

Word senses

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(with thanks to Michael Rundell)



1

“Sentences mean things because words have meanings, and grammar rules build meanings of sentences from meanings of words”



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“Sentences mean things because words have meanings, and grammar rules build meanings of sentences from meanings of words”

but



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“Sentences mean things because words have meanings, and grammar rules build meanings of sentences from meanings of words”

but

some words have multiple meanings, so it must be word **senses**, not words, that we build sentence meanings from.



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Overview

- Ordinary people and word senses
- Lexicographer’s perspective
- Theoretical perspective
- An argument



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How do ordinary people manage?



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She got up and went into the kitchen.
 “Want a drink?” she called.
 “No thanks”, I said, “but could you
 bring me a glass of water?”
 Margaret Atwood, *The Edible Woman* 1969

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‘Of course, once upon a time a tomato
 was a tomato’

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Explicit directions



Obstruction, in a urodynamic sense, implies a high pressure
 and a low flow

He is also, in that double-edged English sense, clever

She was, in the best sense, an old-fashioned family doctor

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Context



Sotheby’s is to auction an **icon** used in 16th century Russia
 to assist women in childbirth

Diana was easily the most influential fashion **icon** of the
 20th century, exhibiting flair and a dash of daring

When you use the mouse to drag an **icon** to a new position,
 the sonic feedback continues

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Some provisional conclusions



- Multiple readings are possible
- Misunderstandings are rare, therefore...
- there are clues that people pick up easily

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Overview



- Ordinary people and word senses
- Lexicographer’s perspective
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- An argument

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Lexicographer's perspective

- Why is it important?
 - Find them in dictionaries
 - Lexicographers put them there

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Lexicographer's perspective

- What dictionaries do
- What lexicographers do
- Two useful ideas
 - regular polysemy
 - metaphor
- Formal and contextual clues

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Lexicographer's perspective

Tasks

- **Analysis:**
 - what senses does word **w** have?
 - when does word **w** have sense **s**?
- **Synthesis:** make it clear in definition

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What dictionaries do

keen¹ *adj* **1.** Having a fine, sharp cutting edge or point. **2.** Intellectually acute; penetrating; trenchant. **3.** Acutely sensitive. Said of the senses **4.** Sharp; vivid; strong: "*His entire body hungered for keen sensation, something exciting*" (Richard Wright). **5.** Intense; piercing: *a keen wind*. **6.** Pungent; acrid: *A keen smell of skunk was left behind*. **7.** Ardent; enthusiastic: *a keen chess player*. [etc.]
[*American Heritage Dictionary 3rd edition 1994*]

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What dictionaries do: assumptions and problems

- a set of numbered senses: '**keen** has 7 meanings'
- each sense is discrete, with clear boundaries
- each sense is mutually exclusive: if in context (C) word (W) is sense 3, it cannot also be sense 6
- 'Dictionaries traditionally record vocabulary as if meaning is something independent, inherent, and unique to an item' (Moon 1987:86)
- no explanation of when word **w** has sense **s**

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What dictionaries do: homonymy and polysemy

tip¹ *noun* the pointed or rounded end or extremity of something slender or tapering [...]
■ *verb* attach to or cover the end or extremity of ...
-PHRASES **on the tip of one's tongue** used to indicate...
tip² *verb* **1** overbalance or cause to overbalance so as to fall or turn over...
... **it is tipping down** Brit. rain heavily
■ *noun* **1** Brit. a place where rubbish is left [...]
tip³ *noun* **1** a sum of money given to someone as a way of rewarding them for their services ...
2 a small but useful piece of practical advice [...]
-PHRASES **tip someone off** give someone information...

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- based on etymology
 - based on unrelatedness of meanings:
 - tip = pointed end
 - tip = rubbish dump
- but...*
- does it help?

1: money for waiter and helpful advice are *same homograph*
 2: where to look for **on the tip of ones tongue, it's tipping down, to tip someone off ... ?**

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Finding senses: what lexicographers do

1 arity, which will be used to take a party of under-privileged children to
 2 from outside. You are invited to a party and after a couple of drinks you
 3 tion, we believe politicians of all parties will listen to our views. seq
 4 could be reaching agreement with all parties concerned, as to which event
 5 lack people. I have certainly been party to one or two discussions amongs
 6 . These should be discussed by both parties before entering into the relat
 7 presents they had hosted a cocktail party at Kensington palace, for examp
 8 akes. By midnight the end-of-course party is in full swing, but most cad
 9 e should be a right for the injured party to terminate the contract. A ma
 10 by the Safran Peoples' Liberation Party. This presents the powerful nei
 11 s. Ahead I could see the rest of my party plodding towards the final slope
 12 cial ethic. The two main political parties - the Tories and the Liberals
 13 ritish successes in Perth The small party of British players competing in
 14 to help control. One member of the party went to summon the rescue team a
 15 rket society fashion magazine. The party was held at his flat which was a
 16 security and secrecy than any Tory Party Conference : it seems that bootl

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What lexicographers do

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- 1 political association
- 2 fun social event
- 3 group of people
- 4 person in an agreement/dispute
- 5 be party to something...

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What lexicographers do

Extract from
 Word Sketch
 for **goal** (noun),
 showing the
 grammatical relation
 'object of'

object of	3430	3.1
score	297	75.31
achieve	363	48.14
concede	125	47.79
disallow	26	34.87
pursue	15	33.13
attain	34	29.34
net	18	26.7
kick	36	26.2
grab	20	24.43
reach	28	23.81
set	17	23.53
hit	34	21.7
land	21	21.09
get	158	19.14
drop	31	19.06
define	29	18.0
strike	23	16.85
share	26	16.14
set	6	15.94
meet	20	15.64

- ← football
- ← objective
- ← football
- ← objective
- etc
- etc

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Regular polysemy

(Apresjan 1974)

glass 1 Glass is a hard transparent substance
 2 A glass is a container made from glass, which you can drink from....
 ♦ The contents of a glass can be referred to as a **glass** of something (COBUILD3 2001)

waltz noun a dance in triple time performed by a couple who, as a pair...

- a piece of music written for or in the style of this dance

(NODE 1998)

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Metaphor and the activation of 'meaning potentials'

icon an image of a holy person, used in the worship of the Eastern branches of Christianity (LDOCE1 1978)

small picture, object of worship

icon 1 a picture or figure of a holy person, used in the worship of the Eastern branches of Christianity **2** a small sign on a computer screen which, when you point to it with a mouse, makes the computer perform a particular operation (LDOCE2 1987)

small picture

icon 1 a small sign or picture on a computer screen that is used to start a particular operation **2** someone famous who is admired by many people and is thought to represent an important idea **3** a picture or figure of a holy person, used in worship in the Greek or Russian Orthodox Church (LDOCE3 1995)

object of worship

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WSD for lexicographers: Formal clues

(1) Morphology

hang: usual past tense **hung**, 'specialized' past tense **hanged** (=execute by hanging)

appendix: plural **appendices** (=at end of book/report)
plural **appendixes** (=body part)

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(2) Grammar

Transitivity, countability, optional and obligatory complements

borrow some sugar/someone's car *requires an object*
companies were forced to **borrow** *object is optional*

There were 65 **emails** waiting for me *countable*
The server has to cope with a huge volume of **email** *uncountable*

a forest of **oaks**/a table made of **oak**
(regular polysemy)

an ant **crawling** across the table *requires an adverbial*
she's already learning to **crawl** *adverbial is optional*

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(3) Gradability: 'pertainyms' vs. descriptive/evaluative

a **conventional** young man He's **so conventional**
a **conventional** oven *My oven is **so conventional**

a **medieval** cathedral *The cathedral is positively **medieval**
medieval working conditions Working conditions were positively **medieval**

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(4) Selectional restrictions

What can you **forge**?

- alliances, relationships, links
- metal objects
- passports, bank notes, signatures

What can **crawl**?

- insects, snakes
- people
- babies
- your skin, a building, an area ...

More narrowly ...

- what can **taxi**? (only planes)
- who can **abdicate**? (only heads of state)

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(5) Collocation

They borrowed **heavily** to finance the new stadium
They borrowed **freely** from Japanese artistic conventions

Rooney **scored** all three goals
Rooney **achieved/attained** all his goals

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(6) Lexical relations

synonymy, antonymy, hyponymy

They **escaped** from the jail ⇨ they **got free**
Gas **escaped** from the pipe ⇨ it **leaked out**
We **escaped** without injuries ⇨ we were **unharmed**

borrow a book (from library) ⇔ **return** it
borrow someone's calculator ⇔ **give it back**
borrow money from the bank ⇔ **repay it/pay it back**

There was a fire in the **bank** ↑ a **building**
She got a top job in a **bank** ↑ an **institution**

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(7) Equivalents in other languages

<i>English</i>	<i>French</i>
Shall I cook (the dinner) tonight?	préparer, faire
Cook the pasta/peas in salted water	cuire, laisser cuire
	<i>Spanish</i>
There's a pub on the corner of the street	esquina
There's a chair in the corner of the room	rincón

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Finding senses – summary

- A range of criteria, including:
 - morphology, syntax, valence etc
 - collocation and collocational networks
 - lexical relations
 - translation equivalents
 - regular polysemy, metonymy, metaphor ...
- Depends on dictionary:
 - size
 - target users' reference needs/reference skills
 - Occam's razor: no more complex than it needs to be

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Overview

- Ordinary people and word senses
- Lexicographer's perspective
- Theoretical perspective
 - Quine's challenge
 - Ambiguity and vagueness/indeterminacy
 - Selection and modulation
 - Ambiguity tests
 - Experiment
- An argument

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Quine's challenge

What is a word sense?

"No entity without identity"
(W. v. O. Quine)

- Are word senses a respectable part of a theoretical vocabulary?
- Only if we can give a decent answer to the question:
 - *is this the same word sense as that?*

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Basics

<i>bank</i> (n):	R1=money	R2=river	ambiguous
<i>dog</i> (n):	R1=species	R2=male-of-species	ambiguous
<i>blue</i>	R1=light blue	R2=dark blue	vague
<i>hand</i>	R1=left hand	R2=right hand	indeterminate

Different = 'split' = ambiguous = polysemous
Same-sense = 'lump' = vague/indeterminate

- USAGE: token (eg in corpus, in context)
- READING, potential sense, candidate for sense-hood
- SENSE only where there is ambiguity

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Indirect indications

- Morphology: hang-hanged vs. hang-hung
- Synonym: green-innocent vs. green-ecological
- Antonym: light-heavy vs. light-dark
- Translation: drug-drogue vs. drug-médicament
- Not **semantic**
- Only semantic evidence is decisive

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Selection vs modulation (1)

From Cruse 1986.

- polish the car (reading of *car* = A+B1)
- service the car (reading of *car* = A+B2)
- Hoover the car (reading of *car* = A+B3)

car is GENERAL

Context explains **all of** difference

There **is** a viable general sense, A.

context MODULATES rather than SELECTS

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Selection vs modulation (2)

Is there a general component A of the meaning of *bank* such that

- rob the bank: (reading of *bank* = A+B1)
- climbed up the bank (reading of *bank* = A+B2)

- Can the difference between meanings be explained by the difference between contexts

- rob *the* vs climb *up the*?

- No

context SELECTS rather than MODULATES

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Semantic tests

Zwicky and Sadock, 1975: various tests including

- Yes/no
- zeugma
- crossed readings

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Format

WORD:

R1: identify sense distinction

R2: (R1 vs R2)

TEST: devise test sentence/scenario

RESULT: is test sentence/scenario OK?

could it occur?

is it plausible/funny/weird?

INFERENCE: implication of result (Same or Different)

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Two Readings : one sense or two?
YES/NO test (1)

Format

WORD:	XXX	e.g. dog
R1:	} identify sense } distinction	} { opp. of cat (R1) } { opp. of bitch (R2)
R2:		
TEST:	devise test sentence/ scenario	Is that a dog? - Yes (it's a spaniel) - No (it's a bitch)
RESULT:	test is OK / not OK	Both OK for same facts
INFERENCE:	implication of result: Same or Different.	Different (senses)

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YES/NO test (2)

- **WORD:** hand
- R1:** left hand
- R2:** right hand
- TEST:** Did he raise his hand?
- Yes (he raised his right hand)
- No (he didn't raise his left hand)
- RESULT:** Not OK
- INFERENCE:** S(ame)

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Zeugma

- Greek for “yoke”
- *She came out in spots and a bath chair*
- *He caught three trout and a cold*

There is only a joke if the word is ambiguous
(D)

- based on "one meaning per instance"

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CROSSED READINGS (1)

1. Two times R1 possible
2. Two times R2 possible
3. One of each (the "crossed reading")??

- **WORD:** bank
- R1:** river
- R2:** money
- TEST:** Mary blew up a bank and so did John (robbers or dambusters!?)

RESULT: Crossed reading not possible
INFERENCE: D

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CROSSED READINGS (2)

- **WORD:** hand
- R1:** left
- R2:** right
- TEST:** Mary put up her hand and so did John
- RESULT:** Crossed reading OK
- INFERENCE:** S

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CROSSED READINGS (3)

- **WORD:** crate
- R1:** tray with partitions (milk, beer)
- R2:** wooden box (chickens, car parts)
- TEST:** John's offering came in a crate, and so did Peter's.
- RESULT:**
- INFERENCE:**
- DECISION:**

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Limitations of tests

- Syntactic compatibility
- Nothing to say about collocations, multi-word units “**divide and rule**”
- Multiple test sentences: might disagree
- How hard you look...
- No reference to dictionary size, style
 - *different starting point*
 - “sense divisions should be clear and rational”
 - *fig.* glosses in examples
 - subsenses

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Do the tests deliver?

- Textbook cases vs use in anger

Desiderata

Clear cases: consistent with intuition

Unclear case: resolves the issue

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Experiment

- Find difficult cases
 - one dict says 'split', another says 'lump'
- Find lexicographers to be 'experimental subjects'
- Teach lexicographers how to use tests
- Lexicographers apply tests to difficult cases
- Did it help?

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Experiment

- Training sessions/experiments performed at Chambers-Harrap, Collins, CUP, Macquarie

Findings

- in some cases, they add useful evidence
- often inapplicable/irrelevant
- Can they answer our question, *is this the same word sense as that?* No

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Back to the lexicographer

- They are the experts
- Answer to Quine
 - This (corpus instance) is the same word sense as that (corpus instance) *if and only if the lexicographer puts them in the same meaning-group*

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Do lexicographers *find* word senses

-or do they create them?

"The numbered lists of definitions found in dictionaries have helped to create a false picture of what really happens when language is used"
(Hanks 2000)

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Overview

- Ordinary people and word senses
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- Theoretical perspective
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Words and word senses (1)

"Sentences mean things because words have meanings, and grammar rules build meanings of sentences from meanings of words"

but

some words have multiple meanings, so it must be word **senses**, not words, that we build sentence meanings from.

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Words and word senses (2)

- automatic thesauruses
 - words

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Words and word senses (2)

- automatic thesauruses
 - words
- manual thesauruses
 - simple hierarchy is appealing
 - homonyms

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Words and word senses (2)

- automatic thesauruses
 - words
- manual thesauruses
 - simple hierarchy is appealing
 - homonyms
 - *crane is-a machine* vs *crane is-a bird*
 - “aha! objects must be word **senses**”

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Problems

- Theoretical
- Practical

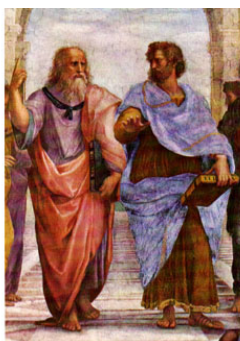
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Theoretical



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Wittgenstein



Don't ask for the
meaning,
ask for the use

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Practical



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Problems

- Practical
 - A thesaurus is a tool
 - if the tool organises words senses **you must disambiguate before you can use it**
 - Automatic disambiguation (WSD):
 - state of the art 65%

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Problems

- Practical
 - A thesaurus is a tool
 - if the tool organises words senses **you must disambiguate before you can use it**
 - Automatic disambiguation (WSD):
 - state of the art 65%

"To use this tool, first replace one third of your input with junk"

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Avoid word senses

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"Sentences mean things because words have meanings, and grammar rules build meanings of sentences from meanings of words"

but

some words have multiple meanings, so it must be word **senses**, not words, that we build sentence meanings from.

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Meaning potential



- The premise was wrong:
 - *What could be more obvious than the platitude that “dog” means “dog” and “house” means house? This reasonable and simple view serves us well in everyday life and is widely shared. And yet there is considerable evidence that it is deeply wrong ... forget notions like “meaning of an expression” and think instead of the “meaning potential” of a language form*

Fauconnier and Turner, in Ed. Nerlich et al 2003, p79.