

## Lecture 9: Figurative Language

Lexical Semantics and Discourse Processing  
MPhil in Advanced Computer Science

Simone Teufel

Natural Language and Information Processing (NLIP) Group



February 18, 2011



## Reading

- Lapata, M. and A. Lascarides (2003). A Probabilistic Account of Logical Metonymy, *Computational Linguistics*, 29(2):263–317.
- Markert and Nissim (2002). Metonymy Resolution as a Classification Task. In *Proceedings of EMNLP*.
- Shutova et al. (2010). Metaphor Identification Using Verb and Noun Clustering. In *Proceedings of COLING 2010*.



- 1 Phenomenology
  - Logical Metonymy
  - Regular Metonymy
  - Metaphor
  - Idioms
- 2 Automatic Approaches
  - Logical Metonymy
  - Regular Metonymy
  - Metaphor



## Types of Figurative Language

- Hyperbole (*mile-high ice cream cone*),
- Irony, Humour (*beauty is in the eye of the beer-holder*)
- Metonymy
  - Creative: *The ham sandwich is waiting for his check.*
  - Regular: *All eyes were on Germany, but Berlin seemed unwilling to lead the Union.*
  - Logical: *a fast plane*
- Metaphor
  - *He shot down all my arguments.*
- Simile
  - *She is like a rose.*
- Idiom
  - *He has a bee in his bonnet.*



## Logical Metonymy

- Due to Pustejovsky (1991, 1995)
- Additional meaning arises for particular verb-noun and adjective-noun combinations in a systematic way
- Verb (or adjective) semantically selects for an event-type argument, but syntactically selects for a noun.
- The event is however predictable from the semantics of the noun.

Examples:

- *Mary finished her beer.*  
*Mary finished **drinking** her beer.*
- *easy problem*  
*difficult language*  
*good cook*  
*good soup*

## Metonymy

- Creative metonymy is hard to recognise automatically, because it depends on the understanding of the entire situation. AI bottleneck of knowledge representation.
- Regular metonymy follows schemes:
  - PRODUCT-FOR-PRODUCER: *Press-men hoisted their notebooks and their Kodaks.*
  - LOCATION-FOR-EVENT: *After Lockerbie, people were more careful about saying that.*
- Very frequent phenomenon in language

## Metaphor

Express one concept/situation in terms of another concept/situation (including all other participants, properties and events of that situation).

FEELINGS are LIQUIDS:

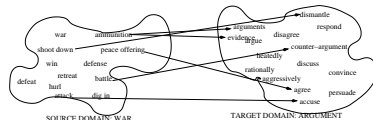
- *A simple phone call had managed to **stir up** all these feelings.*
- *Now here I was, **seething** with anger*
- *is a kind of **pressure valve** for the release of **pent-up** nervous energy*
- *... provide an **outlet** for creativity ... Just ignore the **turbulent** feelings and turn your attention towards ...*

ARGUMENT is WAR:

- *Parties **go into battle** about how high to push the bar for skills*
- *Villagers **launch fight** to save their primary school from closure*

## Conceptual Metaphor Theory

- Due to Lakoff and Johnson (1980)
- Mapping between two cognitive domains
- Source and target domains
- Usually, source domain is more concrete/evocative



## Mixed Metaphor

Combination of two incompatible metaphorical mappings:

- *If we can hit that bullseye then the rest of the dominoes will fall like a house of cards... Checkmate.*  
Zapp Brannigan (Futurama)
- *it would somehow bring the public school system crumbling to its knees.*
- *biting the hand that rocks the cradle*
- *He took to it like a fish out of water.*
- *He wanted to get out from under his father's coat strings.*
- *She's been burning the midnight oil at both ends.*

## Idioms

- Minimal semantic constituents which consist of more than one word.
- Definition: the meaning of an idiom cannot be inferred as a compositional function of the meaning of its parts.
- *pull somebody's leg*
- *be off one's rocker*

Syntactic Variability Tests:

- ?*Arthur has a bee, apparently, in his bonnet.* (insertion)
- ?*Arthur kicked the large bucket.* (modification)

## Dead metaphor

**Dead metaphor:** The image that the metaphor invokes has been established in the language, i.e., is now contained in the "lexicon". Creative, situational figurative images are excluded.

- *I simply cannot **grasp** this idea.*
- *This really made an **impression** on me.*

Often not perceived as metaphor.

## Idioms: crosslingual issues

Level of translatability of idiom into another language is unpredictable.

- "*donner sa langue au chat*" (give your tongue to the cat)
- "*appeller un chat un chat*" (call a cat a cat)

## Idiom or dead metaphor? Rephrasing Test

If rephrasing results in similar semantics, the multi-word entity is not a semantic constituent (thus a dead metaphor, not an idiom).

**Dead metaphors:**

- *They tried to sweeten the pill.* ≈ *They tried to sugar the medicine.*
- *We shall leave no stone unturned in our search for the culprit.*  
≈  
*We shall look under every stone in our search for the culprit.*

**Idioms:**

- *John pulled his sister's leg* ≠ *John tugged at his sister's leg*
- *Arthur kicked the bucket* ≠ *Arthur tipped over the water receptacle*

## Logical Metonymy: Lapata and Lascarides (2003)

- $a \text{ fast} \left\{ \begin{array}{l} \text{landing?} \\ \text{taxiing?} \\ \text{flying?} \end{array} \right\} \text{ plane}$
- $I \text{ enjoyed} \left\{ \begin{array}{l} \text{reading?} \\ \text{writing?} \\ \text{eating?} \end{array} \right\} \text{ the book}$

- What is missing for full automatic recognition is the implicit verb (*fly(ing)* and *read(ing)*).
- Cooccurrences of *plane-fly* and *fly-fast* and *like-reading* and *read-book* in corpus can give us the answer.
- But: conditioning on both associations at the same time will result in data sparseness
- Therefore: probabilistic model used separates the two associations

## Logical Metonymy: the models

Verbs:

$$P(e, o, v) = \frac{f(v, e)f(o, e)}{f(e)N}$$

Adjectives:

$$P(a, e, n, rel) = \frac{f(rel, e, n)f(a, e)}{f(e)N}$$

Frequency: verbs modified by fast.			Frequency: verbs taking plane as argument.		
f(fast,e)	f(fast,e)		f(SUBJ,e,plane)	f(OBJ,e,plane)	
go	29	work	fly	20	catch
grow	28	grow in	come	17	board
beat	27	learn	go	15	take
run	16	happen	take	14	fly
rise	14	walk	land	9	get
travel	13	think	touch	8	have
move	12	keep up	make	6	buy
come	11	fly	arrive	6	use
drive	8	fall	leave	5	shoot
get	7	disappear	begin	5	see

## Corpus-based recognition of metonymy

Markert and Nissim (06):

- Supervised learning problem: country and organisation names are classified as metonymical or not
- Manually annotate large training corpus (1,000 examples of each from the BNC)
- Good human agreement
- Use grammatical information as features
- Roughly 20% of country names are used metonymically, and 33% of organisation names.

## Metonymy: examples

Countries:

- *Or have you forgotten that America did once try to ban alcohol and look what happened!*
- *At one time there were nine tenants there who went to America.*

Organisations:

- *BMW and Renault sign recycling pact.*
- *How I bought my first BMW.*

## Metonymy: Features and results

Features:

- Grammatical function (subj, premod, gen, obj, PP, pred, subjpassive, iobj, other)
- Number, definiteness of determiner
- Lexical head

Results:

- 87% correct for country names (EMNLP 2002 paper)
- 76% correct for organisations (IWCS 2005 paper)

## Automatic Approaches to Metaphor Recognition

- Selectional restrictions of metaphorically used word in literal interpretation are violated (Wilks 79)
- is-a metaphors violate WN-hyponymy relation: *all the world is a stage* (Krishnakumar and Zhu, 2007)
- Or use manually created metaphor-specific knowledge bases (Martin 1980; Narayanan 1999; Barnden and Lee 2002).

## A Symbolic Approach to Metaphor Interpretation

SLIPNET (Veale and Hao 2008) relates two concepts via definitions, allowing for deletions, insertions and substitutions. Goal: to find a connection between source and target concepts.

Example:

*Make-up is a Western Burqa*

**make-up** =>

typically worn by women  
 expected to be worn by women  
 must be worn by women  
 must be worn by Muslim women

**burqa** <=

## Metaphor Recognition (Shutova et al. 2010)

- Start from seed set including a potentially metaphorical verb
- Model possible target domain → cluster its arguments and subject
- Most “abstract” cluster corresponds to target concept cluster
- Model possible source domain → cluster the verbs that go with these arguments

**Target concept cluster**

desire hostility anxiety passion excitement doubt fear anger curiosity enthusiasm impulse instinct emotion feeling suspicion rage

↔

**Source domain cluster**

gulp drain stir empty pour sip spill swallow drink pol-lute seep flow drip purify ooze pump bubble splash ripple simmer boil tread

stir excitement → swallow anger  
cast doubt → spark enthusiasm



## Metaphor Interpretation by literal paraphrase

Input: *A carelessly leaked report*

Output: *A carelessly disclosed report*

- Find lexically similar candidates for replacement (standard distributional semantics approach)
- Use a Resnik-type selectional restriction filter to filter out metaphorical expressions (those that have low selectional restriction strength), so that only literal ones are left over.

$$A_R(v, c) = \frac{1}{S_R(v)} P(c|v) \log \frac{P(c|v)}{P(c)}$$



## Shutova et al: Paraphrasing Example

	Initial ranking	SP reranking
hold back truth	-13.09 contain	0.1161 <b>conceal</b>
	-14.15 <b>conceal</b>	0.0214 keep
	-14.62 suppress	0.0070 suppress
	-15.13 hold	0.0022 contain
	-16.23 keep	0.0018 defend
	-16.24 defend	0.0006 hold
stir excitement	-14.28 create	0.0696 <b>provoke</b>
	-14.84 <b>provoke</b>	0.0245 elicit
	-15.53 make	0.0194 arouse
	-15.53 elicit	0.0061 conjure
	-15.53 arouse	0.0028 create
	-16.23 stimulate	0.0001 stimulate
	-16.23 raise	~0 raise
	-16.23 excite	~0 make
	-16.23 conjure	~0 excite



## Summary

- Logical Metonymy can be solved by individual associations of implicit verb with explicitly mentioned lexical items
- Problem with Lapata/Lascarides (2003): word senses all conflated
- Regular Metonymy can be solved by supervised classification with features similar to supervised WSD.
- Metaphors can be recognised by seed clustering and paraphrased by lexical similarity and selectional restrictions.
- Shutova et al.'s system: precision is high (~ 80%), but recall is very low (0.25%)

