# L114 Lexical Semantics

## Session 6: Figurative Language

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2014/2015

# Types of Figurative Language

- Hyperbole (*mile-high ice cream cone.*)
- Simile (*She is* **like** *a rose.*)
- 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.*)
- Idiom (*He has a* **bee in his bonnet**.)
- Irony, Humour (*Beauty is in the eye of the beer-holder*)

# 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 of Logical Metonymy

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

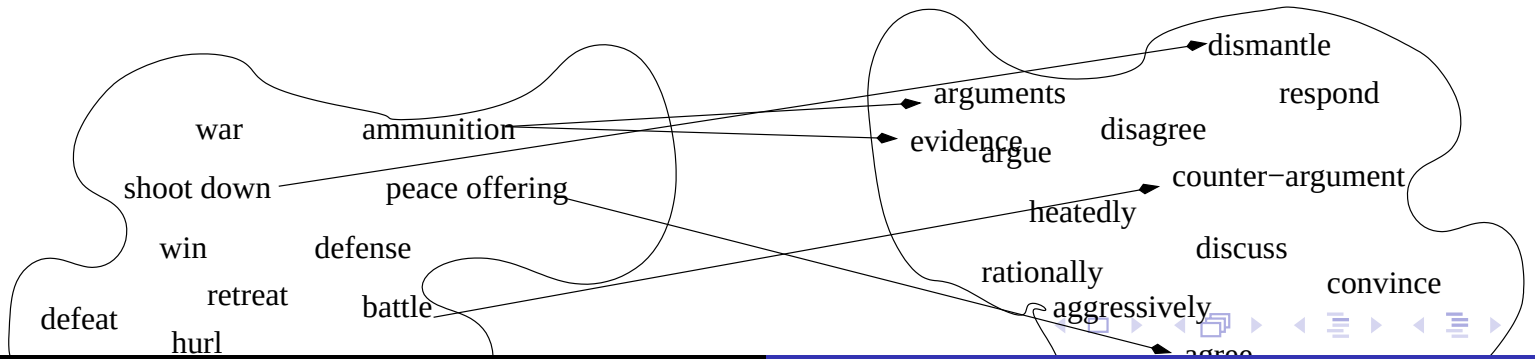
# Metonymy

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

# Metaphor

A metaphor is a figure of speech that creates an analogical mapping between two conceptual domains so that the terminology of one (source) domain can be used to describe situations and objects in the other (target) domain.

- Lakoff and Johnson (1980): Conceptual Metaphor Theory
- Mapping between two cognitive domains (source and target)
- Usually, source domain is more concrete/evocative
- Domains include all participants, properties and events of a situation – i.e., expressed by abstract/concrete nouns, verbs, adjectives. . .



# Metaphor: 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*
- *how to* **defend** *yourself against stupid arguments*

# Metaphor: 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 . . .*

# Mixed Metaphor

Combination of two incompatible metaphorical mappings:

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

Zapp Brannigan (Futurama)

# Dead metaphor

**Dead metaphor:** The image that the metaphor invokes has been established in the language, and is therefore typically not perceived as metaphor.

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

We think of it as now being contained in the "lexicon" (real or mental lexicon). This is opposed to creative, situational metaphor, which requires active resolution to understand.

# Idioms

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

**Syntactic Variability Tests:**

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

# Idiom or dead metaphor? Rephrasing Test

Rephrasing of a **dead metaphor** results in similar semantics:

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

This is not the case for **idioms** (due to their non-compositional semantics):

- *John pulled his sister's leg* $\not\approx$ *John tugged at his sister's leg*
- *Arthur kicked the bucket* $\not\approx$ *Arthur tipped over the water receptacle*

# Idioms: crosslingual issues

Level of translatability of idioms into another language is unpredictable. This is closely related to the issue of compositionality.

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

# Automatic Approaches

- Logical Metonymy: Lapata and Lascarides (2003)
- Regular Metonymy: Markert and Nissim (2006)
- Metaphor: Shutova et al (2010)

# Logical Metonymy: Lapata and Lascarides (2003)

- *a fast* { landing? / taxiing? / flying? } *plane*
- *I enjoyed* { reading? / writing? / eating? } *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.
- Probabilistic model used collects counts for the two associations **separately**.

# Logical Metonymy: data sparseness

Only 6 sentences in BNC that would allow us to estimate $P(a, e, n, rel)$ directly:

- The plane **went** so fast it left its sound behind.
- And the planes **going** slightly faster than the Hercules or Andover.
- He is driven by his ambition to build a plane that **goes** faster than the speed of sound.
- Three planes **swooped in**, fast and low.
- The plane was **dropping down** fast towards Bangkok.
- The unarmed plane **flew** very fast and very high.

Also gives wrong predictions!

# Logical Metonymy: the adjective model

$$P(a, e, n, rel) = P(e)P(n|e)P(a|e, n)P(rel|e, n, a)$$

Independence assumptions:

$$P(a|e, n) \approx P(a|e)$$

$$P(rel|e, n, a) \approx P(rel|e, n)$$

# Logical Metonymy: the adjective model

This means that we can estimate the whole thing as:

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

Verbal predicate *e* is modified by adverb *a*, bearing argument relation *rel* to head noun *n*.

$f(a, e)$: look for "flies fast"
$f(rel, e, n)$: look for "plane flies" and "flies a plane"
$f(e)$: look for "flies"

# Logical Metonymy: the adjective model

| 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 | 6 | fly | 20 | catch | 24 |
| grow | 28 | grow in | 6 | come | 17 | board | 15 |
| beat | 27 | learn | 5 | go | 15 | take | 14 |
| run | 16 | happen | 5 | take | 14 | fly | 13 |
| rise | 14 | walk | 4 | land | 9 | get | 12 |
| travel | 13 | think | 4 | touch | 8 | have | 11 |
| move | 12 | keep up | 4 | make | 6 | buy | 10 |
| come | 11 | **fly** | 4 | arrive | 6 | use | 8 |
| drive | 8 | fall | 4 | leave | 5 | shoot | 8 |
| get | 7 | disappear | 4 | begin | 5 | see | 7 |

# Logical Metonymy: results

Object-related interpretations for adjective-noun combinations, ranked in order of likelihood:

| **easy problem** | | **easy text** | | **difficult language** | | **comfortable chair** | | **good umbrella** | |
|---|---|---|---|---|---|---|---|---|---|
| solve | -15.14 | read | -17.42 | understand | -17.15 | sink into | -18.66 | keep | -21.59 |
| deal with | -16.12 | handle | -18.79 | interpret | -17.59 | sit on | -19.13 | wave | -21.61 |
| identify | -16.83 | use | -18.83 | learn | -17.67 | lounge in | -19.15 | hold | -21.73 |
| tackle | -16.92 | interpret | -19.05 | use | -17.79 | relax in | -19.33 | run for | -21.73 |
| handle | -16.97 | understand | -19.15 | speak | -18.21 | nestle in | -20.51 | leave | -22.28 |

# Regular metonymy: Markert and Nissim (2006)

- Country and organisation names are classified as metonymical or not

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

# Regular Metonymy: method and results

Markert and Nissim (2006):

- Manually annotate large training corpus (1,000 examples of each from the BNC)
- Good human agreement
- Supervised learning problem: use grammatical information as features
- Roughly 20% of country names are used metonymically, and 33% of organisation names.

# Regular 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* (Krishnakumaran and Zhu, 2007)
- Or use manually created metaphor-specific knowledge bases (Martin 1980; Narayanan 1999; Barnden and Lee 2002).

# A Symbolic Approache 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 metaphorical verb (verb in source domain; e.g., *stir excitement*)
- Task: find other sourceVerb–targetNoun pairs (*swallow anger*)
- Step 1: Collect all subjects and arguments that occur with the seed sourceVerb.
  - Most of these are sourceNouns (*soup*; non-metaphors), but some are targetNouns (*anger*).
- Step 2: Clustering the nouns according to their semantics by verb association (cf. last lecture)
  - The targetNoun cluster is the most "abstract" cluster
  - Half the job done; we now need to find more sourceVerbs.
- Step 3: Start from sourceNoun clusters found in Step 1 and project "backwards"
  - Cluster the verbs they cooccur with
  - The cluster which has the seed verb in it is the sourceVerb cluster.

# Metaphor Recognition – Examples

| **Target domain N cluster** | ⇔ | **Source domain V cluster** |
|---|---|---|
| *desire hostiliy anxiety passion excitement doubt fear anger curiosity enthusiasm impulse instinct emotion feeling suspicion rage* | | *gulp drain stir empty pour sip spill swallow drink pollute seep flow drip purify ooze pump bubble splash ripple simmer boil tread* |

# Task 2: 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 | **conceal** |
| | -14.15 | **conceal** | 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 | **provoke** |
| | -14.84 | **provoke** | 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 | $\sim$0 | raise |
| | -16.23 | excite | $\sim$0 | make |
| | -16.23 | conjure | $\sim$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 ($\sim$ 80%), but recall is very low (0.25%)