Roles and the semantics of *presidential*-adjectives

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Introduction

Introduction

- ▶ Some nominals such as *president* show an ambiguity between readings related to an official role, and to readings on a personal level.

  (1)   The president visited his mother.   (personal visit preferred)

  (2)   The president visited Netanyahu.   (official visit preferred)

- ▶ These readings are driven in large part by our understanding of social roles in the world: heads are state are visited in the course of official duties of leading a country, while parents are not.

Introduction

- **Puzzle:** These same nominals admit for **only** a role-related reading when used as adjectives.

  (3) A presidential visit to $\left\{ \begin{array}{l} \text{Canada.} \\ \text{\#the president's mother.} \end{array} \right\}$

  (4) The president visited his mother.
       NO INFERENCE: There was a presidential visit to the president's mother.

- Distinction manifests in possession versus adjectival modifiers as well.

  (5) a. the president's desk   (personal reading possible)
       b. the presidential desk   (role reading only)

  (6) a. the president's advisor   (personal reading possible)
       b. the presidential advisor   (role reading only)

Introduction

- *Presidential* is a relational adjective (RA). Other examples:

  (7)   Ukrainian crisis, technical architect, nuclear war, dental care, syntactic explanation

- **This talk:** focus on relational adjectives related to social roles (e.g., *presidential*-type RAs).
  - Semi-productive subclass of RAs in English.
  - Oftentimes transparently derived from a corresponding nominal
  - For some cases the connection is only apparent diachronically

  (8)   a.   president $\leftrightarrow$ presidential
         b.   mayor $\leftrightarrow$ mayoral
         c.   senator $\leftrightarrow$ senatorial
         d.   pope $\leftrightarrow$ papal
         e.   *rex* 'king' $\leftrightarrow$ regal   (diachronic connection, Latin and French)

Questions for this talk

- How are relational adjectives (especially those of the *presidential*-type) represented semantically?
- How are ordinary individuals semantically distinguished from roles?

Answers

- ▶ Enrich ontology with levels of action (official and personal).
- ▶ Lexically decompose role-denoting nouns. Role nouns encode an event at an official level of action.
- ▶ Role-denoting RAs relate meaning of modified nominal to official actions encoded in the semantics of the adjective.
- ▶ Roles are derived from the thematic roles of events at an official level of action.

Big picture

- How adjectives compose with the nouns that they modify.
- How world knowledge and context interact with lexical meaning.
- Natural language metaphysics: how our natural language ontology is organized, and what kinds of things we find in it (Bach, 1986).

Roadmap

§2: Basic data on how relational adjectives are distinguished from other adjectives.

§3: Discussion of previous approaches to RAs and why they don't extend so well to *presidential*-adjectives.

§4: Ontological background for roles.

§5: Background on Frame Semantics.

§6 and 7: The analysis.

§8: Discussion on how frames fit in to bigger picture of the grammar.

Relational adjectives

Property adjectives

- Relational adjectives differ from the better understood property adjectives.
- Property adjectives include...
    - non-gradable adjectives of shape, color, and material: *green*, *round*, *wooden*
    - gradable one-dimensional adjectives: *big*, *expensive*, *hot*
    - gradable multi-dimensional adjectives: *healthy*, *intelligent*
- Define a property of their argument. Property attributed to referent of the nominal they combine with.
- Property adjectives are intersective (cf. Partee (1995) and references therein).

    (9) $[\![round\ peg]\!] = [\![round]\!] \cap [\![peg]\!]$

- Due to this, they can be used predicatively and define a class in their own right (e.g., *the round things/ones*).

Relational adjectives

▶ Relational adjectives are not usually intersective, but rather subsective (McNally & Boleda, 2004).

   (10)   a. $[\![presidential\ visit]\!] \neq [\![presidential]\!] \cap [\![visit]\!]$
              b. $[\![presidential\ visit]\!] \subseteq [\![visit]\!]$

▶ Typically (though not always) related to a nominal.

   (11)   a.   president, presidential
              b.   music, musical
              c.   senator, senatorial

Relational adjectives

- ▸ Two characters of readings with RAs modifying nouns.
- ▸ Thematic: characterizes an argument or event participant.

    (12)   a.   presidential visit
                 b.   French policy

- ▸ Classificatory: characterizes a subclass of the nominal.

    (13)   a.   nuclear war
                 b.   musical instrument
                 c.   dental care

Relational adjectives

- Not usually able to be used predicatively; do not define a class in their own right.

    (14)   a. #The care was dental.   (dental care)
           b. #This instrument is musical.   (musical instrument)
           c. #This conference is pediatric.   (pediatrics conference)

- Under their thematic readings, some (including the role-denoting class I'm discussing today) are similar in meaning to genitives.

    (15)   a.   the presidential visit
           b.   the president's visit

    (16)   a.   the papal decree
           b.   the pope's decree

Previous approaches

Levi (1978): Recoverably deletable predicates

- ▶ Levi (1978): compounds and RAs are transformationally derived from predications that make use of a set of abstract "Recoverably Deletable Predicates."
- ▶ Examples: CAUSE, HAVE, MAKE, USE, BE, IN, FOR, FROM, ABOUT

  (17)   thermal stress
       a.   stress CAUSED by heat
       b.   heat stress   (via deletion of CAUSE)
       c.   thermal stress   (via passivization)

- ▶ Raises questions of where these predicates come from, and why only these predicates.

Other syntactic accounts

- Previous syntactic accounts assume a syntactic distinction between thematic and classificatory uses of RAs (Bosque & Picallo, 1996; Alexiadou & Stavrou, 2011; Fábregas, 2007).
- In these accounts, thematic RAs syntactically saturate an argument position. RAs are nouns in disguise that are spelled out as adjectives.
- Classificatory RAs are true adjectives (in many accounts) and not argument-saturating.
- Arsenijevic et al. (2014) provide arguments against this view and for a view that RAs are always true adjectives.
- They argue that the argument-saturating behavior is only apparent. Product of semantics.

Kinds in relational adjectives: a Larsonian analysis

- McNally & Boleda (2004) argue that relational adjectives are properties of kinds and not individuals.
- Propose an analysis of RAs in the spirit of Larson (1998)'s analysis of event-related modifiers.
- Observation: Some subsective adjectives (such as *beautiful*) can be interpreted as being related to an event.

  (18)   Olga is a beautiful dancer.

      a.   Olga is beautiful and Olga is a dancer. (individual-related reading)

      b.   Olga dances beautifully.   (event-related reading)

Kinds in relational adjectives: a Larsonian analysis

- Larson (1998): Some nouns (like *dancer*) have arguments for events as well as individuals.

  (19) $\llbracket dancer \rrbracket = \lambda e \lambda x.\textbf{dance}(e,x)$

- Adjectives like *beautiful* are actually always intersective, but can be predicates of different arguments when they're available.

  (20) $\llbracket Olga\ is\ a\ beautiful\ dancer \rrbracket = \exists e.\textbf{dance}(e,\textbf{olga}) \wedge \textbf{beautiful}(\textbf{olga})$

  (21) $\llbracket Olga\ is\ a\ beautiful\ dancer \rrbracket = \exists e.\textbf{dance}(e,\textbf{olga}) \wedge \textbf{beautiful}(e)$

Kinds in relational adjectives: McNally & Boleda (2004)

- McNally & Boleda (2004): Suppose common nouns have an argument for a Carlsonian kind in addition to an argument for an ordinary individual. Kinds and individuals related via Carlson's R(realization) relation.

  (22) $[\![architect]\!] = \lambda x_k \lambda y_o. R(x_k, y_o) \wedge \mathbf{architect}(x)$

- Treat RAs as being properties of kinds rather than of individuals.

  (23) $[\![technical]\!] = \lambda x_k. \mathbf{technical}(x_k)$

- RAs are then interpreted intersectively via the kind argument.

  (24) $[\![technical\ architect]\!] = \lambda y_o \exists x_k. R(x_k, y_o) \wedge \mathbf{architect}(x_k) \wedge \mathbf{technical}(x_k)$

Kinds in relational adjectives: Arsenijevic et al. (2014)

- ▶ Arsenijevic et al. (2014) focus on ethnic adjective (EA) subclass of RAs (*French*, *German*, *Canadian*, *Dutch*).
- ▶ Restricted set of meanings with EAs. Classify according to a physical location (such as a nation).

  (25)   a.   French wine
         b.   German chocolate cake
         c.   Canadian involvement in the war
         d.   Dutch approach to life

- ▶ Adjective encodes thematic relation **Origin**, relating a kind and a location.

  (26)   **Origin**(x, y) iff x comes into existence within the spatial domain of y

- ▶ EAs intersect with kind argument of the common noun.

  (27) $[\![French\ wine]\!] = \lambda y_o \exists x_k [R(x_k, y_o) \wedge \textbf{wine}(x_k) \wedge \textbf{Origin}(x_k, \textbf{France})]$

Objection: Paraphrases with *kind*

▸ Given a kind-based analyses, we might expect paraphrases with kind to be
  possible with role adjectives (e.g., *an A kind of N*, *N of the A kind*)

▸ Generally, paraphrases of this sort are not possible with role adjectives or don't
  quite capture the role-related sense.

presidential election	#presidential kind of election
presidential office	#presidential kind of office
presidential advisor	#presidential kind of advisor
presidential visit	#presidential kind of visit
presidential motorcade	#presidential kind of motorcade

▸ This suggests that kinds are not the ontological sort relevant for an analysis of
  adjectives like presidential.

Objection: Encoding the relation in the adjective

- Arsenijevic et al. (2014) encode a thematic relation in the adjective itself.
- However, attributions with *presidential*-type adjectives seem to encode a number of different possible relations.

presidential election	election to determine the next president
presidential office	the office of president
presidential office	office for official action by the president
presidential advisor	advisor to the president for official action
presidential visit	visit by the president as the president
presidential visit	visit to the president as the president
presidential motorcade	motorcade [for] escorting the president

- Encoding relation in the adjective too strong of a strategy.
- Relation must come from the modified nominal, or a bridging to relation provided by context.

Objection: Predications with RAs

▸ Properties of kinds accounts predict that RAs should be able to have kind-denoting DPs as arguments (e.g., bare plurals or kind-denoting indefinites) when used predicatively.

▸ This is possible, though not always so.

(28)   For women concerned about their future fertility for reasons that are medical, social or financial. . .   (Google)

(29) $\left\{ \begin{array}{l} \text{*Doctors} \\ \text{*A doctor} \end{array} \right\}$ can be medical.

Objection: Predications with RAs

▶ Additionally, RAs used predicatively can sometimes predicate of DPs not denoting kinds, which should result in a sortal mismatch, all things being equal.

  (30)   a. *Carleton University is widespread.
         b. *My dog is extinct.

  (31)   This university is public, but private universities and colleges are also on the island.   (Google)

  (32)
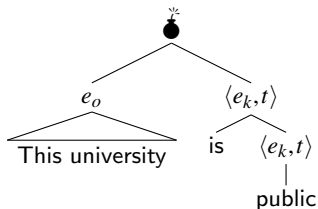
▶ This distribution isn't straightforwardly predicted by RAs as predicates of kinds; other pragmatic and semantic properties must be involved.

Ontological background

Social ontology

- A social ontology provides for social entities: persons and institutions, roles, offices, functions, actions by social agents (e.g. voters, politicians, police, parents, spouses, teachers, and such).
- Essential are social acts performed by social agents that produce social facts by acting, implementing social roles, and so on.
- Entities in the social ontology are (ultimately) implemented by entities in a physical ontology (e.g., "brute facts," Searle (1995)).
    - Persons are implemented by human animals.
    - Social acts are implemented by doings that (under appropriate circumstances) count as particular social acts (Searle, 1995).
- The social ontology of our world is in itself multi-level.
    - For example, persons are social entities that may take in social roles (a higher level).
    - The social ontology is grounded by and dependent on the physical ontology.

Levels of action

- Ontological distinction between acts at the social level and the individual level.
- A social office, like 'president of France', is defined at a non-basic, abstract level of social ontology: there is an incumbent of the office, a person.
- Certain types of acts are considered acts by the office and not by a person.
- Being an abstract institution, the office cannot execute the act.
- Official acts have to be implemented by the person in office.
- What office-holders do when they implement an official act is **not** the official act because the official act is an act by the office, not by its incumbent.

Connections between levels

- We suppose functions to map between individuals and events at different levels of the ontology.
  - INC is a function from offices to entities serving as incumbents of the office.
  - IMPL is a function from official acts to implementing acts.
  - CONST is a partial function from implementing acts (acts at the individual level of the ontology) to the acts they implement.
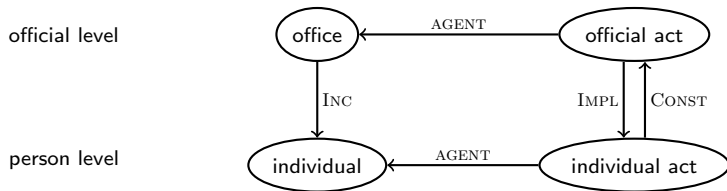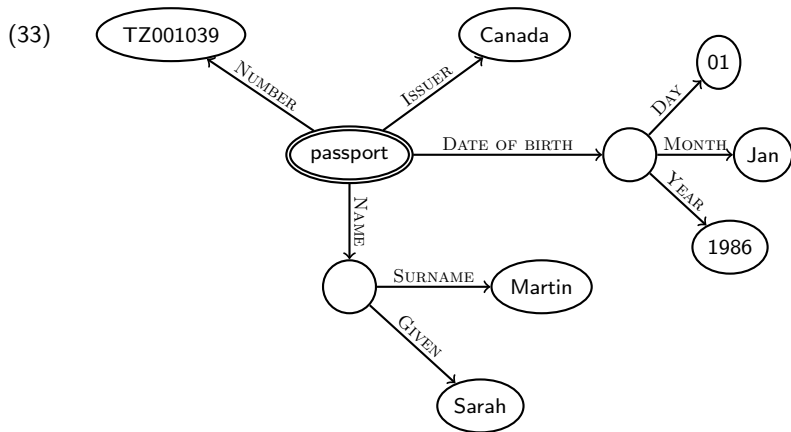
Frame Semantics

Frame Semantics

- We assume Frame Semantics, a theory of meaning representation (Petersen, 2007; Löbner, 2014).
    - Argument structure frames are familiar in linguistics from Fillmore (1968).
    - Petersen/Löbner frames descended from concept frames in cognitive psychology (Barsalou, 1992).
- These frames represent lexical and world knowledge (and not only argument structure) in the same representation.
- Decomposition of lexical knowledge.
- Structure:
    - Frames are recursive attribute-value structures. Attributes can have other frames as their values.
    - Attributes are functions. Values are typed in a type-feature hierarchy (Carpenter, 1992).
    - Distinguished node in the frame ("central node") represents referential argument.

Example

- Non-linguistic example of a frame: passport
- Attribute-value structure:
  - Set of attributes (SURNAME, GIVEN NAME, DATE OF BIRTH, PHOTOGRAPH)
  - Each has exactly one value (*Martin*, *Sarah*, *01 January 1985*)
- Recursive: (some) values themselves are also structured as frames
  - Date of birth: DAY, MONTH, YEAR
  - Photograph: SUBJECT, WIDTH, HEIGHT

Frame Semantics

- Notion of a frame is a theoretical concept.
- Different logically equivalent ways of representing the same frame.
- Directed graph. Example:

(33)

Frame Semantics

- Attribute-value matrix. Example:

(34)

$$\begin{bmatrix} \textit{passport} \\ \textsc{Issuer} & \text{Canada} \\ \textsc{Number} & \text{TZ001039} \\ \textsc{Name} & \begin{bmatrix} \textsc{Surname} & \text{Martin} \\ \textsc{Given} & \text{Sarah} \end{bmatrix} \\ \textsc{Date of birth} & \begin{bmatrix} \textsc{Day} & \text{01} \\ \textsc{Month} & \text{Jan} \\ \textsc{Year} & \text{1985} \end{bmatrix} \end{bmatrix}$$

Frame Semantics

- First-order logic with lambda calculus. Example:

(35)

$$\exists x \begin{bmatrix} \textbf{passport}(x) \wedge \\ \text{Issuer}(x) = \textbf{Canada} \wedge \text{Number}(x) = \text{``\textit{TZ}001039''} \wedge \\ \text{Surname}(\text{Name}(x)) = \text{``\textit{Martin}''} \wedge \text{Given}(\text{Name}(x)) = \text{``\textit{Sarah}''} \wedge \\ \text{Day}(\text{DOB}(x)) = 01 \wedge \text{Month}(\text{DOB}(x)) = \text{``\textit{Jan}''} \wedge \\ \text{Year}(\text{DOB}(x)) = 1985 \end{bmatrix}$$

- This talk: mix of graph-theoretic and first-order representations.
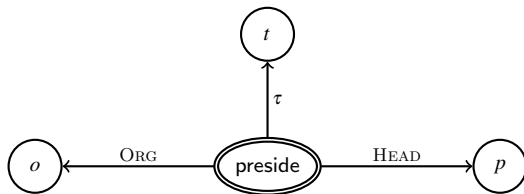
Presidency, *president*, and *presidential*

preside and *presidency*

- ▶ The concepts for 'president' and 'presidency' are defined (by social regulation) at the office level.
- ▶ We assume that the basic notion is of a presidency.
- ▶ A presidency is assumed to be an event with two arguments ($\approx$ thematic roles), an ORG(IZATION) and a HEAD.
- ▶ We introduce a predicate **preside** for this type of event.
- ▶ As for any event, every presidency has a temporal extension τ. We assume that presidencies are temporally uninterrupted.

preside and *presidency*

(36)

presidency ⤳ $\lambda e.\textbf{preside}(e) \wedge \text{ORG}(e,o) \wedge \text{HEAD}(e,p) \wedge \tau(e) = t$,
where o is an organization, p is the president of o, and t is the temporal
extension of the presidency.

Events in nominals

- Some nominals (such as *president*) include reference to an event.
- Does not mean that these nominals must have a verb in their semantics!
- Not all role nouns have a corresponding verbal form (e.g., *pope*), and we do not necessarily expect them to.
- Larson (1998) makes a similar move in allowing non-deverbal nouns like *king* to also have an event argument, and notes other nominals with apparent connections to events.

(37) a. a just king   ('rules justly')
      b. The New York Times is a daily newspaper.   ('appears daily')
      c. That was a stray bullet.   ('went astray')
      d. Dancer's Delight is a fast horse.   ('runs fast')

Events in nominals

- Modifiers like *frequent* licensed by event structure (Grimshaw, 1990).
- Limited evidence that *president* and other role nouns encode event from event-related modifiers *frequent*, *occasional*?

  (38)   As the occasional president of the local winegrower's association, Frédéric has been one of the leading advocates...   (Google)

  (39)   Huntington Hall on the corner of Merrimack and Dutton Streets was named for Dr. Elisha Huntington, Lowell's frequent mayor (elected in 1839, 1844, 1852, 1858, and 1859).   (Google)

President

- The noun *president* is indiscriminately used to refer to individuals at both the office level and the person level of the ontology.

  (40)   The president visited Canada (as part of an official trip).

  (41)   The president visited his mother (#as part of an official trip).

- We derive the meaning of *president* from the **preside** frame, as either the head or the incumbent.

- *President* allows for referential node to be individual corresponding to either the head or the incumbent.
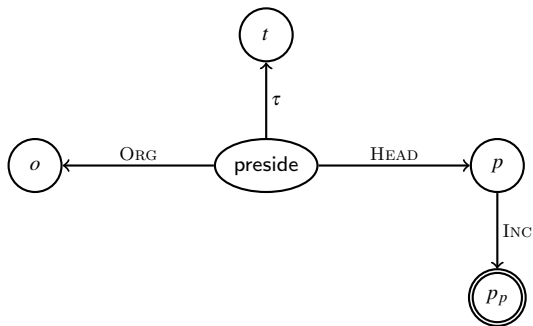
President (official)

(42)
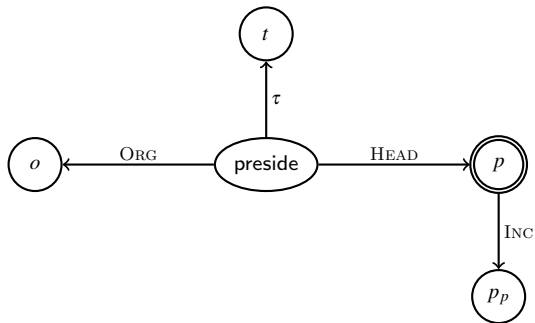
$$\text{president}_{\text{office}}(t,o) \overset{\text{def}}{=} \text{HEAD}(\iota e.\textbf{preside}(e) \wedge t \sqsubseteq \tau(e) \wedge \text{ORG}(e,o))$$
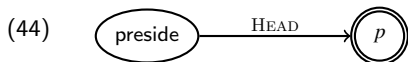
President (personal)

(43)

$$\text{president}_{\text{person}}(t,o) \stackrel{\text{def}}{=} \text{Inc}(\text{Head}(\iota e.\textbf{preside}(e) \wedge t \sqsubseteq \tau(e) \wedge \text{Org}(e,o)))$$

Presidential

- The adjective *presidential*, in the meaning underlying its RA use, relates only to the office level of the ontology.
- It is also based on the concept **preside**, as *president* is.
- Arguments for *presidential* seem to be either absent or implicitly filled.

(44)

preside $\xrightarrow{\text{HEAD}}$ p

Compositional analysis

Reminder: possible readings

▶ Objective: explain how the adjective is constrained to interpretations at the official level.

(45)   a.   The US president visited the Russian president.   (official or personal)
       b.   Trump visited Putin.   (official or personal)
       c.   Trump visited his son.   (personal preferred)
       d.   the president's visit   (official or personal)
       e.   the presidential visit   (official only)

▶ Readings determined by both lexical semantics and world knowledge.

Assumptions regarding composition

- The basic mechanism of composition in Frame Semantics is free variable unification, rather than function application.
  - Mode of composition in HPSG
  - Some forms of Discourse Representation Theory (Bende-Farkas & Kamp, 2001)
- When two meanings are unified, there may be multiple possibilities for unification.
- This means that composition is not necessarily deterministic.
- Expressions with multi-level denotations lend themselves for unification at all levels involved (e.g., unification at official or personal levels).
- Semantic concepts are based on our general ontology and knowledge of the world.
- Contextual knowledge may enable or prevent particular choices for unification.

Predication at a level

- Predication can happen at either the official or personal levels (e.g., there are acts that are official acts, personal acts, or even both).

  (46)   The president vetoed the bill.   (official)

  (47)   The president combed their hair.   (personal)

  (48)   The president visited Canada.   (both possible)

- Some modifiers (such as *as president* or *on their own time*) seem to be able to distinguish these senses.

  (49)   a.   (As president/#on their own time), the president vetoed the bill.
          b.   (#As president/on their own time), the president combed their hair.
          c.   (As president/on their own time), the president visited Canada.

- Action at a level requires the event participants to be at the same level in the ontology.

- Entities not at a particular level must be reconstrued to be at that level.

Official visits

- Official reading of *visit* requires official-level Theme.

  (50)   The president visited Netanyahu.   (official)

- AGENT of $visit_o$ unifies with office-level node of *president* frame p.
- Office corresponding to *Netanyahu* comes from world knowledge; name itself does not denote an official entity.
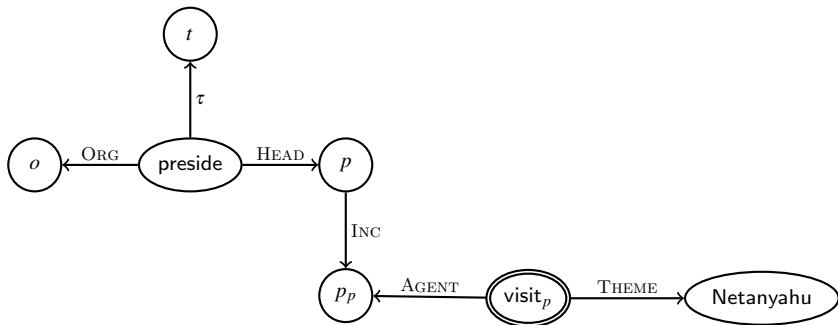- Personal-level $visit_p$ elaborated due to individual at personal-level (*Netanyahu*).
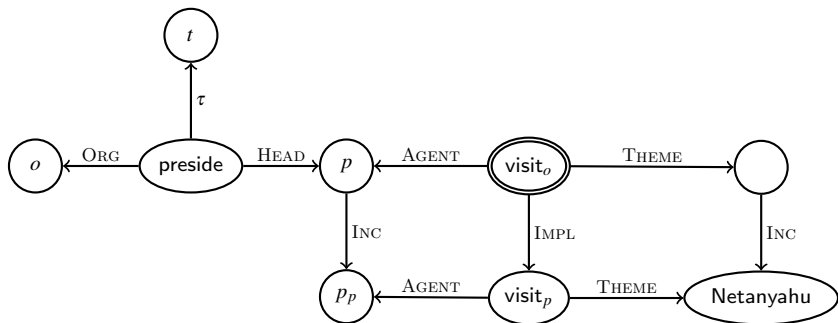
Personal visits

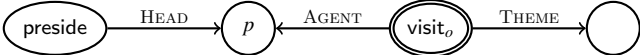- Personal reading of *visit* possible as well.

  (51)   The president visited Netanyahu.   (personal)

- *Visit* in the non-institutional sense requires agent and theme at the personal level.

- AGENT node unifies with INC (incumbent) node of *president* frame.

Presidential visit

- *presidential visit* only allows for an official-level reading.
- Due to frame for *presidential* only providing nodes at the official level.
- Can only unify with official-level *visit*.
- Only target for unification is office-level node for the president, although *visit* provides two: Agent or Theme.

(52)

preside $\xrightarrow{\text{Head}}$ p $\xrightarrow{\text{Agent}}$ visit$_o$ $\xrightarrow{\text{Theme}}$ ◯

presidential visit ⤳
$\lambda e \exists x.\textbf{visit}(e) \wedge \text{Agent}(e, \text{Head}(\iota e'.\textbf{preside}(e))) \wedge \text{Theme}(e,x)$

(53)

preside $\xrightarrow{\text{Head}}$ p $\xleftarrow{\text{Theme}}$ visit$_o$ $\xrightarrow{\text{Agent}}$ ◯

presidential visit ⤳
$\lambda e \exists x.\textbf{visit}(e) \wedge \text{Theme}(e, \text{Head}(\iota e'.\textbf{preside}(e))) \wedge \text{Agent}(e,x)$

Presidential visit

- More than one possibility for unification predicts ambiguity.
- This seems to be possible; *presidential visit* allows for a reading where the president is the theme of the visiting as well as the agent.

    (54)   Will NBA champions continue to visit the White House under Donald Trump? One of the first players to make **the presidential visit** gives his opinion.   (Google)

- Similar pattern with other role-denoting RAs.

    (55)   Abuse survivor disputes removal from Vatican commission, seeks **papal meeting**.   (Google)

- Difficult to account for this in theories where the RA is treated as an external argument (such as Alexiadou & Stavrou (2011)).
- Natural consequence in our analysis, however.

How do frames fit in to the architecture of the grammar?

World knowledge effects in natural language

- Increased attention to inferences arising from world-knowledge.
- Aktionsart is one domain where this has been noticed.

  (56)   a.   The tailor almost lengthened my pants.   (telic; ambiguous)
           b.   The teacher almost lengthened the exam.   (atelic; unambiguous)
                                     (Hay et al., 1999, ex. 6)

- Weak definites are another (Aguilar-Guevara & Zwarts (2011) and references therein).

  (57)   Today, I visited $\left\{ \begin{array}{l} \text{the doctor} \\ \text{*the surgeon} \end{array} \right\}$.

World knowledge effects in natural language

- Change of state verbs also sensitive to properties of arguments (Spalek (2015) and references therein).

  (58)   a.   John broke $\left\{ \begin{array}{l} \text{the window} \\ \text{the law} \end{array} \right\}$.

           b. $\left\{ \begin{array}{l} \text{The window} \\ \text{*The law} \end{array} \right\}$ broke.

  (59)   a.   cut the grass

           b.   cut interest rates

- And issues regarding what constitute "minimal parts" necessary for quantification.

  (60)   a.   John ate the apple.   (inference: did not eat the core)

           b.   John ate the cake.   (inference: ate all the cake)

World knowledge effects in natural language

- Standard practice in formal semantics: relativize terms to contextual variable C.
- Example: quantify over only the relevant parts of the apple for *eat the apple*.

   (61)   *John ate the apple* $\rightsquigarrow \forall x \in \mathbf{parts}_C(\iota y.\mathbf{apple}(y) \wedge \mathbf{ate}(\mathbf{j}, y))[\mathbf{ate}(\mathbf{j}, x)]$
            'For all the contextually defined relevant parts of the apple that John
            ate, John ate those parts.'

- Find context-sensitive aspects of language with regularity.
- How widely should we invoke contextual parameters to account for these facts
  and others like them?
- Inferences about the relevant parts for eating stem from knowledge of cakes
  and apples. How to capture this fact in the semantic representation?

Productivity in language

- ▶ Productivity of expressions.

    (62)   a.   throw a baseball
           b.   throw support behind a candidate
           c.   throw a boxing match
           d.   throw a party
           e.   throw a fit

                                              (Marantz, 1981, ex. 35)

    (63)   a.   The factory horns sirened throughout the raid.
           b.   The factory horns sirened midday and everyone broke for lunch.
           c.   The police car sirened the Porsche to a stop.
           d.   The police car sirened up to the accident site.
           e.   The police car sirened the daylight out of me.

   (Borer, 2005a, ex. 7)

- ▶ Different but clearly related senses.
- ▶ How to characterize the relatedness of the examples?

Frames to the rescue?

- ► These kinds of puzzles are becoming more important in theoretical work, and have long been of interest to researchers coming from a computational angle.
- ► Frames provide a principled way of organizing lexical and world knowledge.
- ► May provide a way of approaching these sorts of puzzles.

Sketch: *eat an apple*

- Constraining *eat an apple* to prevent inferences that the core was also eaten?
- Treat *eat* as requiring edible stuff for the theme argument.

(64) ◯ ←AGENT— (eat) —THEME→ (edible)
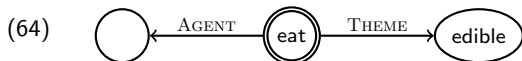
- Lexical entry (e.g., the frame) for *apple* includes an attribute for what parts of the apple are edible.

(65) (edible) ←EDIBLE_PARTS— (apple)

- Unification of *eat* and *an apple* involves unifying nodes with equivalent or compatible types. THEME of *eat* unifies with EDIBLE_PARTS of *apple*.

(66) ◯ ←AGENT— (eat) —THEME→ (edible) ←EDIBLE_PARTS— (apple)

Sketch: Weak definites

- Weak definites are not always so "definite" (many doctors and surgeons in a city) and good in out-of-the-blue contexts (unlike most definite DPs).

  (67)   Today, John visited $\left\{ \begin{array}{l} \text{the doctor} \\ \text{*the surgeon} \end{array} \right\}$.

- However, definite when knowledge about the speaker is taken into account.
- Many people have one unique doctor.
- Include DOCTOR attribute as part of the frame for an individual.
- *The doctor* refers to the unique doctor that is part of the frame for the subject.

  (68)   *John visited the doctor* $\rightsquigarrow$
        $\exists e.\textbf{visit}(e) \wedge \text{AGENT}(e, \textbf{j}) \wedge \text{THEME}(e, \text{DOCTOR}(\textbf{j}))$

- Requires unification of THEME with DOCTOR attribute of the subject.
- Failure of *the surgeon* due to most individuals not having a surgeon.

Some final thoughts on FS and productivity

- ▶ Richness of frame representation might provide the right kind of semantics for roots (in the Distributed Morphology sense).
- ▶ Availability of lexical information and world knowledge might make it possible to model in detail the variations in meaning that arise when roots are embedded in structure.
- ▶ Frames themselves are unconstrained, but syntax provides constraints.
- ▶ Functional heads then serve the purpose of...
    - ▶ Valuing attributes and providing constraints
      (example: tense and aspectual heads)
    - ▶ Shifting central node/referential argument
      (example: category changing morphology)
    - ▶ Providing additional frames that must be unified with the root frame
      (example: verbalizing morphology)
- ▶ To borrow a metaphor from Borer (2005a,b), pour raw frame material into syntax mold.
- ▶ A project for the future...

Conclusion

Social ontology

- Analysis requires a rich ontology that includes a social ontology and is able to distinguish between levels that constitute or implement each other.
- Roles can be derived from events of role-incumbency at an appropriate level in the social ontology. They are thematic roles in this type of event.
- Roles as abstract entities in the social ontology are linked by the incumbent relation to entities at the level of persons in the social ontology.
- The ontology level of roles and offices provides for role and office acts by agents at this level.
- Reference to acts at office level necessarily requires lower level implementary action by the incumbent of the office.

Compositional analysis

- A frame-based lexical semantics allows the application of unification as the basic mechanism of composition.
- Composition allows for multiple readings from the same lexical input, if unification is possible in more than one way. Thus composition is not necessarily deterministic.
- The ontology connects lexical concepts to world knowledge.
- Some lexical concepts involve more than one ontological level.
- Composition requires level-selection for unification.

Thank you!

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