Lexical Semantic 2
ICS 482 Natural Language Processing

Lecture 29-1: Lexical Semantic 2

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NLP Credits and Acknowledgment

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and some modifications from presentations found in the WEB by several scholars including the following

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Thematic Roles

- Sami broke a glass
  - $\exists e,y,\ Isa(e,Breaking) \wedge Breaker(e,\ Sami\ ) \wedge BrokenThing(e,y) \wedge Isa(y,GlassWare)$
- Ali opened a jar
  - $\exists e,y,\ Isa(e,Opening) \wedge Opener(e,\ Ali\ ) \wedge OpenedThing(e,y) \wedge Isa(y,Container)$

Inside Words

- Thematic roles: more on the stuff that goes on inside verbs.
  - Thematic roles are semantic generalizations over the specific roles that occur with specific verbs.
  - I.e. Takers, givers, eaters, makers, doers, killers, all have something in common
    - -er
    - They're all the agents of the actions
  - We can generalize across other roles as well to come up with a small finite set of such roles

Thematic Roles: A set of roles for each event

- Agent: volitional causer
  - *Ali hit Sami*
- Experiencer: experiencer of event
  - *Sami got a headache*
- Force: non-volitional causer
  - *The concrete block struck Sami on the head*
- Theme/ patient: most affected participant
  - *Ali hit Sami*
- Result: end product
  - *Sami got a headache*
- Content: proposition of propositional event
  - *Sami thought he should take up IAS courses*

Thematic Roles: A set of roles for each event

- Instrument: instrument used
  - *Ali hit Sami with a bat*
- Beneficiary: Beneficiary of an event
  - *Ali hit Sami to avenge his friend*
- Source: origin of object of transfer event
  - *Sami flied from Dammam to Riyadh*
- Goal: destination of object
  - *Sami flied from Dammam to Riyadh*

Thematic roles: more examples

- Agent: Volatile causer
- Experiencer: Experiencer of an event
- Force: Non-volatile causer
- Theme: Participant most directly affected
- Result: End product of event
- Content: Proposition or content

- Ali reads a book
- Sami feels good
- The earth was shaking
- Ali kicked the ball
- Ali has built a sand castle
- Ali said ”Leave me alone”

Thematic roles: More Examples

- Instrument: Instrument used
  - Sami caught a fish with his hands
- Beneficiary: Beneficiary of an event
  - Sami cooks for his mother
- Source: Origin of object in transfer
  - I arrived from Amman
- Goal: Destination of object in transfer
  - I traveled to England

Thematic roles

- Determining roles?
- Assigning the subject role
  - Agent
  - Instrument
  - Theme
- If you have an agent, an instrument and a theme, the agent will be subject

Examples

- So instead of
  - Ali gave Sami a book.
    - Giver(Ali)^Givee(Sami)^Given(book)
    - Agent(Ali)^Goal(Sami)^Theme(book)

Thematic Roles

- Takes some of the work away from the verbs.
  - It's not the case that every verb is unique and has to completely specify how all of its arguments uniquely behave.
  - It helps in organizing semantic processing
  - It permits us to distinguish near surface-level semantics from deeper semantics

Linking

- Thematic roles, syntactic categories and their positions in larger syntactic structures are all intertwined in complicated ways. For example…
  - AGENTS are often subjects
  - In a `VP->V NP NP` rule, the first NP is often a GOAL and the second a THEME

Thematic roles

- Limitation
  - Different verbs can take different arguments
  - Can only determine noun-phrases and preposition-phrases
  - Nouns have arguments also (destruction of the city)

Selectional Restriction

- A semantic constraint imposed by a lexeme on the concepts that can fill the various argument roles associated with it

I want to eat someplace that is close to KFUPM

- Selectional restrictions are associated with particular senses, not entire lexemes
  - *They served Chinese food last night.*
  - *Which airlines serve Amman?*

Selectional Restrictions

- Augment thematic roles by defining restrictions on what lexemes and phrases can accompany them in a sentence
- Representing selectional restrictions
  - $\exists$ *e,x,y Eating(e)* $\wedge$ *Agent(e,x)* $\wedge$ *Theme(e,y)*
  - $\exists$ *e,x,y Eating(e)* $\wedge$ *Agent(e,x)* $\wedge$ *Theme(e,y)* $\wedge$ *Isa(y, EdibleThing)*
  - $\exists$ *e,x,y Eating(e)* $\wedge$ *Agent(e,x)* $\wedge$ *Theme(e,y)* $\wedge$ *Isa(y, EdibleThing)* $\wedge$ *Isa(y, Hamburger)*

Thank you

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