Compositionality and the Theory of Argument Selection

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Lecture 3. Applications of the Theory of Selection

Outline

- Inherent versus Selectional Polysemy
- Classifier Constructions and Selection
- Spatial Prepositions: the case of *at*
- Derived Agency: Cocomposition

Review of Compositional Mechanisms

Where have we gotten ourselves . . .

Maintaining Compositionality

- Generative Mechanisms of Argument Selection:
  - Selection
  - Accommodation
  - Coercion:
    (i) Introduction
    (ii) Exploitation
- Qualia-based Type Structure:
  - Natural,
  - Artifactual,
  - Complex.

Generative Mechanisms of Argument Selection

- Pure Selection: The type a function requires is directly satisfied by the argument.
- Accommodation: The type a function requires is inherited by the argument.
- Coercion: The type a function requires is imposed on the argument type. This is accomplished by either:
  - Exploitation: selecting part of the argument's type structure to satisfy the function's typing;
  - Introduction: wrapping the argument with the type the function requires.

Difficult Cases of Selection

Co-compositional Selection:

- The derived verb type and meaning is dependent on the type of its argument.
- This violates basic principle of functional typing.

Disambiguating open:

(a) If the object is an entity, then when it's open, it can be used for its purpose.

(b) If the object is an event, then it begins.

Co-compositional Selection:

(1)a. Mary opened the letter from her mother.

b. The rangers have opened the trail for the summer.

c. John opened the door for the guests.

Typically, when "The door opened", someone comes through the door.

(2)a. Mary broke the teapot this morning.

b. Federica's television broke during the Oscars.

c. Mary broke the stick in two.

Compositional Selection in Prepositions

Types of Locations

- Natural Location: defined by 3-D coordinates
- Artifactual Location: defined by Telic on Natural
- Complex Location: defined by coherence relation with Physical Entity

Natural Locations

From the abstraction of spatial coordinates, there are entities which have spatial denotations without entity extention. e_{NL} is structured as a join semi-lattice, $\langle e_{NL}, \sqsubseteq \rangle$;

(3)a. $point$, $spot$, $position$, $area$

b. $space$, sky

Artifactual Locations: e_{AL}

(4)a. $x : e_{NL} \otimes_T \tau$

b. $g \vdash x : e_{NL} \otimes_T \tau \ =_{df} \ g \vdash x : e_{AL}$

c. $g \vdash P : e_{NL} \otimes_T \tau \rightarrow \underline{t} \ =_{df} \ g \vdash P : e_{AL} \rightarrow \underline{t}$

Examples of types in e_{AL}.

(5)a. *seat*: $loc \otimes_T sit$

b. *home*: $loc \otimes_T live\_in$

Complex Locations: e_{CL}

(6)a. $g \vdash x : \sigma \bullet \tau \ =_{df} \ g \vdash x : e_{CL}$

b. $g \vdash P : (\sigma \bullet \tau) \rightarrow \underline{t} \ =_{df} \ g \vdash P : e_C \rightarrow \underline{t})$

Examples of types in e_{CL}.

(7)a. *door*: $phys \bullet loc \otimes_T walk\_through$

b. *window*: $phys \bullet loc \otimes_T see\_through$

Closer Look at the Data

Consider the physical objects from $\mathcal{E}$:

1. Natural Types (No Selection):
   rock, tree, tiger
   We'll meet up with you at the tigers.
2. Artifactual Types (Partial Selection):
   blackboard, computer, table, bar, sink, stove,
   garage$_1$, station, park, museum, restaurant
3. Complex Types (Selection): door, window, room, pool

Non-selecting Artifactual Entities

1. train, chair, phone, garage_2, kitchen, sofa, bed
2. But...
   on the sofa, in bed, on the phone, ...

Dot Objects with Functions

Consider the objects from $\mathcal{C}$:
school, work, hospital

1. Stage-level: at (the) school
2. Individual-level: in school, in the army

Events as Containers

Consider the events from $\mathcal{R}$:

1. Symmetric:
   party, conference, workshop, meeting, battle, breakfast
2. Asymmetric:
   lecture, talk, concert

Degree of Involvement

Symmetric event in the container:

(8) a. John is at a meeting
    b. Mary is at an appointment.

Asymmetric event in the container:

(9) a. John is at a lecture. (he's not giving it).
    b. * John is at his lecture.
    c. John is at a concert. (He's not performing).

The Selective Force of Locative AT

(10) a. Any Locative Type from Entity Domain:

b. Some physical objects from Entity Domain:

c. Some Events from Relation Domain:

The Semantics of Locative AT

(11) a. Locative Relation is proximity along horizontal dimension.

b. Telic property of the location or object is exploited.

(12)a. $x : e_{NL} \otimes_T \tau$

b. $g \vdash x : e_{NL} \otimes_T \tau \ =_{df} \ g \vdash x : e_{AL}$

c. $g \vdash P : e_{NL} \otimes_T \tau \rightarrow \underline{t} \ =_{df} \ g \vdash P : e_{AL} \rightarrow \underline{t}$

Artifactual Locative Relations

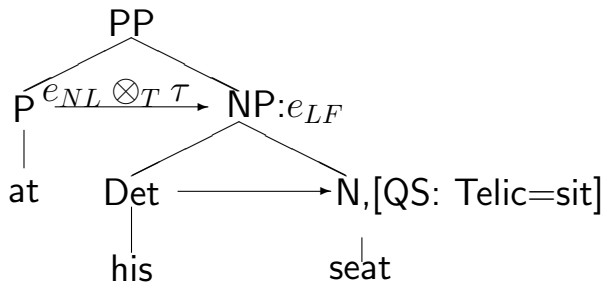
(13) at: $e_{AL} \rightarrow (e \rightarrow \underline{t})$

Locative Selection

Location Types:

at his seat

(14)



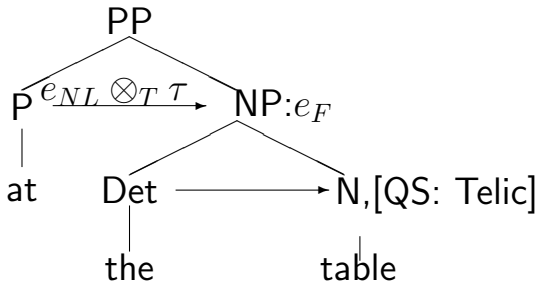
(15) $\lambda x \lambda e \exists y[loc(x, y) \wedge sit(e, x, y) \wedge seat(y)]$

Artifactual Locative Coercion

Objects are coerced to Locations

at the table

(16)



(17) $\Theta[phys \sqsubseteq loc] : phys \longrightarrow loc$

(18) $\lambda x \lambda e(\iota y)[loc(x, y) \wedge Telic(e, x, y) \wedge table(y)]$

Violations of Selectional Constraints

- at the chair: locative relation is violated.
- at the tree: Artifactual (Telic) constraint is violated.

Catalan Locatives (p.c. Roser Saurì)

(19) On són les claus?
where are-3pl the keys?

(20) Són a la cadira de lentrada.
Are-3pl at the chair of the hall.

(21) al despatx/cuina /menjador
in-the office /kitchen /dinning room

(22) al calaix.
in-the drawer.

(23) a /sobre la taula.
at/over the table.

(24) where is-3sg the cat?

(25) El gat sobre la taula.
∗El gat a la taula.
The cat is on the table.

(26) where is-3sg the cup?

(27) sobre la taula.
a la taula.
on the table.

Qualia Selection and Default Arguments

(28) És al telfon (, parlant amb la Maria).
Is-IND.LEVEL at-the phone (, speaking with the-SG-FEM Mary)
He is on the phone.

(29) Està parlant per telèfon (amb la Maria).
Is-STAGE.LEVEL speaking for phone (with the-SG-FEM Mary)
He is speaking through/by the phone .
*Est per telfon.

Classifier Systems and Coercion

(Data from David Wilkins (2000))

(30)a. *thipe*: flying, fleshy creatures;

b. *yerre*: ants;

c. *arne*: ligneous plants;

d. *name*: long grasses;

e. *pwerte*: rock related entities.

Classifier Systems and Coercion

(31)a. *kere*: game animals, meat creatures;

b. *merne*: edible foods from plants;

c. *arne*: artifact, usable thing;

d. *tyape*: edible grubs.

(32)a. *kere aherre*: kangaroo as food;

b. *merne langwe*: edible food from bush banana;

c. *pwerte athere*: a grinding stone

Type Distinctions

(33)a. SPECIFIC NOUN: sortal classification, a Natural type;

b. GENERIC NOUN: a Artifactual type;

c. CLASSIFIER CONSTRUCTION: the instantiation and binding of the qualia role from the Artifactual type onto the Natural Type.

Natural vs. Functional

(34) *Iwerre-ke anwerne aherre arunthe-∅ are-ke.*

way/path-DAT 1plERG kangaroo many-ACC see-pc

"On the way we saw some kangaroos."

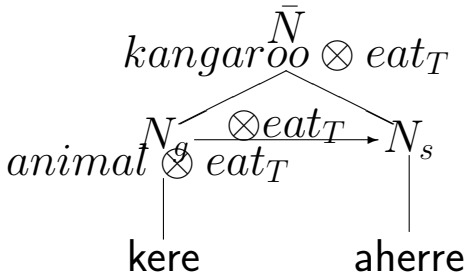
(35) *the imarte arratye kere aherre-∅ arlkwe-tye.lhe-me-le.*

1sgERG then truly meat kangaroo-ACC eat-GO&DO-npp-SS

'When I got there I ate some kangaroo meat."

Classifier Construction

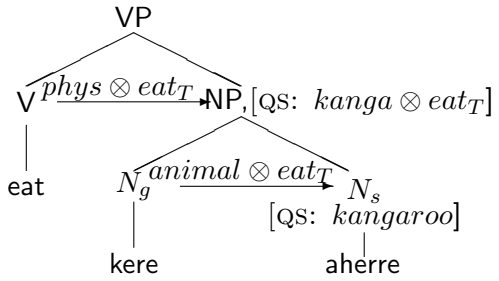
(36)



$$\begin{bmatrix} \textbf{see} \\ \text{CAT} = \textbf{verb} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = animal \\ \text{ARG2} = phys \end{bmatrix} \end{bmatrix}$$

Artifactual Selection with Classifier Construction

$$\begin{bmatrix} \textbf{eat} \\ \text{CAT} = \textbf{verb} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = animal \\ \text{ARG2} = phys \otimes eat_T \end{bmatrix} \end{bmatrix}$$



$$\Theta[kangaroo \sqsubseteq phys] : kangaroo \rightarrow phys$$

Accounting for Agency

1. Selection: x *assassinated/murdered* y
2. Accommodation: x *rolled down the hill*
3. Coercion: x *flies to Boston*

- Human is a complex type of rational animal.
- human: $anim \otimes_{\mathrm{A,T}} (\mathrm{E,E'})$

(37) a. The child /storm / tree killed the teacher.

b. The child /*storm / *tree murdered the teacher.

(38) a. *kill*: $anim \longrightarrow (e_N \longrightarrow t)$

b. *murder*: $anim \longrightarrow (human \longrightarrow t)$

Selection of Agency

John murdered Mary.

1. murder: $\lambda x[\mathit{murder}(\mathsf{x},\mathsf{m})]$,
   $\langle m\colon anim, x\colon anim \otimes_{\mathsf{A,T}} (\mathrm{E},\mathrm{E'})\rangle$
2. john: $anim \otimes_{\mathsf{A,T}} (\mathrm{E},\mathrm{E'})$
3. $\exists e[\mathsf{murder}(e, j, m)]$, Intentional Act

Accommodation of Agency

John killed Mary (intentionally).

Co-Composition

Classic Co-composition cases:

(39)a. John baked a potato.

b. John baked a cake.

(40)a. The bottle is floating in the river.

b. The bottle floated under the bridge.

(41)
$$\begin{bmatrix} \textbf{float} \\ \text{ARGSTR} = \left[\text{ARG1} = \boxed{1} \left[\textbf{physobj} \right] \right] \\ \text{EVENTSTR} = \left[\text{E}_1 = \textbf{e}_1\textbf{:state} \right] \\ \text{QUALIA} = \left[\text{AGENTIVE} = \textbf{float}(\textbf{e}_1, \boxed{1}) \right] \end{bmatrix}$$

(42)
$$\begin{bmatrix} \textbf{into the cave} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \boxed{1}\begin{bmatrix}\textbf{physobj}\end{bmatrix} \\ \text{ARG2} = \boxed{2}\begin{bmatrix}\textbf{the\_cave}\end{bmatrix} \end{bmatrix} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E}_1 = \mathbf{e_1}\textbf{:process} \\ \text{E}_2 = \mathbf{e_2}\textbf{:state} \\ \text{RESTR} = <_\propto \\ \text{HEAD} = \mathbf{e_2} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \text{FORMAL} = \textbf{at}(\mathbf{e_2}, \boxed{1}, \boxed{2}) \\ \text{AGENTIVE} = \textbf{move}(\mathbf{e_1}, \boxed{1}) \end{bmatrix} \end{bmatrix}$$

(43) $\lambda x \lambda e_1 \exists e_2 [move(e_1, x) \wedge \circ(e_1, e_2) \wedge float(e_2, x)]$

$\Rightarrow$ *while floating*

(44)
$$\begin{bmatrix} \textbf{float into the cave} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \boxed{1}\begin{bmatrix}\textbf{physobj}\end{bmatrix} \\ \text{ARG2} = \boxed{2}\begin{bmatrix}\textbf{the\_cave}\end{bmatrix} \end{bmatrix} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E}_1 = \mathbf{e_1}\textbf{:state} \\ \text{E}_2 = \mathbf{e_2}\textbf{:process} \\ \text{E}_3 = \mathbf{e_3}\textbf{:state} \\ \text{RESTR} = <_\propto (e_2, e_3), \circ_\propto (e_1, e_2) \\ \text{HEAD} = \mathbf{e_3} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \text{FORMAL} = \textbf{at}(\mathbf{e_3}, \boxed{1}, \boxed{2}) \\ \text{AGENTIVE} = \textbf{move}(\mathbf{e_2}, \boxed{1}), \textbf{float}(\mathbf{e_1}, \boxed{1}) \end{bmatrix} \end{bmatrix}$$

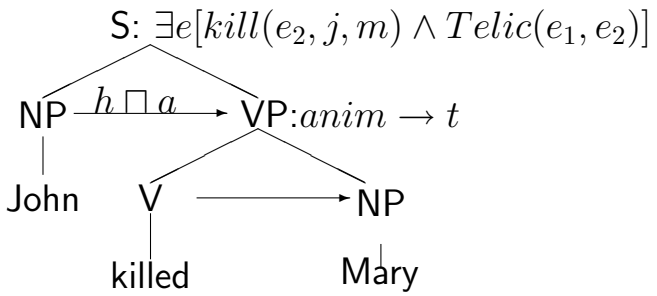
$$\begin{bmatrix} \textbf{kill} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E}_0 = \textbf{e}_0\textbf{:state} \\ \text{E}_1 = \textbf{e}_1\textbf{:process} \\ \text{E}_2 = \textbf{e}_2\textbf{:state} \\ \text{RESTR} = <_\alpha \\ \text{HEAD} = \textbf{e}_1 \end{bmatrix} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \boxed{1}\begin{bmatrix} \textbf{ind} \\ \text{FORMAL} = \textbf{physobj} \end{bmatrix} \\ \text{ARG2} = \boxed{2}\begin{bmatrix} \textbf{animate\_ind} \\ \text{FORMAL} = \textbf{physobj} \end{bmatrix} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \textbf{cause-lcp} \\ \text{FORMAL} = \textbf{dead}(\textbf{e}_2, \boxed{2}) \\ \text{AGENTIVE} = \textbf{kill\_act}(\textbf{e}_1, \boxed{1}, \boxed{2}) \\ \text{PRECOND} = \neg\textbf{dead}(\textbf{e}_0, \boxed{2}) \end{bmatrix} \end{bmatrix}$$

$$\begin{bmatrix} \textbf{kill} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E}_0 = \textbf{e}_0\textbf{:state} \\ \text{E}_1 = \textbf{e}_1\textbf{:process} \\ \text{E}_2 = \textbf{e}_2\textbf{:state} \\ \text{RESTR} = <_\alpha \\ \text{HEAD} = \textbf{e}_1 \end{bmatrix} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \boxed{1}\begin{bmatrix} \textbf{ind} \\ \text{FORMAL} = \textbf{physobj} \end{bmatrix} \\ \text{ARG2} = \boxed{2}\begin{bmatrix} \textbf{animate\_ind} \\ \text{FORMAL} = \textbf{physobj} \end{bmatrix} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \textbf{cause-lcp} \\ \text{FORMAL} = \textbf{dead}(\textbf{e}_2, \boxed{2}) \\ \text{AGENTIVE} = \textbf{kill\_act}(\textbf{e}_1, \boxed{1}, \boxed{2}) \\ \text{TELIC} = \textbf{P}(\textbf{e}_3, \boxed{1}) \\ \text{PRECOND} = \neg\textbf{dead}(\textbf{e}_0, \boxed{2}) \end{bmatrix} \end{bmatrix}$$

Accommodation of Agency

1. kill: $\lambda x[\mathit{kill}(\mathsf{x},\mathsf{m})]$, $\langle m\colon anim, x\colon anim\rangle$
2. john: $anim \otimes_{\mathsf{A,T}} (\mathrm{E},\mathrm{E}')$
3. Agent Accommodation: $\lambda x[\mathit{kill}(\mathsf{x},\mathsf{m})]$,
   $\langle m\colon anim, x\colon anim \otimes_{\mathsf{A,T}} (\mathrm{E},\mathrm{E}')\rangle$
4. Function Application:
5. $\exists e[\mathsf{kill}(e, j, m)]$

(45)


S: $\exists e[kill(e_2, j, m) \wedge Telic(e_1, e_2)]$
NP
$h \sqcap a$
VP:$anim \rightarrow t$
John
V
NP
killed
Mary

(46) a. John killed the flowers accidently / intentionally.
b. John/the rock rolled down the hill.
c. John cooled off with an iced latte.

(47) a. John gave Mary a book.
b. John gave Mary a shower.
c. John gave the plants a spray.

Coercion of Agency

(48)a. We painted$_{R(i,j)}$ our house last summer.
We$_i$/They$_j$ used Benjamin Moore paints.
They$_j$/*We$_i$ even worked in the heat of the day.

b. I dry-cleaned$_{R(i,j)}$ my shirts before I left on the trip.
They$_j$/*I$_i$ stained the sleave, though.

e. I washed$_{R(i,j)}$ my car yesterday.
They$_j$/*I$_i$ waxed the exterior too.

(49)a. Lufthansa flies to Boston.

b. McDonalds has served 1 trillion burgers.

Contractual Co-composition

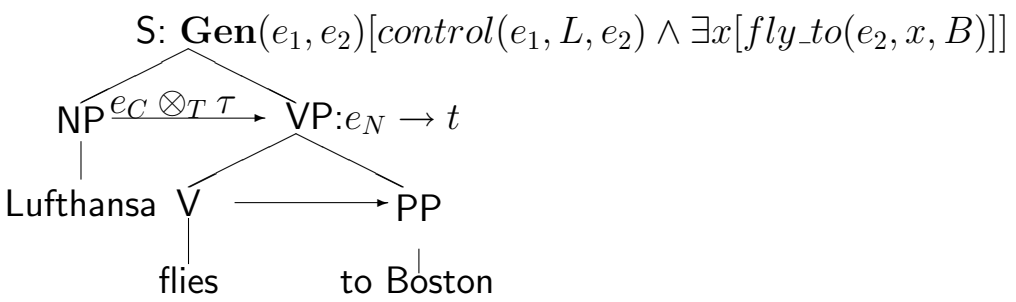
(a) Activities that are contractual between two parties, one in the service of the other; Primary agent A_1 performs an activity in the service of secondary agent A_2.

(b) The controlling (secondary) agent assumes grammatical prominence as subject. The primary agent is shadowed.

Agent Introduction

(50) Lufthansa flies to Boston.

(51)



Difficult Cases

There is no indirect (coerced) interpretation available for most predicates...

- Nixon bombed Hanoi.
- !Clinton kissed all the children.
- !John kicked the dog.
- !Clinton visited Hanoi.

Contractual Assension

(52)a. **publish**: " x brings into print form an informational object y"

b. informational objects have creators;
e.g., $\lambda^* z \lambda y.human[letter(y) \wedge author(z, y)]$

(53)a. The New York Times$_i$ publishes a daily newspaper$_i$.

b. The New York Times published Chomsky's letter.

(54)a. Chomsky published yet another book recently.

b. Eno has finally released a new album.

c. McCartney has issued a new version of "Blackbird."

WordNet synset under: *bring out, issue, release, publish*

(55)a. Chomsky published every early book with Mouton.

b. Mouton published every early Chomsky book.

c. *Mouton and Chomsky published every early book.

d. *Mouton published every early book Chomsky published.

Instrument Control

(a) Activities performed by a tool or instrument, that are controlled by an agent; Primary instrument I performs an activity under control of agent A.

(b) The controlling agent assumes grammatical prominence as subject. The instrument is shadowed.

(56)a. I visited your webpage yesterday to download a file.

b. My students crawled the CNN.com site and indexed the newsfeed headers.

Licensing Purpose and Rationale Clauses

(57) a. Mary$_j$ bought a pizza$_i$ e_j to eat e_i at home.
b. Roger$_i$ bought a Hummer e_i to impress his friends.

(58) What is the difference between purpose and rationale clauses?

a. PURPOSE CLAUSE:
1.. Adjunct is the TELIC of the matrix event.
2. Object argument coherence is required.
3. Subject control.

b. RATIONALE CLAUSE:
1. Adjunct is TELIC for the matrix event.

2. No object argument coherence.
3. Subject control.

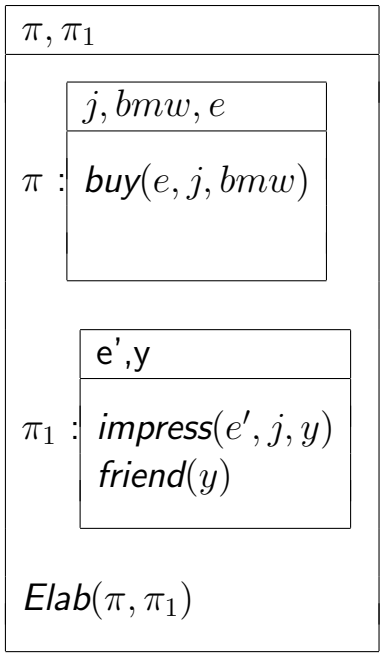
(59) a. Everyone bought a book to read to a child.
b. Everyone bought a car to impress a friend.

Licensing Adjunction

(60)
$$\lambda x \lambda e \exists y \left[\begin{array}{l} \textbf{VP} \\ \text{ARGSTR} = \left[\begin{array}{l} \text{ARG1} = x \\ \text{ARG2} = y : pizza \end{array} \right] \\ \text{EVENTSTR} = \left[\text{E}_0 = e : transition \right] \\ \text{QUALIA} = \left[\begin{array}{l} \text{FORMAL} = \textbf{have(x,y)} \\ \text{TELIC} = \textbf{eat(x,y)} \\ \text{AGENTIVE} = \textbf{buy-act(x,y)} \end{array} \right] \end{array} \right]$$

(61) The "outer TELIC" relation is Asher and Lascarides' *Elaboration* relation.

(62)



(63) Inner TELIC can be embedded within outer TELIC:
Roger bought a Hummer$_i$ to drive e_i to work to impress his teammates.

Corpus Data on Selection: believe [__ S+-fin]

• inf clause	1996	0.6
• ing clause	18	1.9
• that clause	13974	2.6
• wh clause	486	0.5

Corpus Data on Selection: believe [__ NP]

• luck	73	33.05
• ear	48	22.14
• story	73	20.67
• word	95	18.9
• eye	74	14.78
• hype	6	14.16
• myth	12	14.07
• truth	19	13.39
• it	8	12.91
• lie	10	12.57
• opposite	7	12.22
• tale	13	12.16
• nonsense	7	11.62
• propaganda	7	11.17

Concordance for believe [__ NP]:

31 percent said they'd believe the newspaper, primarily because they had "more

He seems to have made the mistake of believing his own propaganda .

Politicians are always at their most vulnerable when they believe their own propaganda .

They weren't quite so stupid as to believe wholly their own propaganda .

The trouble with the hon. Gentleman is that he believes his own propaganda .

The trouble is , the media is able to influence the public and unfortunately influential people in the trade union and labour movements , and maybe they believe the propaganda that socialism is dead and respond accordingly .

PropBank: doubt

Predicate *doubt*:

Frames file for 'doubt' based on sentences in financial subcorpus. No access to verbnet. Comparison with 'believe'.

Roleset doubt.01 "doubt, disbelieve":

Roles:

Arg0:*disbeliever*

Arg1:*disbelief*

Examples:

sentential disbelief (-)

```
Although takeover experts said they doubted Mr. Steinberg will
make a bid by himself...
```

Arg0: they
REL: doubted
Arg1: Mr. Steinberg will make a bid by himself

As usual, leave 'that' complementizers out of the Arg1.

nominal disbelief (-)

```
John doubted Mary.
```

Arg0: John
REL: doubted
Arg1: Mary

Corpus Data on Selection: doubt [__ NP]

•	ability	40	28.79
•	validity	16	27.09
•	sincerity	8	23.7
•	sanity	6	20.83
•	existence	13	18.5
•	correctness	4	16.9
•	accuracy	7	16.7
•	thomases	2	15.99
•	wisdom	6	15.53
•	viability	4	14.28
•	truth	7	13.22
•	authenticity	3	12.83
•	word 1	4	12.75

•	feasibility	3	12.42
•	suitability	3	12.2
•	veracity	2	12.11
•	strength	7	11.84
•	seriousness	3	11.64
•	faith	5	10.75
•	value	9	10.17
•	presupposition	2	9.74
•	possibility	5	9.72
•	claim	6	9.6
•	Sebastian	2	9.48
•	commitment	5	9.4

Corpus Data on Artifactual Selection: repair [__ NP]

• damage	107	42.92
• roof	16	20.31
• covenant	9	18.38
• fence	10	18.1
• gutter	5	15.89
• ravages	4	15.82
• hernium	4	15.6
• car	23	15.39
• shoe	10	15.04
• leak	5	15.01
• bridge	10	14.03
• crack	6	14.02
• fencing	4	13.91
• wall	14	13.77
• puncture	3	13.54
• building	16	13.52

pipe	7	12.92
saddlery	2	12.79
ligament	3	11.85
road	13	12.24

Corpus Data on Complex Selection: read [__ NP]

• book	772	43.31
• newspaper	205	35.76
• bible	82	34.24
• papers	144	32.61
• article	156	31.89
• letter	226	30.44
• poem	85	29.39
• novel	88	28.57
• paper	175	28.54
• text	112	26.93
• passage	82	26.89
• story	148	26.03
• comic	26	25.41
magazine	85	25.38
script	37	24.37
poetry	46	24.12
report	180	23.37
page	89	23.25
paragraph	38	22.92
word	162	21.85

Corpus Data on Propositional Selection: tell [__ NP]

• story	1293	51.85
• truth	602	49.55
• lie	254	45.4
• tale	275	41.0
• reporter	170	38.53
• inquest	82	34.16
• court	639	33.72
• Reuter	44	33.62
• conference	288	30.81
• fib	18	30.49
• joke	94	28.63

Corpus Data on Polysemous Alternating Verbs: open:

Before Bramble could answer , the door **opened** and another stranger entered

As he hesitated the door **opened** and Gilbert Forbes came out in a rush ,

Dressing-room doors **opened** , voices questioned , feet clattered on

and when the door **opened** again he started violently and spilled

It turned . He pulled . The door **opened** . He looked out . The corridor dusky .

But midway through the afternoon the door **opened** . Pike came in. x

xThe bedroom door **opened** and she rushed in . ` Want anything

The door **opened** and there she stood . She was wearing a

they sang as the back door **opened** and Nick came in , a bottle of wine in

but then the door **opened** . The policeman smiled showing large flashy

then the door **opened** . A Bengali girl , absurdly young , stood

The door **opened** and Sheila came in . ` What are

still searching for them as the front door **opened** and Herr Nordern came in.

Corpus Data on Complex Types: lunch (as Obj)

eat	93	42.49
cook	34	34.46
serve	44	28.44
skip	9	23.41
finish	21	22.58
enjoy	25	21.97
prepare	21	20.66
attend	15	18.54
miss	12	16.96
take	48	15.47
provide	26	15.21
bring	21	15.06
get	40	14.98
include	12	10.89

buy	14	14.21
arrange	8	13.18
want	19	12.69
host	4	12.17
organise	6	11.1
cancel	4	11.08
order	6	10.74
spoil	3	9.72
share	6	9.75

Corpus Data on Complex Types: lecture (as Obj)

attend	75	38.84
deliver	65	38.02
give	226	35.18
entitle	12	19.41
organise	9	14.38
present	13	14.16
sponsor	5	12.55
illustrate	7	12.44
finish	7	11.81
include	13	11.4
organize	5	11.21
publish	8	10.99
prepare	7	10.52
get	22	9.82

record	6	9.73
hold	12	9.55
arrange	5	9.46
read	6	8.59
write	8	8.54
begin	6	6.4

Corpus Data on Complex Types: seminar (as Obj)

• attend	65	39.64
• organise	56	38.75
• hold	88	32.76
• host	7	18.77
• entitle	9	18.08
• run	19	17.09
• convene	5	16.94
• chair	6	16.83
• arrange	9	15.72
• sponsor	6	15.5
• conduct	8	14.93
• address	7	13.84
• give	24	12.71

plan	7	11.98
design	5	8.84
present	5	8.4
aim	6	11.87
follow	6	7.15

Corpus Data on Complex Types: appointment (as Obj)

make	454	35.11
announce	71	30.09
terminate	20	27.2
confirm	35	24.53
approve	31	24.52
arrange	32	24.26
cancel	16	22.16
keep	55	20.42
accept	32	19.64
get	89	18.58
secure	17	18.21
relinquish	7	17.67
book	9	16.21
include	30	15.47
ratify	6	15.32

hold	36	15.49
follow	30	14.69
welcome	11	14.5
recommend	11	14.06
receive	20	13.23
block	7	12.81
oppose	7	12.01
veto	5	15.44
miss	9	11.83

Corpus Data on Complex Types: book (as Subj)

•	contain	119	30.89	consist	16	15.28
•	deal	51	24.3	devote	11	14.97
•	cover	48	19.9	trace	11	14.7
•	include	58	18.85	reveal	20	14.66
•	review	19	18.62	concentrate	15	14.59
•	lie	28	18.4	explain	24	14.58
•	provide	70	17.69	chronicle	6	18.06
•	publish	30	17.37	describe	28	13.93
•	show	65	17.07			
•	appear	37	17.01			
•	bargain	6	16.28			
•	help	37	15.54			

Corpus Data on Complex Types: book (as Obj)

• read	772	53.51
• write	933	50.44
• publish	416	44.21
• balance	76	32.65
• buy	187	29.16
• entitle	66	27.96
• borrow	43	24.94
• illustrate	65	24.38
• close	76	22.84
• produce	146	22.66
• research	26	22.34
• open	100	22.05
• rewrite	16	21.69
• sell	92	21.25
• print	34	20.74
• recommend	44	20.17
• get	301	20.15
• Compile	23	19.81

dedicate	23	19.53
ban	27	18.52
purchase	28	18.2
consult	22	17.52
finish	38	17.37
edit	18	17.27

Complex Types: book (modified by Adjective)

• concerned	61	34.79
• available	65	31.21
• useful	20	22.67
• full	30	21.91
• enjoyable	8	20.99
• readable	5	19.09
• interesting	13	18.45
• unreadable	3	15.46
• relevant	9	14.78
• complete	9	14.59
• ready	9	14.45
• up to date	4	14.29
• valuable	6	13.73

good	18	13.2
popular	8	13.03
encyclopaedic	2	12.69
blasphemous	2	12.53
open	9	11.67
invaluable	3	11.56
impressive	4	11.2
supposed	5	11.03