

On the Ontological Basis for Logical Metonymy:

Telic Roles and WORDNET

Sandiway Fong
NEC Research Institute
Princeton NJ
USA

sandiway@research.nj.nec.com

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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,...*

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Logical Metonymy

Eventive verb *enjoy*:

Mary enjoyed the sonata

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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

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#Mary enjoyed the **door**
Mary enjoyed [*V-ing* the door]

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Mary enjoyed the **sonata** (listen to/play)
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#Mary enjoyed the **door** (?? telic role)
Mary enjoyed [*V-ing* the door]

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WordNet

• What is it?

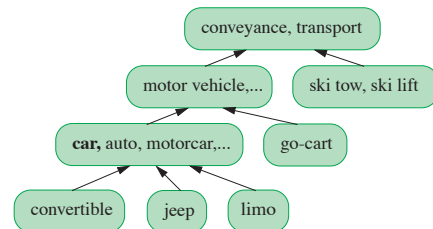
Synonym set (*synset*) network for nouns, verbs, adjectives and adverbs
Synsets connected by semantic relations (*isa*, *antonymy*,...)
139,000 entries (word senses), 10,000 verbs (polysemy 2), 20,000 adjectives (1.5)
Originally designed as a model of human semantic memory (Miller, 1985)

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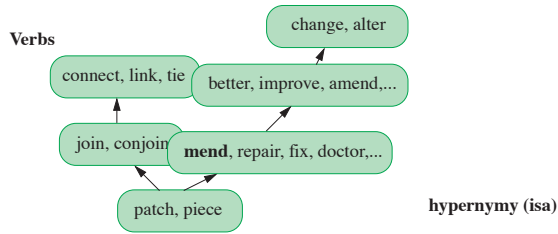
hypernymy (*isa*)

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WORDNET Relations

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

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Hyponymy and Logical Metonymy

From the literature:

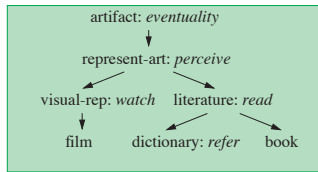
- (Verspoor, 1997) Summary from the BNC corpus:

tell STORY
eat FOOD/MEAL
drink LIQUID
tell STORY
play MUSIC
read/write WRITTEN_OBJECT

Hypernymy and Logical Metonymy

From the literature:

- (Verspoor, 1997) Summary from the BNC corpus
- (Lascarides & Copestake, 1995) Inheritance hierarchy



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Hypernymy and Logical Metonymy

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

- a) $p \textcircled{\otimes} \text{see}$: objects with extension typically visible
- b) $p \textcircled{\otimes} \text{hear}$: objects involving sound typically audible
- c) all artifacts inherit a general dependent type that gives their cause
- d) *wine*: liquid $\textcircled{\otimes}_T$ drink
- e) *class*: people $\textcircled{\otimes}_T$ teach

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Basic Idea:

- Use WordNet's concept hierarchy
- Test a bunch of worked examples
- Locus of telic roles should be in ontological *not* lexical structure

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Begin and Enjoy

Pustejovsky (1995), Lascarides & Copestake (1995) and Verspoor (1997):

John **began** the novel
The author **began** his unfinished novel back in
1962

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Begin and Enjoy

Pustejovsky (1995), Lascarides & Copestake (1995) and Verspoor (1997):

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

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Begin and Enjoy

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John **began** the novel (reading/writing)
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1962 (writing)

novel:

telic role: *read* (purpose/function)
agentive role: *writing* (creation)

event/non-eventive noun mismatch: coercion

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Begin and Enjoy

Pustejovsky (1995), Lascarides & Copestake (1995) and Verspoor (1997):

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

Mary enjoyed the novel (reading)
!!The visitor enjoyed the door (?telic role)
Mary enjoyed the garden (seeing...)

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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

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Discourse and Telic Roles

Easily defeasible:

He really enjoyed your book (reading)

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Discourse and Telic Roles

Easily defeasible:

My goat eats anything.
He really enjoyed your book (reading)
(eating)

(Lascarides & Copestake, 1995)

!He enjoyed your shoe

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Discourse and Telic Roles

Easily defeasible:

My goat eats anything.
He really enjoyed your book (reading)
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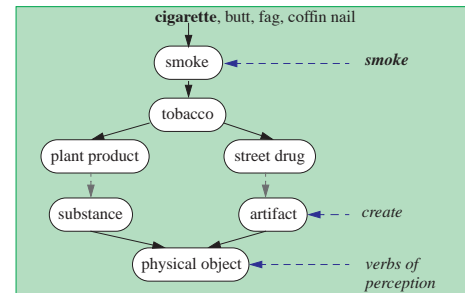
(Lascarides & Copestake, 1995)

My dog eats everything.
!He really enjoyed your shoe (eating)

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WordNet and Telic Roles

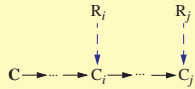
John enjoyed the cigarette (smoking)



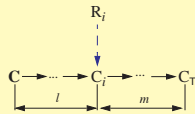
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Contextual Function Search Rules

Principle of Specificity: Prefer R_i to R_j in



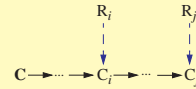
Principle of Locality: Plausibility of R_i scales with m and inversely with l



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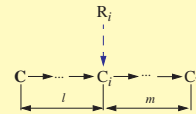
Contextual Function Search Rules

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Override possible but requires strong contextual support

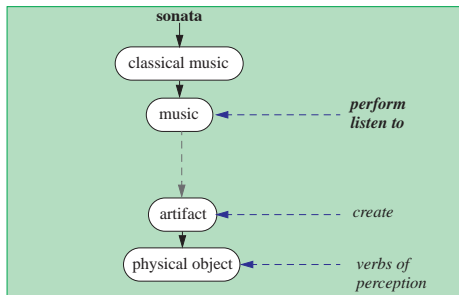
Principle of Locality: Plausibility of R_i scales with m and inversely with l



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Telic/Agentive Roles

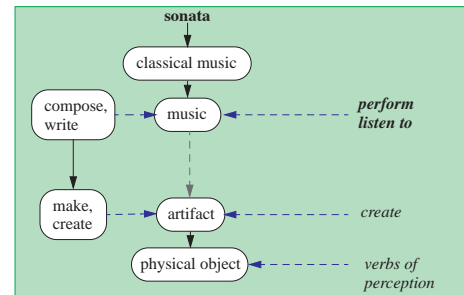
Mary enjoyed/began the sonata



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Noun/Verb Hierarchies

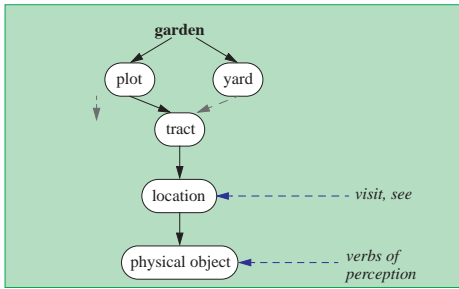
Mary enjoyed/began the sonata



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Location

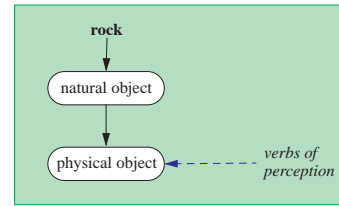
Mary enjoyed the garden (seeing/visiting)



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Absence of Function

!John enjoyed the rock (?telic role)



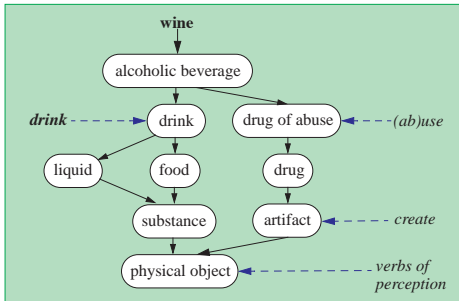
Note: rock not characterized as a location (cf. garden)

Mary enjoyed Ayer's Rock (visiting)

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Type/Function Distinction

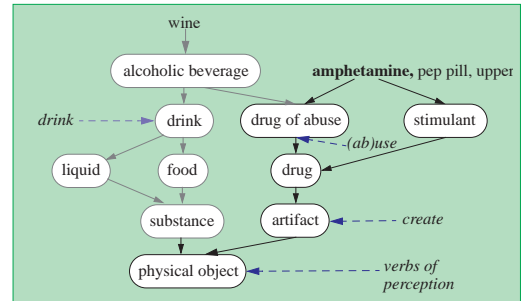
Mary enjoyed the wine (drinking)



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Type/Function Distinction

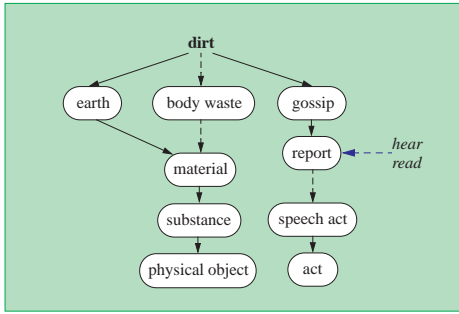
Mary enjoyed the amphetamine (abuse)



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Polysemy

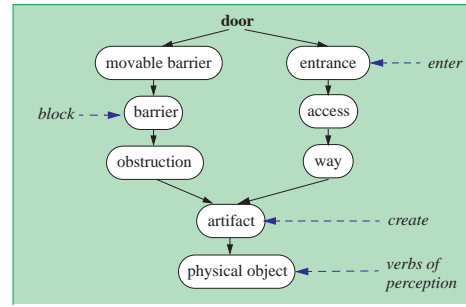
!John enjoyed the dirt



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Grammatical Constraint

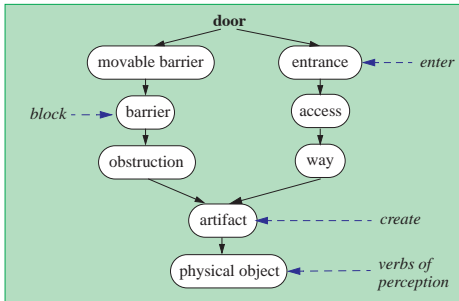
!!John enjoyed the door



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Grammatical Constraint

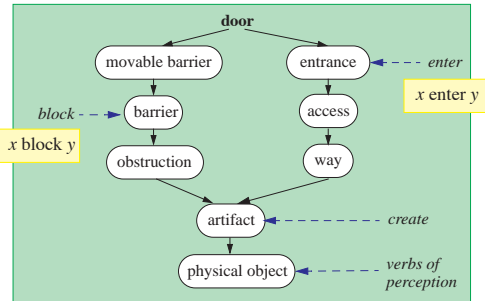
!!John enjoyed the door EXP enjoy NP
EXP_i enjoy [PRO_i [V(ing) NP]]



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Grammatical Constraint

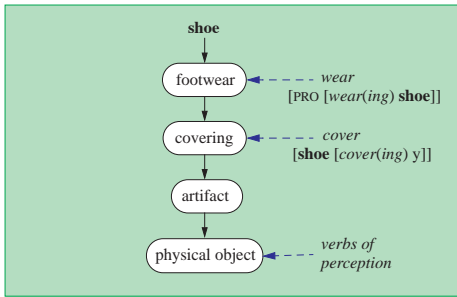
!!John enjoyed the door EXP enjoy NP
EXP_i enjoy [PRO_i [V(ing) NP]]



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Grammatical Constraint

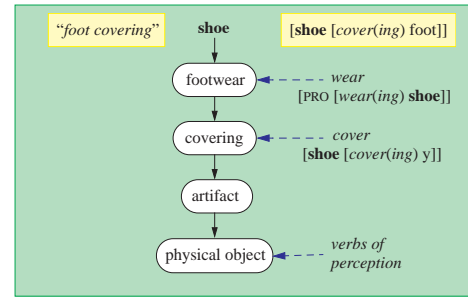
!He enjoyed your shoe [PRO [V(ing) shoe]]



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Grammatical Constraint

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



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Corpus Data

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

- Infrequent

Corpus	No. of examples
BNC	164
LOB	3

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- Limited number of semantic classes

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

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Summary

- **Linguistic phenomena as benchtests for WordNet relations**

Hyponymy: Logical Metonymy

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Hyponymy: 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 hyponymy hierarchy and annotate only higher concepts.