

Assignment4

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Q1:

Word	WordNet	Collins Cobuild	Analysis
imitation	5 1. (n) the doctrine that representations of nature 2. (n) something copied or derived from an original 3. (n) copying the actions of someone else 4. (n) a representation of a person that is exaggerated for comic effect 5. (adj) not genuine or real	4 1. (n) a copy of something, fake 2. (n) copy someone else's action, copying 3. (adj) not genuine but are made to look similar 4. (n) copy the way of speaking or behaving of another person, sometimes to be funny	I agree with WordNet. The difference between Wordnet and Collins is sence#1 in the WordNet. I think sense#1 in Word Net is a high technology and it is different from simply copying something.
synthetic	7 1. (n) a compound made artificially by chemical reactions 2. (adj) not of natural origin; prepared or made artificially 3. (adj) involving or of the nature of synthesis as opposed to analysis 4. (adj) systematic combining of root and modifying elements into single words 5. of a proposition whose truth value is determined by observation or facts 6. (adj) artificial as if portrayed in a film 7. (adj) not genuine or natural	1 1. (adj) Synthetic products are made from chemicals or artificial substances rather than from natural ones.	I agree with WordNet. The Wordnet provides a detailed explanation, but the sense in Collin is too general.
artificial	3 1. (adj) contrived by art rather than nature 2. (adj) artificially formal	4 1. (adj) Artificial objects, materials, or processes do not occur naturally	I don't agree with WordNet. The Collins Cobuild provides a more

	<p>3. (adj) not arising from natural growth or characterized by vital processes</p>	<p>and are created by human beings</p> <p>2. (adj) An artificial state or situation exists only because someone has created it, and therefore often seems unnatural or unnecessary.</p> <p>3. (adj) disapprove of some things because they pretend to have attitudes and feelings which they do not really have.</p> <p>4. (adj) If saying food tastes or looks artificial, you do not like it because its taste or appearance does not seem genuine, and seems to be created by added substances.</p>	<p>detailed explanation and gives various types. The sense#2 in the WordNet is not very detailed and not understandable.</p>
fake	<p>8</p> <p>1. (n) something that is a counterfeit</p> <p>2. (n) a person who makes deceitful pretenses</p> <p>3. (n) (football) a deceptive move</p> <p>4. (v) make a copy of with the intent to deceive</p> <p>5. (v) tamper, with the purpose of deception</p> <p>6. (v) speak insincerely or without regard for facts or truths</p> <p>7. (adj) fraudulent</p> <p>8. (adj) not genuine or real</p>	<p>4</p> <p>1.(adj) look valuable or genuine, usually in order to deceive people</p> <p>2. (v) make it look valuable or genuine, although in fact it is not</p> <p>3. (n) they do not have the qualifications that they claim to have</p> <p>4. (v) pretend that you are experiencing it when you are not</p>	<p>I agree with WordNet. The Wordnet provides a detailed explanation, but the sense in Collin is too general.</p>
simulated	<p>5</p> <p>1. (v) reproduce someone's behavior or looks</p> <p>2. (v) create a representation or model of</p> <p>3. (v) make a pretence of</p>	<p>2</p> <p>1. (adj) of fur, leather, pearls, etc) being an imitation of the genuine article, usually made from cheaper material</p>	<p>I agree with WordNet. The Wordnet provides a detailed explanation, but senses in Collin are too general.</p>

	4. (adj) not genuine or real; being an imitation of the genuine article 5. (adj) reproduced or made to resemble; imitative in character	2. (adj) (of actions, qualities, emotions, etc) imitated; feigned	
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Q2:

Word: bat (noun), I only get 5 distinct senses of noun bat in the WordNet.

bat₁: (n) chiropteran (nocturnal mouselike mammal)

bat₂: (n) at-bat ((baseball) a turn trying to get a hit)

bat₃: (n) squash racket (a small racket with a long handle used for playing squash)

bat₄: (n) cricket bat (the club used in playing cricket)

bat₅: (n) a club used for hitting a ball in various games

Homonymy:

bat₁ and bat₂

Polysemy:

bat₃, bat₄ and bat₅

Argument:

bat₃ and bat₄ are both standing for a thing that we can use it to play a game. In bat₃, we can play squash and we can play cricket in bat₄. The sense of bat₅ is more like a hypernymy of bat₃ and bat₄. These senses all means a club that can be used for playing, therefore, bat₃, bat₄ and bat₅ are polysemy.

Q3:

I choose Chinese and English

	Word in English	First sense with Chinese translation	Second sense with Chinese translation
Senses translated into different words	spring	Spring is the season between winter and summer when the weather becomes warmer and plants start to grow again. (春天)	A spring is a spiral of wire which returns to its original shape after it is pressed or pulled. (弹簧)
	table	A table is a piece of furniture with a flat top that you put things on or sit at. (桌子)	A table is a written set of facts and figures arranged in columns and rows. (表格)

	right	If something is right, it is correct and agrees with the facts. (正确的)	The right is one of two opposite directions, sides, or positions. (右)
Senses translated into the same word	nail	A nail is a thin piece of metal with one pointed end and one flat end. You hit the flat end with a hammer in order to push the nail into something such as a wall. (钉)	If you nail something somewhere, you fasten it there using one or more nails. (钉)
	hole	A hole is a hollow space in something solid, with an opening on one side. (洞)	A hole is an opening in something that goes right through it. (洞)
	think	If you think that something is the case, you believe that it is the case (觉得)	If you say that you think that something is true or will happen, you mean that you have the impression that it is true or will happen, although you are not certain of the facts. (觉得)

Q4:

The open classes in English are nouns, lexical verbs, adjective, adverbs. I use WordNet3.1.

1. The last full moon of 2017 will appear especially plump and vibrant in the night sky this weekend.

- Length: 18
- Distinct combinations: 32256
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
last	8	2	9	2
full	1	3	8	1
moon	6	3	-	-
appear	-	7	-	-
especially	-	-	-	2
plump	1	4	1	1
vibrant	-	-	3	-
night	8	-	-	-
sky	1	1	-	-
weekend	1	1	-	-

2. And yet, the perfection of the physical elements was never the end goal.

- Length: 13
- Distinct combinations: 672
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
perfection	3	-	-	-
physical	-	-	7	-
elements	1	-	-	-
never	-	-	-	2
end	14	4	-	-
goal	4	-	-	-

3. It's still a mixed bag.

- Length: 6
- Distinct combinations: 108
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
still	4	4	6	4
mixed	-	-	2	-
bag	9	5	-	-

4. Throughout his career, he has taken on the interests and physical challenges of every character he plays.

- Length: 17
- Distinct combinations: 1234800
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
throughout	-	-	-	2
career	2	1	-	-
taken	-	-	2	-
interests	7	3	-	-
physical	-	-	7	-
challenges	5	4	-	-
every	-	-	2	-
character	9	1	-	-
plays	17	35	-	-

5. The insane popularity of a single sweatshirt has forced its maker to expand into four new factories within the last year just to meet the soaring demand.

- Length: 27
- Distinct combinations: 372556800
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
insane	-	-	2	-

popularity	1	-	-	-
single	2	1	7	-
sweatshirt	1	-	-	-
forced	-	4	-	-
maker	3	-	-	-
expand	-	7	-	-
new	-	-	10	1
factories	1	-	-	-
last	8	2	9	2
year	4	-	-	-
just	-	-	4	8
meet	1	11	1	-
soaring	1	-	2	-
demand	5	6	-	-

6. At the time, American Giant had only one factory in Brisbane, California. The company has since expanded into a factory in Los Angeles and three more in rural North Carolina, just outside Raleigh.

- Length: 33
- Distinct combinations: 287280
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
time	10	5	-	-
American	3	-	2	-
Giant	7	-	1	-
have	1	19	-	-
only	-	-	2	7
factory	1	-	-	-
company	9	1	-	-
expanded	-	-	1	-
more	1	-	2	2
rural	-	-	2	-

7. Shortly after the announcement, a video surfaced on local television.

- Length: 10
- Distinct combinations: 1080
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
shortly	-	-	-	5
announcement	2	-	-	-
video	4	-	-	-
surfaced	-	3	-	-
local	2	-	3	-
television	3	-	-	-

8. “We want to make the government aware that it cannot put an end to the gangs,” the speaker said.

- Length: 19
- Distinct combinations: 32598720

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
want	4	5	-	-
make	2	49	-	-
government	4	-	-	-
aware	-	-	2	-
put	1	9	-	-
end	14	4	-	-
gangs	4	1	-	-
speaker	3	-	-	-
said	-	11	1	-

9. This video was, in a way, the capstone to his efforts.

- Length: 11
- Distinct combinations: 384

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
video	4	-	-	-
way	12	-	-	1
capstone	2	-	-	-
efforts	4	-	-	-

10. If the government did not care to stop the violence, then the gangs would pursue peace on their own.

- Length: 19
- Distinct combinations: 52800

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
government	4	-	-	-
care	6	5	-	-
stop	11	11	-	-
violence	3	-	-	-
gangs	4	1	-	-
pursue	-	4	-	-
peace	5	-	-	-
own	-	1	1	-

11. The cafe is the closest eatery to the hippo tank, and therefore the closest to Fiona, the 10-month-old hippo who bounces around inside it.

- Length: 26
- Distinct combinations: 1120
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
cafe	1	-	-	-
closest	-	-	-	1
eatery	1	-	-	-
hippo	2	-	-	-
tank	5	3	-	-
month	2	-	-	-
old	1	-	8	-
bounces	3	7	-	-

12. “She has all the merch, the tumblers, the calendar. If there’s something with Fiona’s face on it, she has to have it first.”

- Length: 20
- Distinct combinations: 5928
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
has	-	19	-	-
all	-	-	2	1
tumblers	4	-	-	-
calendar	3	1	-	-
face	13	9	-	-

13. When Fiona was born, no one expected her to survive.

- Length: 10
- Distinct combinations: 52
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
born	1	13	2	-
survive	-	4	-	-

14. The animal becomes a meme, a product, a unit of sale.

- Length: 11
- Distinct combinations: 720

-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
animal	1	-	1	-
becomes	-	4	-	-
meme	1	-	-	-
product	6	-	-	-
unit	6	-	-	-
sale	5	-	-	-

15. In other words, it can be dangerous to overhype and anthropomorphize wild animals, as we project our fantasies and desires onto them and turn the narrative into a heartwarming tale that serves to reaffirm our own sense of goodness.

- Length: 38
- Distinct combinations: 438048000
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
other	-	-	4	-
words	5	1	-	-
dangerous	-	-	2	-
anthropomorphize	-	1	-	-
wild	2	-	13	2
animals	1	-	-	-
project	2	12	-	-
fantasies	3	1	-	-
desires	3	3	-	-
turn	12	26	-	-
narrative	1	-	1	-
heartwarming	-	-	1	-
tale	2	-	-	-
serves	2	15	-	-
reaffirm	-	1	-	-
own	-	1	1	-
sense	5	4	-	-
goodness	2	-	-	-

16. Two weeks later, on Halloween, the zoo announced his death.

- Length: 10
- Distinct combinations: 288
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
weeks	3	-	-	-

later	-	-	2	3
zoo	1	-	-	-
announced	-	4	1	-
death	8	-	-	-

17. Fiona's celebrity has undeniably been good for human business.

- Length: 9
- Distinct combinations: 1134
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
celebrity	2	-	-	-
undeniably	-	-	-	1
good	4	-	21	2
human	1	-	3	-
business	9	-	-	-

18. He is also haunted by the memory of his mother, for whom he made a wedding dress for her second marriage while he was still a young boy.

- Length: 28
- Distinct combinations: 14288400
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
haunted	-	3	3	-
memory	5	-	-	-
mother	5	2	-	-
made	-	49	3	-
wedding	3	-	-	-
dress	3	16	2	-
marriage	4	-	-	-
still	4	4	6	4
young	9	5	-	-
boy	3	-	-	-

19. "When people hear we've held her, they want to touch our hands," Ms. Curley said.

- Length: 16
- Distinct combinations: 1900800
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
people	4	2	-	-
hear	-	5	-	-
held	-	36	1	-

touch	12	15	-	-
hands	16	2	-	-
said	-	11	1	-

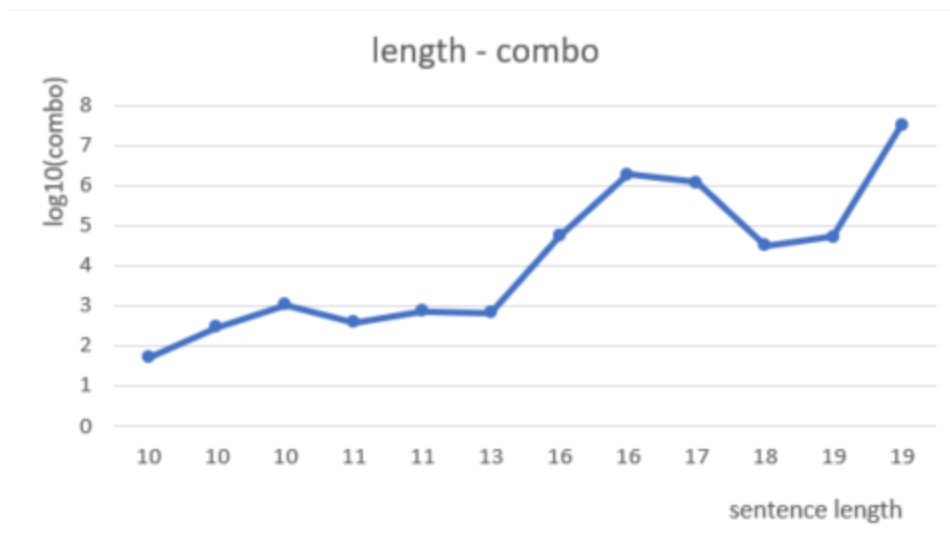
20. Almost everyone I spoke with in Cincinnati seemed to have an opinion on the blessed child.

- Length: 16
- Distinct combinations: 54720
-

Open-class word	Senses			
	NOUN	VERB	ADJECTIVE	ADVERB
spoke	2	5	-	-
seemed	-	4	-	-
have	1	19	-	-
opinion	6	-	-	-
blessed	-	4	6	-
child	4	-	-	-

Analysis:

1	length	log10(combo)	combo
2	6	2.033423755	108
3	9	3.054613055	1134
4	10	1.716003344	52
5	10	2.459392488	288
6	10	3.033423755	1080
7	11	2.584331224	384
8	11	2.857332496	720
9	13	2.827369273	672
10	16	4.738146089	54720
11	16	6.278936423	1900800
12	17	6.091596621	1234800
13	18	4.50861051	32256
14	19	4.722633923	52800
15	19	7.513200548	32598720
16	20	3.772908195	5928
17	26	3.049218023	1120
18	27	8.571192495	372556800
19	28	7.1549836	14288400
20	33	5.458305392	287280
21	38	8.641521702	438048000



In general, the distinct combinations of senses are increasing with the growth of sentence lengths. However, it is not a very strict rule. Some sentences that includes words with various senses have a large distinct combination of senses, no matter how long of them.

Q5:

I use WordNet to tag each open-class word in each sentence.

1.

Open-class word	Tagger
last	adv
full	adj
moon	n
appear	v
especially	adv
plump	adj
vibrant	adj
night	n
sky	n
weekend	n

2.

Open-class word	Tagger
perfection	n
physical	adj
elements	n
never	adv
end	n

goal	n
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3.

Open-class word	Tagger
still	adv
mixed	adj
bag	n

4.

Open-class word	Tagger
throughout	adv
career	n
taken	v
interests	n
physical	adj
challenges	n
every	adj
character	n
plays	v

5.

Open-class word	Tagger
insane	adj
popularity	n
single	adj
sweatshirt	n
forced	v
maker	n
expand	v
new	adj
factories	n
last	adj
year	n
just	adv
meet	v
soaring	adj
demand	n

6.

Open-class word	Tagger
time	n

American	n
Giant	adj
have	v
only	adj
factory	n
company	n
expanded	v
more	adj
rural	adj

7.

Open-class word	Tagger
shortly	adv
announcement	n
video	n
surfaced	v
local	adj
television	n

8.

Open-class word	Tagger
want	v
make	v
government	n
aware	adj
put	v
end	v
gangs	n
speaker	n
said	v

9.

Open-class word	Tagger
video	n
way	adv
capstone	n
efforts	n

10.

Open-class word	Tagger
government	n

care	v
stop	v
violence	n
gangs	n
pursue	v
peace	n
own	adj

11.

Open-class word	Tagger
cafe	n
closest	adj
eatery	n
hippo	n
tank	n
month	n
old	adj
bounces	v

12.

Open-class word	Tagger
has	v
all	adj
tumblers	n
calendar	n
face	n

13.

Open-class word	Tagger
born	v
survive	v

14.

Open-class word	Tagger
animal	n
becomes	v
meme	n
product	n
unit	n
sale	n

15.

Open-class word	Tagger
other	adj
words	n
dangerous	adj
anthropomorphize	v
wild	adj
animals	n
project	v
fantasies	n
desires	n
turn	v
narrative	adj
heartwarming	adj
tale	n
serves	v
reaffirm	v
own	adj
sense	n
goodness	n

16.

Open-class word	Tagger
weeks	n
later	adv
zoo	n
announced	v
death	n

17.

Open-class word	Tagger
celebrity	n
undeniably	adv
good	adj
human	adj
business	n

18.

Open-class word	Tagger
haunted	v
memory	n
mother	n
made	v

wedding	n
dress	n
marriage	n
still	adv
young	adj
boy	n

19.

Open-class word	Tagger
people	n
hear	v
held	v
touch	v
hands	n
said	v

20.

Open-class word	Tagger
spoke	v
seemed	v
have	v
opinion	n
blessed	adj
child	n

Analysis: I don't think choose the correct sense is always a straightforward task. Some proper noun, like American Giant, I can't figure out what is the meaning of Giant here. Therefore, I don't know it is a noun or an adjective.

Q6:

	Subject	Verb	Object	disambiguated (1) / ambiguated (0)
1	moon	appear		1
2	perfection	be	goal	0
3	it	be	bag	0
4	he	take		0
5	popularity	force	maker	0
		meet	demand	1
6	American Gaint	have	factory	1
	company	expand		1

7	video	surface		0
8	we	want		1
		make	government	0
	it	put	end	0
	speaker	say		1
9	video	be	capstone	1
10	government	care		1
	gang	pursue	peace	1
11	café	be	eatery	1
	hippo	bounce		1
12	she	have	merch/tumbler/calendar	1
	she	have	it	0
13		born	fiona	1
	one	expected	her	1
14	animal	become	meme/product/unit	1
15	it	be		1
	we	project	fantasy/desire	1
	we	turn	narrative	0
	tale	serve		0
		reaffirm	sense	1
16	zoo	annouce	death	1
17	celebrity	be		0
18	memory	haunt	he	1
	he	make	dress	0
	he	be	boy	1
19	people	hear		1
	we	hold	he	0
	they	want		1
		touch	hand	1
	Curley	say		1
20	everyone	seem		1
		have	opinion	1
	I	speak		0
How often does it appear to be the case that the words taking part in these relations could be disambiguated using only information about the words in the relation?				66%

Q7.

I chose two measures: Path length and Wu & Palmer.

Path length: A simple node-counting scheme (path). The relatedness score is inversely proportional to the number of nodes along the shortest path between the synsets. The shortest possible path occurs

when the two synsets are the same, in which case the length is 1. Thus, the maximum relatedness value is 1.

Wu & Palmer: The Wu & Palmer measure (wup) calculates relatedness by considering the depths of the two synsets in the WordNet taxonomies, along with the depth of the LCS. The formula is $\text{score} = \frac{2 * \text{depth}(\text{lcs})}{(\text{depth}(s1) + \text{depth}(s2))}$. This means that $0 < \text{score} \leq 1$. The score can never be zero because the depth of the LCS is never zero (the depth of the root of a taxonomy is one). The score is one if the two input synsets are the same.

Word Pair		Similarity Score (max=1)	Path Length (max=1)	Wu & Palmer (max=1)
cord	smile	0.033	0.091	0.375
rooster	voyage	0.020	0.042	0.148
monk	slave	0.138	0.200	0.714
forest	graveyard	0.210	0.111	0.500
tool	implement	0.738	0.500	0.941
bird	cock	0.763	0.500	0.957
food	fruit	0.770	0.100	0.471
asylum	madhouse	0.903	0.500	0.957
brother	lad	0.415	0.200	0.714
automobile	car	0.980	1.000	1.000
Correlation rate (max=1)			0.48	0.29