

Semantic theory: Metaphor and Metonymy

June 28,2005

Today's plan and the overall schedule

- Current topic: Lexical semantics
- Last week: Lexical resources and semantic roles
- This week: Metaphor and metonymy
 - ◆ Metaphor
 - Conceptual blending
 - ◆ Metonymy
 - Properties, representations, computation
- Next week: Event semantics

Metaphor: examples

- Perot will walk into a brick wall on capitol.
- Now they have overstepped the line.
- Mary is a lion.

Metaphor: definition

- Example: *And then he finally grasped the idea.*
- What is a metaphor?
 - ◆ A metaphor is a conceptual view (rather than a sequence of words)
 - IDEAS ARE OBJECTS
 - ◆ It construes one object as another
 - An idea is construed as a concrete object
 - ◆ Through a metaphor, some qualities are transferred from a source domain to a target domain
 - Source: tangible objects; target: ideas

Metaphor vs. simile

- Metaphor:
- Mary is a lion.
- Comparison implicit
- May lead to confusion when taken literally
- Simile:
- Mary acted like a lion.
- Comparison explicit
- Word like 'like', 'than'
- Clearly just a comparison

Metaphor as conceptual view

- Lakoff and Johnson, Metaphors we live by
- ARGUMENT IS WAR:
 - ◆ Your claims are indefensible.
 - ◆ I demolished his argument.
- Argument as war is not just a figure of speech: People actually treat discussion like warfare
- Attacking positions of opponents, defending one's own, planning strategies...
- “The essence of metaphor is understanding and experiencing one kind of thing in terms of another”

Some metaphors from the Master Metaphor List

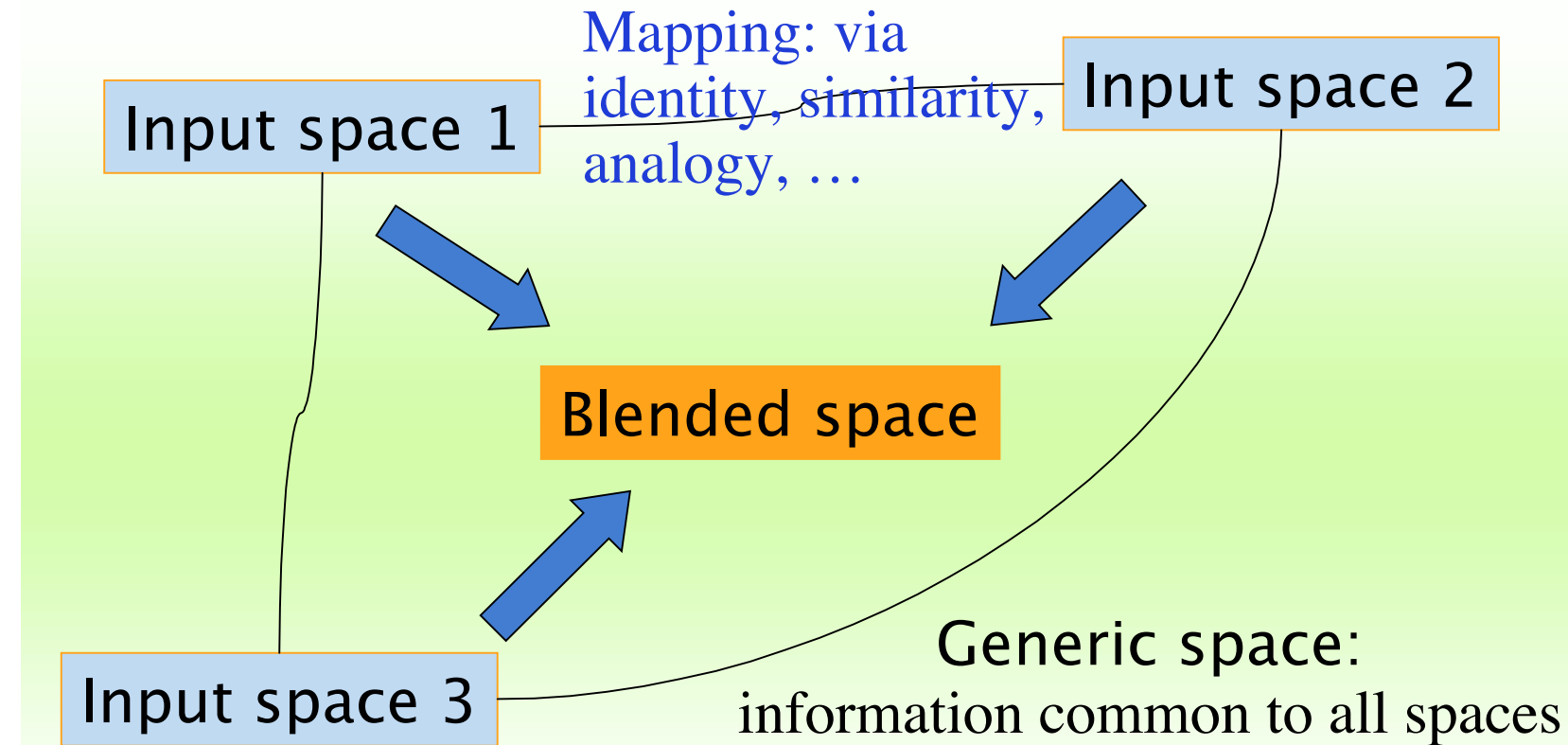
- Anger is heat
- Beliefs are beings with a life cycle
- Ideas are objects
- People are machines
- Money is a liquid
- Rational is up
- A problem is a region in a landscape

Can you find examples of each type?

Explaining metaphor: conceptual blending

- Fauconnier and Turner 1998, Coulson 2000
- Theoretical framework for exploring human information integration
- Mental space:
 - ◆ Representation of entities and relations
 - ◆ Used to partition incoming information
 - ◆ Logically coherent
- Conceptual integration network:
 - ◆ Linking mental spaces to develop novel conceptualizations
 - ◆ Linking mental spaces involves mapping entities and relations between them

Conceptual integration networks



Blending: establishment of partial mappings

Conceptual integration networks

- Array of mental spaces in which blending takes place
- Mental spaces involved:
 - ◆ Two or more input spaces from discrete cognitive domains
 - ◆ Generic space
 - ◆ Blended space
- Soft constraints on mappings
 - ◆ E.g.: Relations in the blend should match the relations of their counterparts in the other spaces

Conceptual integration: An example

- My karma ran over my dogma
(bumper sticker on a student's car)
- Formal blend
 - ◆ Partial phonological similarity of “car” and “karma”, “dog” and “dogma”
- Conceptual blend
 - ◆ Situation of a car running over a dog
 - ◆ Situation where one religious or philosophical notion supplants another

Conceptual integration: An example

- Input spaces:
 1. Car-runs-over-dog space
 2. Philosophical space representing abstract concepts “karma” and “dogma”
- Generic:
 - ◆ CONTACT OVER image schema
 - ◆ An *image schema* is a basic mental pattern that is being used to structure understanding
- Blended space:
 - ◆ Karma fulfils role of car
 - ◆ Dogma fulfils the role of dog
 - ◆ Describes relationship between a person’s karmic status and dogmatic beliefs
 - ◆ Emotional connotation not mapped

Conceptual blending facts

- Typical conceptual blending analyses
 - ◆ start from example hypothesized to involve blending
 - ◆ Then describe conceptual structure of each space in the integration network, characterizing differences between structures of the spaces
- Conceptual blending has been used to explain
 - ◆ Metaphor
 - ◆ Understanding of cause and effect
 - ◆ Experience of motion (integration in the visual system)
 - ◆ The relation between performative and depictive use of language (by a causal relationship between a performative and a depictive mental space)

Current trends in metaphor research

Metaphor databases

- Hamburg metaphor database:
 - ◆ Annotation of French and German sentences containing metaphors
 - ◆ Annotation of metaphoric expressions with EuroWordNet entries (synsets for literal or metaphoric sense or both)
 - ◆ Annotation of conceptual mapping using the Berkeley Master Metaphor List
- John Barnden's Metaphor-of-Mind database
 - ◆ Metaphorical descriptions of mental states and processes

Current trends in metaphor research

Corpus-based approaches

- Automatic detection of conventionalized metaphors by comparing texts from different domains
 - ◆ E.g. Finance domain, Laboratory domain in order to detect “Money is a fluid” metaphors

Metonymy: examples

- The White House said...
- I'm parked out back.
- The pen is mightier than the sword.
- The ham sandwich is getting angry.

Metonymy: definition

- Example: The White House said...
- A phrase P is a metonymic reference to an object X if
 - ◆ P refers to some object Y (in P's literal reading)
 - ◆ Y has a salient connection to X in the given context
 - ◆ “White House” metonymically refers to the U.S. government. Salient connection: place → people located at place

Conventional metonymies

- Part for whole
- Producer for product
- Controller for controlled
- Institution for people responsible
- Place for event
- Place for institution
- Object used for user
- Container for contents

Can you find examples of each type?

Controversial Issue: Mapping determined by argument or predicate?

The argument

- Lexical properties of the argument determine metonymies it can be involved in

The predicate (Nunberg 95).

1. I am parked out back.
 2. * I am parked out back and may not start.
 3. I am parked out back and have been waiting for 15 minutes.
- Conclusion: “parked out back” contributes a property of persons, the property they possess in virtue of the locations of their cars

Controversial Issue: Mapping determined by argument or predicate?

- Sometimes the predicate, sometimes the argument, depending on the metonymy expressed (Dölling)
- **Both.** Information sources:
 - ◆ Lexical entry for the argument
 - ◆ Selectional restrictions (and other properties) of the predicate
 - ◆ Contextual information

Controversial issue: sortal mismatch?

- Metonymy can be detected through violation of a selectional restriction of the predicate
 - ◆ The White House said...
 - ◆ But houses are not agents.
- This is not the case for all metonymies.
 - ◆ I don't really like Shakespeare.
 - ◆ "Like" does not impose strong selectional restrictions on its direct object.
 - ◆ Still, metonymic reading available

Metonymy vs. Metaphor

- Metonymy:
 - A phrase that is saliently related to the concept is substituted for the concept
 - Contiguity
- Metaphor:
 - A whole domain mapped to another
 - Similarity
 - Transfer of qualities from source to target domain

Metonymy vs. Metaphor: a problematic case

- The U.S. believes that...
- Analysis as metonymy:
 - ◆ Either state -> government of state
 - ◆ Or state -> people living in that state
- Analysis as metaphor?
 - ◆ Convince me that this is, in fact, metaphoric: Which term is being used metaphorically? In what way?

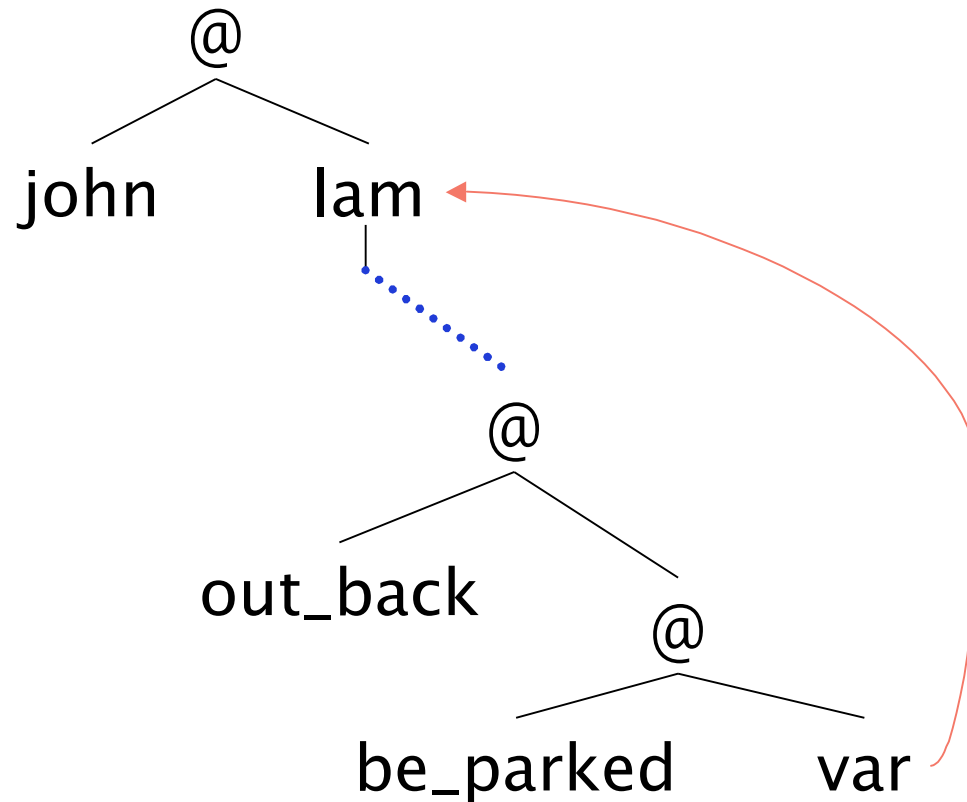
Metonymy vs. Metaphor: a problematic case

- J. Barnden:
 - ◆ Metaphoric analysis 1:
 - “The U.S.” metaphorically regarded as person
 - ◆ Metaphoric analysis 2:
 - “believe” is applied metaphorically to a state: The “believed” proposition is contained in the constitution or the law, as in:
“The editorial page of the Times has always believed that...”

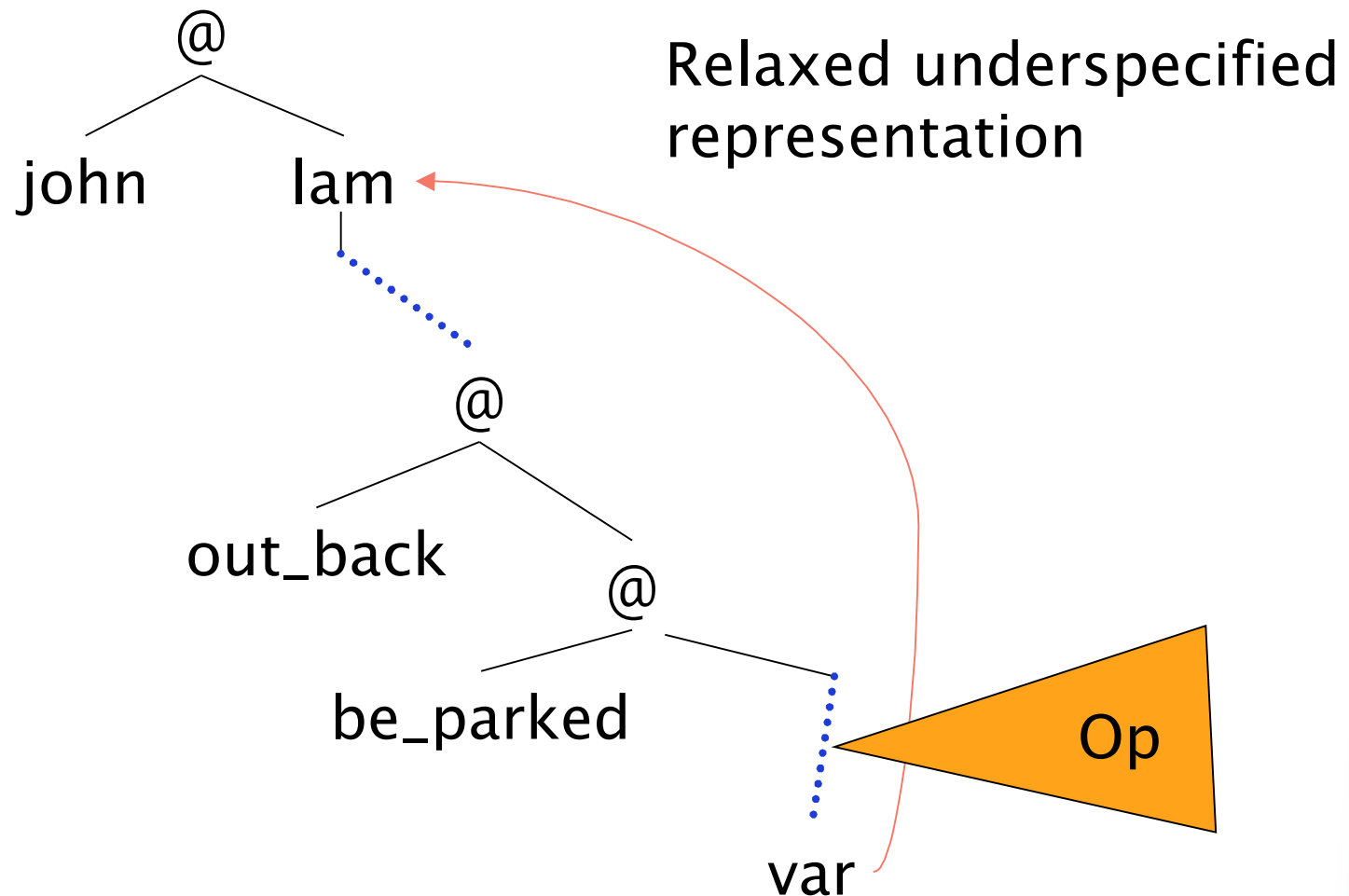
Integration in a formal semantic framework

- I am parked out back \rightarrow
A car whose owner I am is parked out back
- $F(A) \rightarrow F(\text{Op}(A))$
- Egg, Striegnitz, Koller, Niehren:
 - ◆ Semantics construction: dominance graph
 - ◆ Insertion of reinterpretation operator:
Monotonic extension of the dominance graph

Reinterpretation and dominance graphs



Reinterpretation and dominance graphs



The Generative Lexicon

- Pustejovsky 1991
- Lexical decomposition
- But not primitive-based
 - ◆ As in `kill = cause(become(not(alive)))`
- Instead, fixed set of generative devices
- Lexical item includes
 - ◆ Minimal semantic configuration and
 - ◆ Compositional properties

The Generative Lexicon

- **Qualia structure**
 - ◆ **Constitutive role:** relation between word and its constituent parts
 - ◆ **Formal role:** what distinguishes the word in a larger domain
 - ◆ **Telic role:** purpose
 - ◆ **Agentive role:** whatever brings this object about
- **Example:**
 - novel: const: narrative(*x*)
 - form: book(*x*), disk(*x*)
 - telic: read(T, y, *x*)
 - agentive: artifact(*x*), write(T, z, *x*)

The Generative Lexicon

- Complete representation of lexical meaning:
 - ◆ argument structure
 - ◆ event structure: state, process, or transition
 - ◆ qualia structure
 - ◆ inheritance structure
- **Cocompositionality**
 - ◆ Rather than treating the expressions that behave as arguments to a function as simple, passive objects, imagine that they are as active in the semantics as the verb itself.
The product of function application would be sensitive to both the function and its active argument

The generative lexicon and metonymy

- Available for reinterpretation: telic and agentive role of each word
 - ◆ Mary enjoyed the book. (read, write)
 - ◆ John began a novel. (read, write)
- Logical metonymy:
 - ◆ Use of a noun phrase to suggest an event associated with that noun phrase.
 - ◆ Metonymy: one phrase is used in place of another
 - ◆ Logical: triggered by type requirements which a verb places onto its arguments

Testing the predictions of the generative lexicon: Verspoor 1997

- Pustejovsky largely ignores conventionality
- Usage possibilities more limited than predicted by the generative lexicon:
 - * John began the film (watching)
 - * John began the door (opening, walking through)

Testing the predictions of the generative lexicon: Verspoor 1997

- Study of “begin”, “finish” in corpora of spoken and written text, mainly manual analysis
- Few metonymies involving “begin”
- Many more involving “finish”
- Low influence of context on metonymic interpretation
- Telic metonymies occur for only about 20 different categories of nouns
- Agentive metonymies occur for a wider range of objects, in general, for artifacts
- Agentive role more uniform across objects: all agentive events are creation events

Testing the predictions of the generative lexicon: Verspoor 1997

- **Conclusions:**
 - ◆ Not every noun has a telic role
 - ◆ Metonymy seems restricted to either agentive events or conventionalized telic events
- **Proposal:** Account of logical metonymy governed by lexical specification of usage conventions

Markert and Hahn 2002: Metonymies in discourse

- Task: interpreting metonymic expressions in discourse
- Domain: IT test reports
- Interpretation using domain-specific ontology

Markert and Hahn 2002:

Main points

- Detecting metonymy:
 - ◆ Not through sortal mismatch
 - ◆ Rather, compute literal and possible metonymic readings in parallel
- Possible metonymic readings:
 - ◆ Determined by paths in the ontology
 - ◆ Ontology has relations between concepts, e.g. part-of
- Prefer the interpretation that best establishes referential cohesion

Markert & Hahn: Ontology use

- Domain-specific ontology
 - ◆ Concepts: computer-system, printer, hard-disk-drive, ...
 - ◆ Relations: subclass ($\text{laser_printer} \subseteq \text{printer}$), has-physical-part, has-laser, clock-frequency-of
- Possible metonymic relation:
 - ◆ There exists a path between the concepts
 - ◆ Non-cyclic – including subrelation hierarchy among relations
- Prefer conventional metonymies
- No use of path length: granularity of the ontology not uniform!

Markert & Hahn: Metonymy and anaphora

- Anaphora resolution and metonymy interpretation are co-dependent
 - ◆ John could not decide whether to buy the play by Shakespeare or the play by Goethe. In the end, he bought the Shakespeare.
 - ◆ In der Leistung konnte die LPS 105 ebenfalls weitestgehend überzeugen. Laut Core-Test2.8 erreicht die Quantum eine mittlere Zugriffszeit von 16.5 ms
- Prefer interpretations that establish reference

Summing up: Metaphor

- One object construed as another
- Mapping from source domain to target domain, transferring properties
- Master metaphor list
- Conceptual blending theory

Summing up: Metonymy

- Refer to A by B, where B has salient connection to A
- Reinterpretation
 - ◆ Either: Of the argument alone
 - ◆ Or: of the predicate
 - ◆ Or: both are involved
- Metonymic interpretation:
 - ◆ Either: Triggered by selectional restriction violation
 - ◆ Or: Always available
 - Markert: preferred when better cohesion

Summing up: Metonymy

- When is metonymic interpretations available?
 - ◆ Pustejovsky: Universal generative devices described in qualia structure.
Interpretation of metonymy: telic, agentive role
 - ◆ Verspoor: Conventionalization important
 - ◆ Markert: Possible metonymic interpretations determined from domain-specific ontology