP_1 \text{ V } NP_3 \text{ NP}_2$
Alternations Involving Arguments Within the VP

Generally: Internal arguments of the verb are expressed differently

The benefactive alternation:

(14) a. Martha carved a toy for the baby.
    b. Martha carved the baby a toy.

(15) a. The mother selected a toy for the baby.
    b. *The mother selected the baby a toy.

English: $\text{NP}_1 \ V \ \text{NP}_2 \ \textbf{for} \ \text{NP}_3 \ \rightarrow \ \text{NP}_1 \ V \ \text{NP}_3 \ \text{NP}_2$
Generally: Internal arguments of the verb are expressed differently

The locative alternation:

(16) a. Jack sprayed paint on the wall. (locative variant)
    b. Jack sprayed the wall with paint. (with variant)

(17) a. The farmed loaded hay onto the wagon.
    b. The farmer loaded the wagon with hay.

- famous spray/load alternation
Alternations Involving Arguments Within the VP

Generally: Internal arguments of the verb are expressed differently

The reciprocal alternation:

(18) a. The car collided with the bicycle.
    b. The car and the bicycle collided.

But: objects must be of “comparable status”

(19) a. The car collided with the fence.
    b. *The car and the fence collided.
Passive alternations

Generally: the object becomes the subject in the passive, the original subject is optionally expressed by a prepositional phrase

The verbal passive:

(20) a. The cook sliced the mushrooms.
    b. The mushrooms were sliced by the cook.

(21) a. The police kept tabs on the suspect.
    b. Tabs were kept on the suspect (by the police)

- English: $NP_1 \; V \; NP_2 \rightarrow NP_2 \; V_{\text{passive}} \; (\text{by} \; NP_1)$
Passive alternations

Generally: the object becomes the subject in the passive, the original subject is optionally expressed by a prepositional phrase

The verbal passive in Urdu:

(22) ram=ne hāṭʰi pinc ki-ya
Ram.M.Sg=Erg elephant.M.Sg.Nom pinch do-Perf.M.Sg
‘Ram pinched the elephant.’

(23) hāṭʰi (ram=se)
elphant.M.Sg.Nom (Ram.M.Sg=Instr)
pinc ki-ya ga-ya
pinch do-Perf.M.Sg go-Perf.M.Sg
‘The elephant was pinched (by Ram).’

Urdu: NP₁ NP₂ V → NP₂ (NP₁=se) V go_{passive}
Passive alternations

Generally: the object becomes the subject in the passive, the original subject is optionally expressed by a prepositional phrase

The adjectival perfect participle:

(24) a. NP: the collapsed lung
    b. NP: the sunken treasure

(25) a. NP: *the run man
    b. NP: *the slept children

English: $\text{NP}_1 \ V \rightarrow \text{the} \ V_{\text{ed}} \ \text{NP}_1$
Passive alternations

Generally: the object becomes the subject in the passive, the original subject is optionally expressed by a prepositional phrase

The adjectival perfect participle in Urdu:

(26) a.  
kaṭ-e    (hu-e)  pʰal  
cut-Perf.M.Pl be-Perf.M.Pl fruit.M.Pl  
‘the cut fruit’

b. *dor-ə (hu-a) laʁka  
run-Perf.M.Sg be-Perf.M.Sg boy.M.Sg  
‘the run boy’

Urdu: NP₁ V → V be NP₁
1. The cognate object construction

(27) a. Sandy dances a dance.
    b. John fights a fight.
    c. The little girl dreams a dream

- These verbs take a zero-related noun as their object, the “cognate” object
Other constructions

2. The resultative construction

(28) a. The river froze solid.
    b. Betty walked the soles off her shoes.

(29) *Willow arrived breathless.
    (the arriving makes Willow breathless)

- the resultative phrase describes the state which is achieved as a result of the action of the verb
2. The resultative construction

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(31) *Willow arrived breathless.
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Task #1

Think of syntactic alternations that exist in your mother language. Give an example for each alternation.
Some more Urdu-specific alternations

Object shift (Bhatt 2003)

(32) $\text{Ali}=\text{ne} \quad \text{Amra}=\text{ko} \quad \nu\nuh \text{divar}$
    Ali.M.Sg=Erg Amra.F.Sg=Acc that wall.F.Sg.Nom
    $p^h\text{and-va-yi}$
    leap-over-ICaus-Perf.F.Sg
    ‘Ali made Amra leap over that wall.’

(33) $\text{Ali}=\text{ne} \quad \text{vs} \quad \text{divar}=\text{ko} \quad \text{Amra}=\text{ko}$
    Ali.M.Sg=Erg that.Obl wall.F.Sg=Dat Amra.F.Sg=Acc
    $p^h\text{and-va-ya}$
    leap-over-ICaus-Perf.M.Sg
    ‘Ali made Amra leap over that wall.’
Impersonal passive (Ahmed 2010)

(34) a.  
\[
\text{cal-o} \quad \text{doר-a} \quad \text{ja-e} \\
\text{come-Subjv.2.Sg} \quad \text{run.Perf.M.Sg} \quad \text{go-Subjv.M.Sg} \\
\text{‘Come on, let us run.’}
\]

b.  
\[
\text{*cal-o} \quad \text{kaצ-a} \quad \text{ja-e} \\
\text{come-Subjv.2.Sg} \quad \text{cut.Perf.M.Sg} \quad \text{go-Subjv.M.Sg} \\
\text{‘Come on, let us cut.’}
\]
Today

1. Verb alternations

2. Verb classes
What kind of verb classes?

- subcategorization frames
  - intransitives, transitives, ditransitives
- thematic role structure
  - an obligatory instrument, causer etc.
- verbs related to a particular situation
  - e.g. verbs of ingestion
- verbs related to a semantic frame
  - e.g. verbs related to commercial events (negotiating, trading, selling, buying, paying etc.)
- verbs related to a similar event structure
  - e.g. activity verbs, achievement verbs, accomplishment verbs (Vendler 1976)
Levin’s classification

- Seminal investigation of English verb classes and their alternations by Beth Levin (1993)
- Theoretical foundation of the English VerbNet (Kipper-Schuler 2005)
- Detection of common syntactic and semantic properties of verbs

**Core assumption**

“[...] the behavior of a verb, particularly with respect to the expression and interpretation of its arguments, is to a large extent determined by its meaning.”
The situation

- Verbs as argument-taking elements have a complex set of properties
- Verbs can syntactically express their arguments and adjuncts in different ways
  → diathesis alternations

Implication

Verbs with a common meaning partake in the same syntactic alternations.

- Verb entry only lists the idiosyncratic properties of verbs
Levin’s verb classes

- 48 high-level verb classes with a large number of subclasses
- Each class is characterized by
  1. a set of members
  2. their syntactic alternations

→ Let’s look into Levin (1993)
Levin’s verb classes

Task #3

Choose one of the following verb classes and pick five verbs in your mother language that you would consider representative for that verb class. Which syntactic alternations do these verbs undergo? Are they common for all five verbs? Give examples for each alternation.

1. Verbs of motion
2. Verbs of change of state
3. Verbs of change of possession
4. Verbs of image creation
Repetition

**Urdu motion verbs and event classes:**

**State:**

(35) a. 

<table>
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<tr>
<th>pani</th>
<th>tʰand-a</th>
<th>hɛ</th>
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<td>water.M.Mass</td>
<td>cold-M.Sg</td>
<td>be-Perf.M.Sg</td>
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‘The water is cold.’

b. ali   lamb-a   hɛ

| Ali.M.Sg.Nom | tall-M.Sg | be-Perf.M.Sg |

‘Ali is tall.’
Urdu motion verbs and event classes:

**Not to confuse with aspectual** $hɛ$:

(36)

$$\text{anjam}=\text{ne} \quad \text{adnan}=\text{ko} \quad \text{dek}^h-a \quad hɛ$$

Anjum.F.Sg=Erg Adnan.M.Sg=Acc see-Perf.M.Sg be-Perf.M.Sg

‘Anjum has seen Adnan.’
Urdu verbs and event classes:

**Activities:**

(37) a. 
laṛka     langaṛa-ya  
boy.M.Sg.Nom limp-Perf.M.Sg
‘The boy limped.’

b. kaʃti     ter-i  
boat.F.Sg.Nom float-Perf.F.Sg
‘The boat floated.’
Urdu verbs and event classes:

Activities:

(38) kəʃtɪ ɡ^hαnτ̣ɔ ˈtɛɾ rɑh-ɪ heª
boat.F.Sg.Nom hour.M.Pl.Obl float stay-Perf.F.Sg be-Perf.Sg
‘The boat has been floating for hours.’
Urdu motion verbs and event classes:

**Achievements:**

(39) a.

\[
\text{larki} \quad (g^{h}\text{ar} = \text{ko}) \quad \text{pohonc-i} \\
\text{girl.F.Sg.Nom} \quad \text{home.M.Sg=Loc} \quad \text{arrive-Perf.F.Sg}
\]

‘The girl arrived (at home).’

b. * \[
\text{larki} \quad g^{h}\text{an\textt{}}t\text{ب}o \quad (g^{h}\text{ar} = \text{ko}) \\
\text{girl.F.Sg.Nom} \quad \text{hour.M.Pl.Obl (home.M.Sg=Loc)}
\]

\[
\text{pohonc rah-i} \quad \text{h} \epsilon \\
\text{arrive} \quad \text{stay-Perf.F.Sg} \quad \text{be.Perf.M.Sg}
\]

‘*The girl arrived (at home) for hours.’
Repetition

Urdu motion verbs and event classes:

Achievements:

(40) a. vuh kamre=mē gʰus-i
    3P.Sg.Nom room.M.Sg.Obl=Loc enter-Perf.F.Sg
    ‘She entered the room.’

b. * vuh kamre=mē gʰanṭō
    3P.Sg.Nom room.M.Sg.Obl=Loc hour.M.Pl.Obl
    gʰus rah-i hɛ
    enter stay-Perf.F.Sg be.Perf.M.Sg
    ‘*She has entered the room for hours.’