

Nominal non-predicating adjectives

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17 May 2018

SFB 991 Colloquium (Düsseldorf)



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 Justin Trudeau. (official visit preferred)
- ▶ These readings are driven in large part by our understanding of social roles in the world: heads of 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, maternal love, dental care, syntactic explanation, mayoral decision, thermal insulator
 - (8) crisis in the Ukraine, architect who designs technical portions of a system, care for teeth, explanation syntactic in nature, decision by the mayor, insulator against heat

- ▶ All of these examples of adjectives are either denominal, or they have closely related nominal counterparts
 - (9) Ukraine, technique, mother, tooth, syntax, mayor, heat

- ▶ What is the relationship between these adjectives and their nominal counterparts (especially if they are not denominal)?

- ▶ How do we account for the modifications by these adjectives to get the (very rough) truth conditions in (8)?

This talk

- ▶ Distinguish relational adjectives from property adjectives
- ▶ Criticize current and popular semantic account of RAs
- ▶ Introduce a theory of relational adjectives in frames
- ▶ Extend this theory to role-related relational adjectives
- ▶ Many aspects of this talk are already discussed in Anderson & Löbner (to appear).

Relational adjectives and co-nominality

Property adjectives

- ▶ Need to distinguish RAs from property adjectives.
- ▶ Take property adjectives to be the “prototypical” adjectives.

- (10)
- a. red book
 - b. large dog
 - c. hot coffee

- ▶ Sometimes gradable, often able to be used predicatively.

- (11)
- a. The book is red.
 - b. His dog is large.
 - c. My coffee is hot.

- ▶ In formal semantics, usually taken to be property-denoting, e.g. type $\langle e, t \rangle$ (modulo degree arguments in the case of gradable adjectives).

Relational adjectives

- ▶ Characterize a subtype of the modified noun. Examples:

(12) nuclear power, dental instrument, medical school, presidential visit, mental stamina, thermal insulator

- ▶ Cannot always be used predicatively (but more on this in a minute).

(13) a. ??The power this plant makes is nuclear.
 b. ??The visit to Canada was presidential.
 c. ??This insulator is thermal.

- ▶ Non-gradable.

- ▶ No syntactic binding.

(14) a presidential pardon of Richard Nixon/*himself

- ▶ Can relate to thematic argument of modified noun, especially with deverbal nouns.

(15) a. presidential visit
 b. mayoral election

Co-nominality

- ▶ Notice that many RAs are denominal (*presidential, mayoral, parental*).
- ▶ Of those that are not denominal, there is often a noun with a closely related sense (*thermal* and *heat, dental* and *tooth*).
- ▶ We introduce the notion of **co-nominality** to cover this semantic relationship between RAs and certain nouns.
- ▶ Co-nominal adjectives are in a morphological relationship with a noun and/or are in a particular semantic relationship with a noun.

Co-nouns and co-adjectives

N → A	<i>president – presidential</i> <i>Canada – Canadian</i>	<i>parent – parental</i>
A → N	<i>electricity – electric</i> <i>semantics – semantic</i> <i>civilian – civil</i>	<i>municipality – municipal</i> <i>electronics – electronic</i>
A = N	<i>military – military</i> <i>public – public</i>	<i>official – official</i>
A, N	<i>pope – papal</i> <i>mother – maternal</i> <i>mind – mental</i>	<i>lungs – pulmonary</i> <i>king/queen/prince/princess – royal</i> <i>body – physical</i>

Table: Pairs of adjectives and co-nouns, and nouns and co-adjectives

Co-nominality

- ▶ Our claim: co-nouns have essentially the same semantics as their co-adjectives, except for two differences:
 - ▶ Co-adjectives do not refer, unlike their co-nouns
 - ▶ Components of the adjectival meaning corresponding to referential arguments (and other arguments) are not arguments with co-adjectives

- ▶ Same semantics, but variables are unbound in relational adjective.

(16) a. $\llbracket \textit{mother} \rrbracket = \lambda x \lambda y. \mathbf{mother}(x, y)$
 b. $\llbracket \textit{maternal} \rrbracket = \mathbf{mother}(x, y)$

- ▶ Some upshots of this:
 - ▶ Explains why these adjectives do not predicate: they are not predicates.
 - ▶ No arguments explains a lack of anaphoric binding.

- ▶ Take modifications with these adjectives to be marriages between frames, rather than examples of predication.

Kinds in relational adjectives

Kinds in relational adjectives: McNally & Boleda (2004)

- ▶ Carlson (1977): Natural language ontology includes individuals corresponding to kinds (e.g., DOG-KIND, ALLIGATOR-KIND).
- ▶ 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.

$$(17) \quad \llbracket \textit{architect} \rrbracket = \lambda x_k \lambda y_o. R(x_k, y_o) \wedge \mathbf{architect}(x)$$

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

$$(18) \quad \llbracket \textit{technical} \rrbracket = \lambda x_k. \mathbf{technical}(x_k)$$

- ▶ RAs are then interpreted intersectively via the kind argument.

$$(19) \quad \llbracket \textit{technical architect} \rrbracket = \lambda y_o \exists x_k. R(x_k, y_o) \wedge \mathbf{architect}(x_k) \wedge \mathbf{technical}(x_k)$$

Objections to McNally & Boleda (2004)

- ▶ Object to use of term “kind” to cover things such as professions.
- ▶ Object to RAs predicating of kinds; no property common to the following:
 - (20) *technical architects, technical problems, technical colleges, and technical instructions*
- ▶ Additionally, these things are of wildly different ontological kinds.
- ▶ Even paraphrase with *kind* seems to not capture the correct meanings, or is otherwise somewhat degraded.
 - (21) *technical kind of architect, technical kind of problem, college of the technical kind, instructions of the technical kind*

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).

- (22) a. French wine
 b. French agreement (to participate in the negotiations)

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

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

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

(24) $\llbracket \textit{French wine} \rrbracket = \lambda y_o \exists x_k [R(x_k, y_o) \wedge \mathbf{wine}(x_k) \wedge \mathbf{Origin}(x_k, \mathbf{France})]$

Objections to Arsenijevic et al. (2014)

- ▶ Seems clear that linking relation in ethnic adjectives is not always **Origin**. None of the following can be paraphrased as “N with origin in Canada.”

(25) *Canadian . . .*
government, prime minister, immigrants (= immigrants to Canada),
territory, citizenship, army, history, Rockies, border, dollar, reunion,
geography, economics, policy, law, writer

- ▶ Once again, different ontological types: geographic regions and political entities
- ▶ Linking relation not always contributed by the adjective. Sometimes contributed by noun, but sometimes through a bridging relation.

(26) Canadian writer

- writer born in Canada
- writer living in Canada
- writer participating in the literary scene of Canada

Semantics for relational adjectives

Composition via frame unification

- ▶ Composition of relational adjectives occurs via variable unification.
- ▶ Standard method of composition in frame semantics.

Maternal

- ▶ Minimally, *maternal love* might be considered to be the value of MOTHER being unified with the EXPERIENCER in the *love* frame.

(27) maternal love

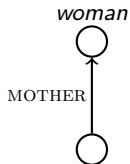


Figure: *Maternal*

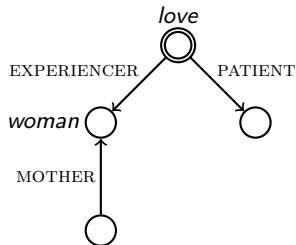


Figure: *Maternal love*

- ▶ This is an example where the head noun provides the linking relation.

Dental instrument and bridging

- ▶ *Dental instrument* provides a case where a bridging relation (background knowledge) links the adjective and the modified noun.

(28) “**Dental instruments** are tools that **dental professionals** use to provide **dental treatment**. They include tools to examine, manipulate, treat, restore and remove teeth and surrounding oral structures.”
 (Wikipedia, “Dental instrument”)

- ▶ Bridging contexts (dentists, dental treatment) necessary to understand common relational adjectives.

Dental instrument

- ▶ *Dental instrument* requires a *treat* frame in order to link *instrument* to co-noun *tooth*.
- ▶ Dental instruments are instruments that doctors who specialize in dentistry (!) use to remove a tooth of the patient they are treating.

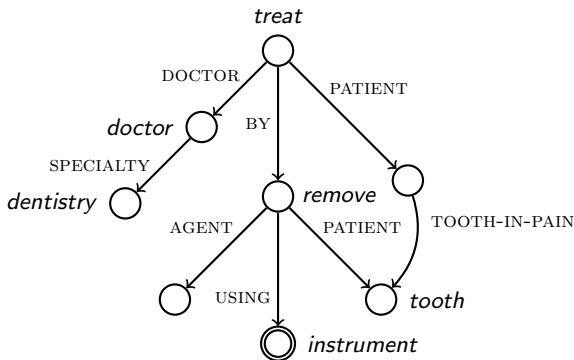


Figure: *Dental instrument*

A more complex case: *nuclear*

- ▶ Consider *nuclear* as case-study. (Ignoring e.g. *nuclear family*)
 - (29) nuclear weapons, nuclear industry, nuclear waste, nuclear energy, nuclear war, nuclear fuel, nuclear disarmament, nuclear deterrent, nuclear plant, nuclear reactor, nuclear testing, nuclear fission, nuclear test, nuclear warheads

- ▶ What relates these senses?

Again, kinds are no help

- ▶ It's worth mentioning again that kinds are no help in understanding the modification. No clear idea of what a “nuclear” kind is.

$$(30) \quad \llbracket \text{nuclear } N \rrbracket = \lambda x \exists k. R(x, k) \wedge \mathbf{N}(x) \wedge \mathbf{nuclear}(k)$$

- ▶ Would need a kind that covers types of physics, weapons, wars, weather (*nuclear winter*), disasters, . . .
- ▶ In order to understand many relational adjectives, more must be said about the concepts involved.
- ▶ *Nuclear* and many other relational adjectives have complex background frames used in understanding.

Understanding *nuclear power*

- ▶ What is nuclear power?

(31) “**Nuclear power** is the use of **nuclear reactions** that release **nuclear energy** to generate heat, which most frequently is then used in steam turbines to produce electricity in a **nuclear power plant**.” (Wikipedia, “Nuclear power”)

- ▶ Understanding the expression *nuclear power* requires understanding at least nuclear power plants, nuclear energy, and nuclear reactions (e.g., nuclear fission).
- ▶ My claim: recursively organized frames that, at their core, ultimately relate to the co-nominal concept (*atomic*) *nucleus*.

Nuclear power

- ▶ Possible frame for *nuclear power* has sub-frames for each of the concepts *nuclear reactor*, *nuclear fission*, and *nuclear energy*.
- ▶ Frame ultimately relates to *nucleus* via the background frame of *nuclear reactor*.

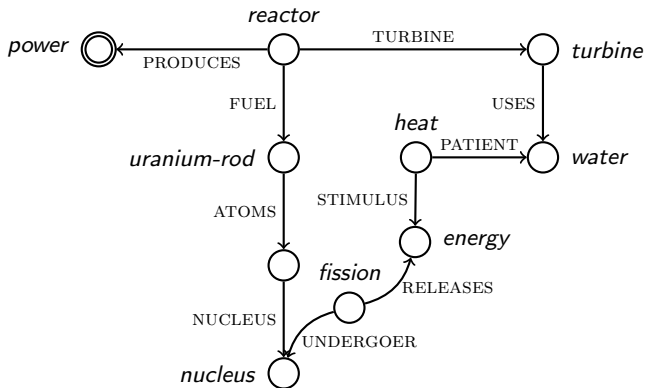


Figure: Nuclear power

Predicative use of RAs?

- ▶ The claim that RAs can't be used predicatively is not entirely correct.
 - ▶ Predicative uses of RAs are improved when its clear how the RA has been "sorted."
- (32)
- a. This university is public.
 - b. This conference is international.
 - c. La tuberculosi pot ser pulmonar. (Catalan; McNally & Boleda (2004))
'Tuberculosis can be pulmonary.'
- ▶ When the particular domain of the adjective is fixed, interpretation is easier.
 - ▶ These represent true cases of predication.
 - ▶ Contextually supplied bridging relation that binds a free variable in the meaning of the adjective.

Predicative use of RAs

- ▶ Consider *public*: constellation relating to *citizens* and/or the government serving the citizens.
 - (33) public sector, public relations, public transport, public interest, public opinion, public health, public expenditure, public service, public spending, public school, public life, public library, public works, public money, public funds, public meeting

- ▶ Not always the same relation; *public sector* relates to governmental jobs, *public library* relates to how a library is funded (by the government), and *public relations* relates (usually business) relations directly to the public (citizens).

Predicative use of RAs

- ▶ Predicative use of *public* involves deploying background knowledge to pick the correct bridging frame between the subject and the adjective. For instance:

- (34) a. This university is public.
 b. This university is publicly funded.

- ▶ Bridging frame creates an open argument position for the subject. A too-simple frame where *public* is embedded in a *fund* frame:

- (35) $\llbracket \text{public}(ly \text{ funded}) \rrbracket =$
 $\lambda x. \exists y \exists e. \mathbf{public}(y) \wedge \mathbf{fund}(e) \wedge \text{AGENT}(e, \text{GOVMNT}(y)) \wedge \text{PATIENT}(e, x)$

Returning to *presidential*...

- ▶ Returning to *presidential*, already noted that *presidential* and its co-noun *president* differ in a crucial way: *presidential* only has a role-related sense.
 - (36) a. the president's desk (personal reading possible)
 - b. the presidential desk (role reading only)
 - (37) a. the president's advisor (personal reading possible)
 - b. the presidential advisor (role reading only)

- ▶ Somewhat more must be said about the meaning of *presidential*, and how it differs from *president*.

- ▶ We introduce an additional level of complexity into the frame ontology to account for roles versus the individuals who hold them.

Ontological background

Social ontology

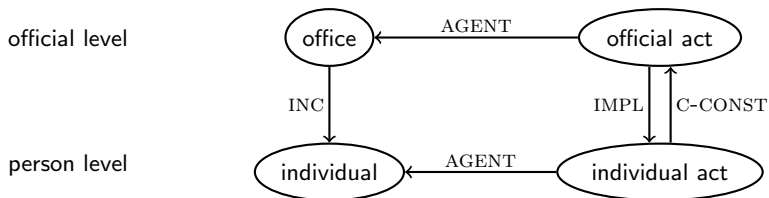
- ▶ A **social ontology** provides for **social entities**: persons and institutions, roles, offices, functions, actions by social agents (e.g. voters, politicians, police, parents, spouses, teachers, and such).
- ▶ Essential are social acts performed by social agents that produce social facts by acting, 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.
 - ▶ C-CONST is a partial function from implementing acts (acts at the individual level of the ontology) to the acts they implement.

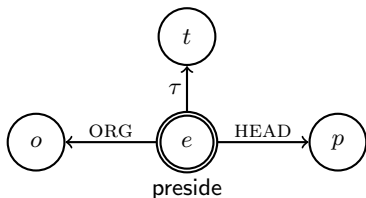


Presidency, president, and presidential

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 frame



- ▶ Same concept is present in both *president* and *presidential*.
- ▶ Notion of an event of some person being the president of some organization. Event is defined at a social level above the simple person level.
- ▶ We introduce the metalanguage predicate **preside** for the event of a presidency.
- ▶ Three attributes (equatable to thematic roles) that are presently relevant:
 - ▶ **ORG**: for “organization”
 - ▶ **HEAD**: one who heads the organization, roughly the agent of the presiding event.
 - ▶ τ represents the temporal extension of the event.

Events in nominals

- ▶ Some nominals (such as *president*) include reference to an event.
- ▶ Does not mean that these nominals must be deverbal!
- ▶ 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.

- (38)
- | | | |
|----|--|-------------------|
| 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') |

President

- ▶ The noun *president* is indiscriminately used to refer to individuals at both the office level and the person level of the ontology.
 - (39) The president visited Canada (as part of an official trip).
 - (40) The president visited his mother (#as part of an official trip).
- ▶ We derive the meaning of *president* from the eventive **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

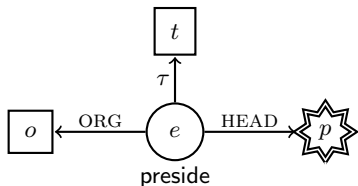


Figure: *president* ('office')

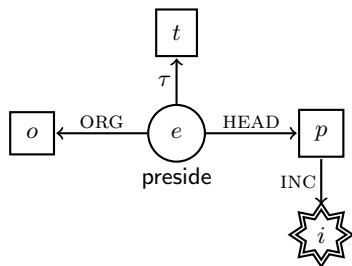


Figure: *president* ('person')

$$(41) \quad \llbracket \textit{president}_{office} \rrbracket = \lambda o \lambda t \lambda p [p = \text{HEAD}(\iota e. \mathbf{preside}(e) \wedge \tau(e) = t \wedge \text{ORG}(e) = o)]$$

$$(42) \quad \llbracket \textit{president}_{person} \rrbracket = \lambda o \lambda t \lambda i [i = \text{INC}(\text{HEAD}(\iota e. \mathbf{preside}(e) \wedge \tau(e) = t \wedge \text{ORG}(e) = o))]$$

Presidential and presidency

- ▶ 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* implicitly filled.

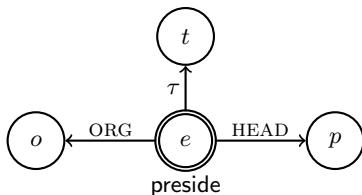


Figure: *presidential*

Compositional analysis

Reminder: possible readings

- ▶ Objective: explain how the adjective is constrained to interpretations at the official level.
 - (43) 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.

Modification at a level

- ▶ Modification can happen at either the official or personal levels (e.g., there are acts that are official acts, personal acts, or even both).
 - (44) The president vetoed the bill. (official)
 - (45) The president combed their hair. (personal)
 - (46) The president visited Canada. (both possible)
- ▶ Some modifiers (such as *as president* or *privately*) seem to be able to distinguish these senses.
 - (47)
 - a. (As president/#privately), the president vetoed the bill.
 - b. (#As president/privately), the president combed their hair.
 - c. (As president/privately), 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.

(48) The president visited Justin Trudeau. (official)

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

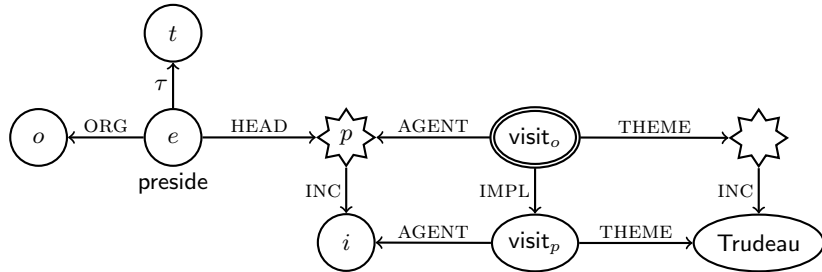


Figure: 'official' level reading

Personal visits

- ▶ Personal reading of *visit* possible as well.

(49) The president visited Justin Trudeau. (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.

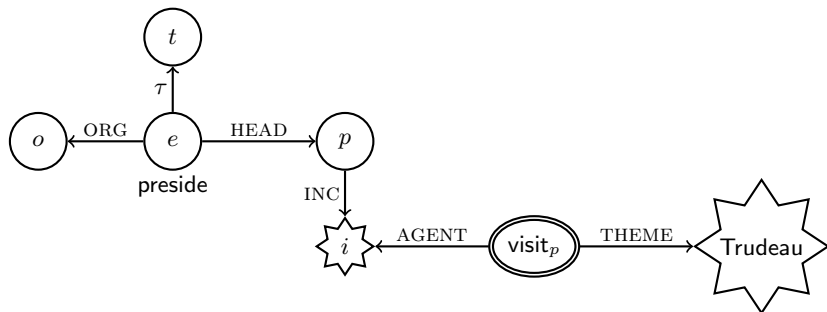


Figure: 'personal' level reading

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.

$$(50) \quad \llbracket \textit{presidential visit} \rrbracket = \lambda e \exists x \left[\begin{array}{l} \mathbf{visit}(e) \wedge \text{THEME}(e) = x \wedge \\ \text{AGENT}(e) = \text{HEAD}(\iota e'. \mathbf{preside}(e')) \end{array} \right]$$

$$(51) \quad \llbracket \textit{presidential visit} \rrbracket = \lambda e \exists x \left[\begin{array}{l} \mathbf{visit}(e) \wedge \text{AGENT}(e) = x \wedge \\ \text{THEME}(e) = \text{HEAD}(\iota e'. \mathbf{preside}(e')) \end{array} \right]$$

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.
 - (52) 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.
 - (53) 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 of the nominal (such as Alexiadou & Stavrou (2011)).
- ▶ Natural consequence in our analysis, however.

Conclusion

Conclusion

- ▶ Notion of co-nominality: certain adjectives have the same semantics as certain nouns.
- ▶ Modification by composing two nominal concepts. Adjective, noun, or context can determine how they compose.
- ▶ Some relational adjectives (ones related to roles) have additional complexity.
- ▶ Introduced a social ontology in order to represent social individuals and events. Related to concrete individuals through frame attributes.
- ▶ Roles are thematic roles for social events.
- ▶ Unification is not deterministic; multiple possibilities for unification predict multiple readings.

Thank you!

This research is supported by the German Science Foundation (DFG) CRC 991 “The Structure of Representations in Language, Cognition, and Science,” project C10.

We thank Henk Zeevat, Willi Geuder, Wiebke Petersen, Katja Gabrovskaja, Gottfried Vosgerau, Gerhard Schurz, Markus Schrenk, Ai Taniguchi, and audiences at Sinn und Bedeutung 22, TbiLLC 2017, and Carleton University for their comments and discussion.

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