met*: A method for Discriminating Metonymy and Metaphor by Computer
(Fass, 1991)

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Outline

- Introduction
  - theoretical background
  - computational approaches
- Main part
  - met*
  - Collative Semantics (CS)
  - example analyses of metonymy and metaphor
- Conclusions
Metaphor

Example

“The car drank gasoline”

Definition

Metaphor: a trope in which one entity is used to **view** another entity to which it bears a *partial resemblance*. 

(\(< \text{μετα - φορά = carry over }\)\)
Metonymy

Example

“The ham sandwich is waiting for his check”

Definition

Metonymy: a trope in which one entity is used to refer to another that is related to it.

(< μετα - όνομα = change of name )
Metaphor views

Example

“Love is a rose”
Metaphor views

Example

“Love is a rose”

1. **Comparison**: the *tenor* bears partial resemblance (*ground*) to the *vehicle*, non literal comparison
Metaphor views

Example

“Love is a rose”

1. **Comparison**: the *tenor* bears partial resemblance (*ground*) to the *vehicle*, non literal comparison

2. **Interaction**: *vehicle* is a template for seeing *tenor* in novel way
Metaphor views

Example

“Love is a rose”

1. **Comparison**: the *tenor* bears partial resemblance (*ground*) to the *vehicle*, non literal comparison

2. **Interaction**: *vehicle* is a template for seeing *tenor* in novel way

3. **Selection Restrictions Violation**: a metaphor violates the selectional restrictions of words in context
Metaphor views

Example

“Love is a rose”

1. **Comparison**: the *tenor* bears partial resemblance (*ground*) to the *vehicle*, non literal comparison

2. **Interaction**: *vehicle* is a template for seeing *tenor* in novel way

3. **Selection Restrictions Violation**: a metaphor violates the selectional restrictions of words in context

4. **Conventional Metaphor**:
   - orientational (e.g. MORE IS UP, HAPPY IS UP),
   - ontological (TIME IS A SUBSTANCE, THE VISUAL FIELD IS A CONTAINER)
   - structural metaphors (ARGUMENT IS WAR, TIME IS MONEY)
Metonymy

Examples

“David drank the glasses”
“They played Schumann”
“Rob bought a Ford”

- Organize instances of metonymy into categories, *metonymic concepts*:
  - PART FOR WHOLE
  - CONTAINER FOR CONTENTS
  - ARTIST FOR ART-FORM
  - PRODUCER FOR PRODUCT
Distinctive characteristics between Metaphor and Metonymy

- Relationship established
  - **Metaphor** based on *similarity*: being alike in essentials or having characteristics in common
  - **Metonymy** founded on *congruity*: being connected or touching

- Primary Function
  - **Metaphor** a way of conceiving one thing *in terms of* another, *understanding*
  - **Metonymy** allows one entity to *stand for* another, *referential*
Computational Approaches to Metaphor and Metonymy

- **Metaphor:**
  - Martin (1990)
  - Narayanan (1999)
  - Terai (2007)

- **Metonymy:**
  - TEAM: a transportable natural-language interface system by Grosz (1983)
  - TACITUS: A Message Understanding System (Hobbs et al., 1989)
  - Markert & Nissim (2009)
  - Shutova & Teufel (2009)
Basic assumptions (1)

<table>
<thead>
<tr>
<th>Literalness</th>
<th>Metonymy</th>
<th>Metaphor</th>
<th>Nonliteralness/Anomaly</th>
</tr>
</thead>
</table>

**Literal** meaning: satisfied constraint preferences

**Example**

“The baby drank milk”

**Metonymy**: source-target in a metonymic inference relation

**Example**

“The baby drank the bottle”
Basic assumptions (2)

<table>
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<tr>
<th>Literalness</th>
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</table>

**Metaphor:** source-target in a relevant analogy relation

**Example**

“The car drank gasoline”

**Anomaly:** preference constraint violation, no metonymic inference, no relevant analogy

**Example**

“The baby drank the table”
The met* Method
Observations on the met* method

1. Literalness is distinct from the others, which are all nonliteral.
2. Metonymies can occur in chains.
3. Metaphor and anomaly are the hardest to tell apart (and thus require the most extended processing to distinguish).
Collative Semantics (CS)

Collative Semantics (CS) is a semantics for Natural Language Processing - extension of Preference semantics - implemented in the meta5 program.

Goal is to distinguish the type of semantic relations between the meanings of words.

Preference-based relations

Components of CS:

1. sense-frames
2. collation
3. semantic vectors
4. screening
Sense-frame examples

sf(crook1,
   [[arcs,
     [[supertype, criminal1]]],
    [node0,
     [[it1, steal1, valuables1]]]]).

sf(crook2,
   [[arcs,
     [[supertype, stick1]]],
    [node0,
     [[shepherd1, use1, it1],
      [it1, shepherd1, sheep1]]]]).
Sense-frames

sense-frame (sf) = ARCS + NODE

schematic representation of sense-frames
Sense-frames

\[
\text{sense-frame (sf)} = \text{ARCS + NODE}
\]

Sense-network a densely structured semantic network of word senses, constructed by all arcs of the sense-frames
Collation matches the sense-frames of two word senses and finds a system of multiple mappings between them.

discrimination of the semantic relation between the word senses.
Metonymy Discrimination (1)

sense-frame retrieval

Example

“Ted played Bach”. (=the music of Bach)

- Sense frame play12

  sf(play12,
  [[arcs,
    supertype, perform1]]],
  [node2,
  [[agent,
    [preference, human being1]],
  [object,
   [preference, music1]]]]).
Example

“Ted played Bach”. (=the music of Bach)

- **Chain of metonymies** from the target (surface object) to the source (selectional preference of the verb):
Metonymy Discrimination (3)

final literal relation

Example

“Ted played *Bach*. (=the music of Bach)

- **Literal relation** between the source and the selectional preferences of the play12.

\[ \text{sf(} \text{play12,} \]

\[
[\text{[arcs, supertype, perform1]]},
\text{[node2, [agent, [preference, human being1]}],
\text{[object, [preference, music1]]]})].
\]
Metaphor discrimination (1)

sense-frame retrieval

Example

“The car drank gasoline”

- Sense-frames for car1 and drink1 (verb)

\[
\text{sf(car1,} \\
\text{[[arcs,} \\
\text{[[supertype, motor\_vehicle1]]],} \\
\text{[node0,} \\
\text{[[it1, use1, gasoline1]} \\
\text{[it1, carry1, passenger1]]]]).} \\
\text{sf(drink1} \\
\text{[[arcs,} \\
\text{[[supertype, [ingest1, expend1]]]]],} \\
\text{[node2,} \\
\text{[[agent, [preference, animal1]],} \\
\text{[object, [preference, drink1]]]]).}
\]
Metaphor discrimination (2)

Assumption: “car” and “animal” stand in a metaphoric relation → seek for relevant analogy:

- match relevant cells: car1 ➔ animal1
- find sister network path between the nodes of the relevant cells:

  use1_v ➔ drink1_v

  gasoline1_n ➔ drink1_n

Else, anomalous semantic relation.
Metaphor discrimination (3)
Matching relevant cells

- Match *relevant cells of sense-frames*:

  car1 ➔ animal1

\[
\text{sf(car1,}
\begin{align*}
&\text{[[arcs,} \\
&\text{[[supertype, motor\_vehicle1]]]}, \\
&\text{[nodeO,} \\
&\text{[[it1, use1, gasoline1]}] \\
&\text{[it1, carry1, passenger1]]]]).}
\end{align*}
\]

\[
\text{sf(animal1,}
\begin{align*}
&\text{[[arcs,} \\
&\text{[[supertype, organism1]]]}, \\
&\text{[nodeO,} \\
&\text{[[biology1, animal1]}] \\
&\text{[it1, drink1, drink1]} \\
&\text{[it1, eat1, food1]]]].}
\end{align*}
\]
Metaphor discrimination (3)

Finding network paths

- find *sister* network path between:

```
use1_v ➔ drink1_v
```
Metaphor discrimination (3)
Finding network paths

- find *sister* network path between:

  \[ \text{gasoline}^{1_n} \rightarrow \text{drink}^{1_n} \]
Metaphor discrimination

Relevant analogy found

**Found** relevant analogy between “**car**” (the surface agent) and “**animal**” (the preference agent)

“The car drank the gasoline” → **Metaphor**
Critics

Advantages

1. seems to work well
2. reasonable approach to metonymy and metaphor
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Advantages

1. seems to work well
2. reasonable approach to metonymy and metaphor

Disadvantages

1. knowledge-based approach,
   - everything set manually (fixed lexicon, metonymic rules)
   - limited coverage, more metonymy cases
2. no evaluation available; performance questioned
Summary

- **views** on metaphor and metonymy
- computational approaches
- continuous from **literalness to anomaly**
- **met***: a method for discriminating metonymy and metaphor
- collative semantics (CS): “**preference-based**” semantic relations
- metonymy and metaphor **example analyses**
- critics
Thanks
Discussion

Further questions?

Your opinion?
Bibliography