On the Ontological Basis for Logical Metonymy:

*Telic Roles and WORDNET*

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Logical Metonymy

Eventive verb *enjoy*:

- Mary enjoyed the party
- Mary enjoyed dancing at the party

*enjoy: [NP/S EVENT]*

cf. *begin, refuse, finish,*...

Logical Metonymy

Eventive verb *enjoy*:

- Mary enjoyed the sonata

Logical Metonymy

Eventive verb *enjoy*:

- Mary enjoyed the sonata (listen to/play)
- Mary enjoyed *V-ing the sonata*
- Mary enjoyed *listening to the sonata*
- Mary enjoyed *playing the sonata*
Logical Metonymy

Eventive verb *enjoy*:

Mary enjoyed the sonata (listen to/play)
Mary enjoyed \[ V-ing \] the sonata
Mary enjoyed *listening to* the sonata
Mary enjoyed *playing* the sonata

Mary enjoyed the door
Mary enjoyed \[ V-ing \] the door

WordNet

- What is it?
  Synonym set (synset) network for nouns, verbs, adjectives and adverbs
  Synsets connected by semantic relations (isa, antonymy,...)
  139,000 entries (word senses), 10,000 verbs (polysemy 2), 20,000 adjectives (1.5)
  Originally designed as a model of human semantic memory (Miller, 1985)
WordNet

• What is it?
  Synonym set (concrete) network for nouns, verbs, adjectives and adverbs
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  139,000 entries (word senses), 10,000 verbs (polysemy 2), 20,000 adjectives (1.5)
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Verbs

- connect, link, tie
- change, alter
- better, improve, amend...
- mend, repair, fix, doctor....

WordNet Relations

<table>
<thead>
<tr>
<th>Relation</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>x HYP y</td>
<td>y is a hypernym of x</td>
<td>x: repair, y: improve</td>
</tr>
<tr>
<td>x ENT y</td>
<td>x entails y</td>
<td>x: breathe, y: inhale</td>
</tr>
<tr>
<td>x SIM y</td>
<td>y is similar to x (A)</td>
<td>x: achromatic, y: white</td>
</tr>
<tr>
<td>x CS y</td>
<td>y is a cause of x</td>
<td>x: anesthetize, y: sleep</td>
</tr>
<tr>
<td>x VGP y</td>
<td>y is similar to x (V)</td>
<td>x: behave, y: pretend</td>
</tr>
<tr>
<td>x ANT y</td>
<td>x and y are antonyms</td>
<td>x: present, y: absent</td>
</tr>
<tr>
<td>x SA y</td>
<td>x, see also y</td>
<td>x: breathe, y: breathe out</td>
</tr>
<tr>
<td>x PPL y</td>
<td>x participle of y</td>
<td>x: applied, y: apply</td>
</tr>
<tr>
<td>x PER y</td>
<td>x pertains to y</td>
<td>x: abaxial, y: axial</td>
</tr>
</tbody>
</table>

Hypernymy and Logical Metonymy

From the literature:
- (Verspoor, 1997) Summary from the BNC corpus

<table>
<thead>
<tr>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>eat FOOD/MEAL</td>
</tr>
<tr>
<td>drink LIQUID</td>
</tr>
<tr>
<td>tell STORY</td>
</tr>
<tr>
<td>play MUSIC</td>
</tr>
<tr>
<td>read/write WRITTEN_OBJECT</td>
</tr>
</tbody>
</table>
Hypernymy and Logical Metonymy

From the literature:
• (Verspoor, 1997) Summary from the BNC corpus
• (Lascarides & Copestake, 1995) Inheritance hierarchy

Basic Idea:
• Use WordNet’s concept hierarchy
• Test a bunch of worked examples
• Locus of telic roles should be in ontological not lexical structure

From the literature:
• (Verspoor, 1997) Summary from the BNC corpus
• (Lascarides & Copestake, 1995) Inheritance hierarchy
• (Asher & Pustejovsky): Logic of type constructors

- a) p @ use: objects with extension typically visible
- b) p @ hear: objects involving sound typically audible
- c) all artifacts inherit a general dependent type that gives their cause
- d) read, liquid @ drink
- e) class: people @ watch

Begin and Enjoy


John began the novel
The author began his unfinished novel back in 1962
<table>
<thead>
<tr>
<th>John began the novel</th>
<th>(reading/writing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The author began his unfinished novel back in 1962</td>
<td>(writing)</td>
</tr>
</tbody>
</table>

**Begin and Enjoy**


- **John began the novel** *(reading/writing)*
- **The author began** his unfinished novel back in **1962** *(writing)*

**Mary enjoyed the novel** *(reading)*

- **Mary enjoyed** *inspecting* the garden
- **Mary enjoyed** *visiting* the garden
- **Mary enjoyed** *strolling* through the garden
- **Mary enjoyed** *rollerblading* in the garden
- **Mary enjoyed** *sitting* in the garden
- **Mary enjoyed** *dozing* in the garden

**Multiple Telic Roles**

- **Mary enjoyed** the garden *(seeing)*
- **Mary enjoyed** *inspecting* the garden
- **Mary enjoyed** *visiting* the garden
- **Mary enjoyed** *strolling* through the garden
- **Mary enjoyed** *rollerblading* in the garden
- **Mary enjoyed** *sitting* in the garden
- **Mary enjoyed** *dozing* in the garden

**event/non-eventive noun mismatch:** coercion
Discourse and Telic Roles

Easily defeasible:

- He really enjoyed your book \((\text{reading})\)
- My goat eats anything.
- My dog eats everything.
- !He really enjoyed your shoe \((\text{eating})\)

(Lascarides & Copestake, 1995)

Discourse and Telic Roles

Easily defeasible:

- My goat eats anything.
- He really enjoyed your book \((\text{reading})\) \((\text{eating})\)
- !He enjoyed your shoe

(Lascarides & Copestake, 1995)

WordNet and Telic Roles

John enjoyed the cigarette \((\text{smoking})\)

- cigarette, butt, fag, coffin nail
- smoke
- tobacco
- plant product
- street drug
- substance
- artifact
- physical object
- verbs of perception

verbs of perception
Contextual Function Search Rules

Principle of Specificity: Prefer $R_i$ to $R_j$ in $R_i R_j C_i C_j$

Principle of Locality: Plausibility of $R_j$ scales with $m$ and inversely with $l$

Override possible but requires strong contextual support

Telic/Agentive Roles

Mary enjoyed/began the sonata

Noun/Verb Hierarchies

Mary enjoyed/began the sonata
Location

Mary enjoyed the garden (seeing/visiting)

Absence of Function

!John enjoyed the rock (?telic role)

Note: rock not characterized as a location (cf. garden)
Mary enjoyed Ayer’s Rock (visiting)

Type/Function Distinction

Mary enjoyed the wine (drinking)

Type/Function Distinction

Mary enjoyed the amphetamine (abuse)
Page 33: Polysemy

John enjoyed the dirt

Page 34: Grammatical Constraint

John enjoyed the door

Page 35: Grammatical Constraint

John enjoyed the door

Page 36: Grammatical Constraint

John enjoyed the door
Grammatical Constraint

![He enjoyed your shoe][PRO [V(ing) shoe]]

- **footwear**
- **covering**
- **physical object**

verbs of perception

- **shoe**

- **wear** [PRO [wear(ing) shoe]]

- **cover** [shoe [cover(ing) y]]

- **artifact**

- **verbs of perception**

Corpus Data

(Verspoor, 1997): BNC (> 100 million words)

- Infrequent

<table>
<thead>
<tr>
<th>Corpus</th>
<th>No. of examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNC</td>
<td>164</td>
</tr>
<tr>
<td>LOB</td>
<td>3</td>
</tr>
</tbody>
</table>

- Limited number of semantic classes

<table>
<thead>
<tr>
<th>telic</th>
<th>begin</th>
</tr>
</thead>
<tbody>
<tr>
<td>tell STORY</td>
<td>20</td>
</tr>
<tr>
<td>eat FOOD/MEAL</td>
<td>11</td>
</tr>
<tr>
<td>sing SONG</td>
<td>9</td>
</tr>
<tr>
<td>serve (jail) sentence</td>
<td>8</td>
</tr>
<tr>
<td>play MUSIC</td>
<td>7.5</td>
</tr>
<tr>
<td>do business</td>
<td>6</td>
</tr>
<tr>
<td>take MEDICINE/TREATMENT</td>
<td>5</td>
</tr>
<tr>
<td>play GAME</td>
<td>4</td>
</tr>
<tr>
<td>attend SCHOOL/CLASSES</td>
<td>4</td>
</tr>
<tr>
<td>argue CASE</td>
<td>3</td>
</tr>
<tr>
<td>read WRITTEN_OBJECT</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Summary

Linguistic phenomena as benchtests for WordNet relations

Hypernymy: Logical Metonymy

WORDNET

Telic role annotation? Should be easy to do:

1. Limited in scope: only 164 instances in the BNC, and
2. Limited to 20 (semantic) categories of nouns

Fall into natural classes, headed by higher concepts: FOOD/MEAL, MUSIC, LITERATURE. Take advantage of the hypernymy hierarchy and annotate only higher concepts.