Lecture 3

A look at language collocations and keywords

Overview

- The focus of this talk – the corpus linguistics perspective collocations and keywords
- • Some examples
- • Multi-methods

Frequency lists

- Simply a list of words and their frequencies in a corpus.

1	the	64420
2	of	31109
3	and	27002
4	to	26062
5	a	21972
6	in	18978
7	is	9961
8	that	9896
9	was	9368
10	it	9298

Collocation - Definition

collocations: the systematic co-occurrence of words in use

some examples: (you can probably think of your own):

- telephone - operator
- back – front (e.g. *back to front, front and back*)
- tell – story (e.g. *tell me a story*)

Collocates of diamond

multichip, solitaire, sapphire, jubilee, bingo, bracelet, graphite, brooch, cluster, necklace, waterfall, moth, ruby, presenter, ring, earrings, eternity, pearl, paste, engagement, shaped, tricks, rings, tiger, pin, anne, atoms, celebrated, dogs, rough, gold, dealer, shapes, mining, anniversary, victoria, neil, stone, queen, wedding

How large should the span be?

- Typically set at +/- 5 words. This seems to be the most useful span for collocates
- Similarly many people set a minimum threshold of frequency for words to count as collocates. I usually use a minimum frequency of 10
- Option to stop at sentence boundaries

Collocates of **company**

am a widow and he **keeps** the two of us	**company**	. Mrs Jackson, Grimston, Norfolk
to follow IBM slavishly) and also **keeps** the	**company**	on a smoother footing as it no
laugh, shows me affection constantly, **keeps** me	**company**	, gives me something to cuddle and
The bubbling cry of the curlew often **keeps** you	**company**	across the moorland to Laddow
the family, aren't you? **Keeps** me	**company**	.Say hello to Kevin.I wash it
under present arrangements;Either a	**company**	**keeps** going forward or it runs the
of Sir Arthur Sullivan, the D'Oyley Carte Opera	**Company**	**keeps** his music alive.Stars from
is covered in sanding marks, but in the	**company**	it helps us to **keep** the exception
.The haulier should make sure that his	**company**	secretary **keeps** a proper record of
borrowing.Credit Reference Agency: a	**company**	which **keeps** files on individuals'
translated: a word may be known by the	**company**	it **keeps**.One may look not only at
for Johnstone, the family name behind a	**company**	which **keeps** six members of the
been said that a person is judged by the	**company**	he **keeps**.It's also true that a
"Of him -- and the	**company**	he **keeps**.Go on."

Rank by frequency

No.	Word	Frequency	Frequency as collocate	In No. of texts
1	the	6,041,234	26151	2155
2	,	5,014,383	10307	1835
3	a	2,164,238	8314	1644
4	of	3,042,376	7039	1551
5	.	4,713,133	5969	1636
6	to	2,593,729	5553	1324
7	's	783,990	4863	1184
8	and	2,616,708	4726	1433
9	in	1,937,819	4689	1438
10	that	1,118,985	2619	905

Mutual information

количество взаимной информации

No.	Word	Frequency	As collocate	In No. of texts	Mutual information value
1	ec-listed	6	5	1	8.6232085249112
2	anglo-persian	8	6	3	8.4712054314661
3	worshipful	49	34	24	8.3589959278801
4	anglo-iranian	13	9	4	8.3557282140462
5	clothworkers	17	11	6	8.2582117081319
6	'64	13	8	2	8.1858032126039
7	2/2	12	6	1	7.886242930745
8	beller	12	5	3	7.6232085249112
9	petrobras	17	7	7	7.6061350115522
10	d'oyly	35	13	9	7.4573996319411

Dice coefficient
коэффициент Дайса

No.	Word	Frequency	As collocate	In No. of texts	Dice coefficient
1	insurance	7,027	446	263	0.019
2	parent	3,728	311	151	0.0143
3	shares	8,386	340	128	0.0141
4	record	14,808	350	94	0.0128
5	limited	10,312	314	135	0.0125
6	says	39,194	482	223	0.0122
7	's	783,990	4863	1184	0.0118
8	holding	7,963	261	121	0.0109
9	has	256,480	1608	625	0.0109
10	private	17,572	287	165	0.01

A look at language collocations and keywords

Colligation

- A word collocates with a particular grammatical class.
- E.g ‘he’ colligates with verbs
- ‘Mrs’ colligates with proper nouns
- determiners colligate with nouns

Semantic preference

- Similar to Bill Louw's concept of semantic prosody.
- 'the relation, not between individual words, but between a lemma or word-form and a set of semantically related words' Stubbs (2001: 65)

Semantic preference – glass of

wine, sherry, champagne, beer, poured, water, juice, brandy, milk, whisky, orange, lemonade, rum, iced, sipped, gin, vodka, small, port, cider, lager

Discourse prosody

- "Discourse prosodies express speaker attitude" (Stubbs 2001: 65)
- CAUSE (Stubbs 2001)
- General Corpus: CAUSE problem(s) 1806, damage 1519, death(s) 1109, disease 591, concern 598, cancer 572, pain 514, trouble 471
- Also: *cause <accident, anger, chaos, crisis, doubt, hurt, suffering, upset>*

Discourse prosody

- Environmental corpus: *cause <blindness, cancer, concern, damage, depletion, harm, loss, ozone, problem, radiation, warning>*

(Corpus) Keywords

A keyword list is calculated by comparing 2 frequency lists together – usually a much larger reference corpus against a smaller specialised corpus (but sometimes 2 equal sized corpora).

- Chi-square or log-likelihood test identify the words that are statistically much more frequent in one list when compared to the other.

http://ucrel.lancs.ac.uk/llwizard.html

Log-likelihood and effect size calculator

To use this wizard, type in frequencies for one word and the corpus sizes and press the calculate button.

	Corpus 1	Corpus 2
Frequency of word		
Corpus size		

Calculate | Clear form

Notes:
1. Please enter plain numbers without commas (or other non-numeric characters) as they will confuse the calculator!
2. The LL wizard shows a plus or minus symbol before the log-likelihood value to indicate overuse or underuse respectively in corpus 1 relative to corpus 2.
3. The log-likelihood value itself is always a positive number. However, my script compares relative frequencies between the two corpora in order to insert an indicator for '+' overuse and '-' underuse of corpus 1 relative to corpus 2.

How to calculate log likelihood

Log likelihood is calculated by constructing a contingency table as follows:

	Corpus 1	Corpus 2	Total
Frequency of word	a	b	a+b
Frequency of other words	c-a	d-b	c+d-a-b
Total	c	d	c+d

Note that the value 'c' corresponds to the number of words in corpus one, and 'd' corresponds to the number of words in corpus two (N values). The values 'a' and 'b' are called the observed values (O), whereas we need to calculate the expected values (E) according to the following formula:

$$N_i \sum_i O_i$$

When is a word a keyword?

The analyst needs to apply cut-off points for statistical significance.

- Some analysts only look at the top 10 or 50 or 100 keywords instead.
- Additionally, sometimes a minimum frequency is applied (e.g. a word must occur 20 times before it's a keyword)
- Also, we may specify a keyword has to be reasonably well distributed (occurring in at least 20 texts)

Common types of keywords

- 1.Proper nouns (Clegg, Ghana etc)
- 2. Markers of style (often grammatical words like must, betwixt)
- 3. Spelling idiosyncrasies (color/colour)
- 4. “Aboutness” words (politics, recipe etc)

What's the point of it?

- Keywords identify salient words in a corpus, acting as signposts for a linguistic, cultural or discursive analysis. Explaining why they're there and what they do can lead to interesting and unexpected findings.
- Keywords can often not be predicted in advance as humans have cognitive biases when it comes to noticing frequencies.
- The statistical method is replicable and unbiased so it has a high reliability/validity from a scientific viewpoint.

Example – Change over time (Baker 2011)

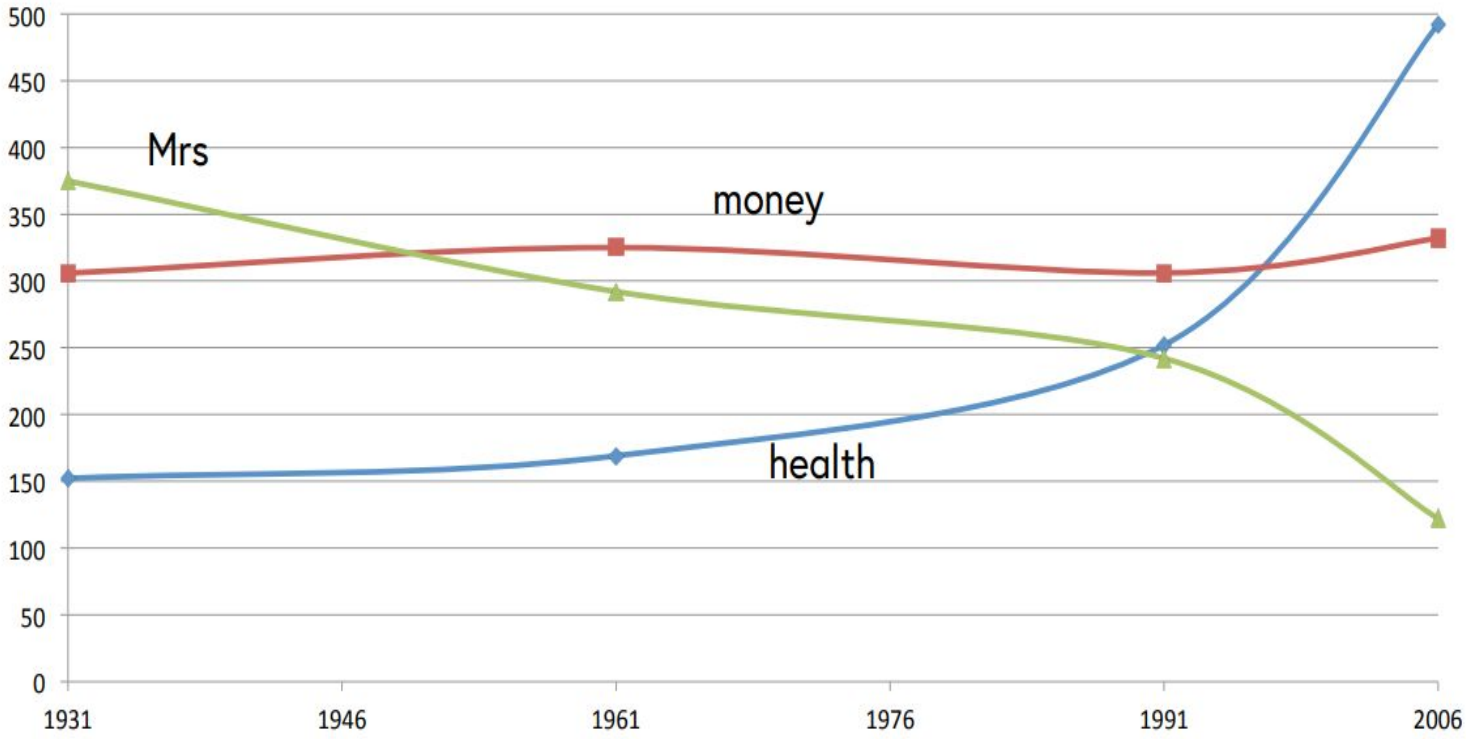
- How has British English changed over time? Which words have
- a) steadily become less frequent
- b) steadily become more frequent
- c) stayed pretty much the same (lock words – locked in place)

- What can this tell us about cultural values?

Identifying key terms

- Four corpora used from 'The Brown Family' each a million words of written, published standard English (news, general prose, academic writing, fiction – 500 samples of 2000 words each), from 1931, 1961, 1991 and 2006.
- A technique called Coefficient of Variance used to identify words with highest and lowest changes in frequency over time.
- Only very frequent words (>1000 occurrences across all corpora considered)

Examples


500
450
400
350
300
250
200
150
100
50
0
1931
1946
1961
1976
1991
2006
Mrs
money
health

Words that are declining the most

- Terms of address: *Mr, Mrs, sir* (a more informal society?)
- Stronger modal verbs: *shall, must, should* (a more democratic society?)
- Longer forms: *cannot, upon, half* (densification?)

Lock words

- Weaker modality: *can, could, would*
- Wh- words: *who, what, whether, where*
- Body parts: *hand, face, head, body, eyes*
- Other nouns: *life, world, government, money*

Words becoming more frequent

- Contracted forms: *it's, didn't, I'm, don't*
- Writing numbers as *34* rather than *thirty four*
- Social terms: *family, children, child, people, social, health, help*

- *Stable keywords vs. Emerging keywords*

ı being a current smoker are elevated among	children	with intellectual disabilities (95 percent CI for
ıy . " People return to your homes ! Kill your	children	! Kill your wives ! Then kill yourself ! ' " No
fective plans for safeguarding and promoting	children	's welfare should be based on a wide-ranging ass
t the formal support for married women with	children	should be extended to single women and that un
nd dining table with chairs can not be taken .	Children	's toys and other possessions can also not be take
owing up I was probably one of thousands of	children	across the length and breadth of Wales whose di
them in a boarding school.95 Many of these	children	were lucky enough to have relations who visited
: welfare of children and families Supporting	children	and families 1.1 All children deserve the opportu
ts had a great influence on adults ' as well as	children	's behaviour . We all went to confession , said ou
f friends . In the same study , healthy-weight	children	were rated as clever , attractive , healthy , kind ,
opean Endeavour ; these were cards made by	children	visiting the National Maritime Museum Cornwa
ctorates published their report , Safeguarding	Children	, following joint inspections of children 's safegu
ed of offences listed under Schedule 1 of the	Children	and Young Persons Act 1933 would obviously c
ning . But Miss Connor stood up and told the	children	to leave their things exactly as they were on thei
es firmly on the road ahead and observed my	children	pinching each other in the back . If my wife was

Children

- In the top 10 most increasing words.
- In the 1931 corpus there are more references to "women and children" or "men, women and children".
- In the 2006 corpus there are references to moral panics around children: childhood obesity, paedophiles, poor literacy, poverty, knives, AIDS, adoption, protection from the media (e.g. advertising aimed at children), parental smoking and asthma – children are increasingly viewed as *victims and threats*.
- Does this fit the definition of a keyword as a socially prominent word with interlocking but sometimes contradictory meanings? Or is it too concrete a concept?

Multi Methods

- Corpora can answer some questions very well, others not at all.
- Corpora can integrate with other methods gainfully
- Corpora can help mesh quantitative and qualitative analyses
- Corpora are a tool – and like any tool they are good for some jobs and not others. They should also be part of a tool set.

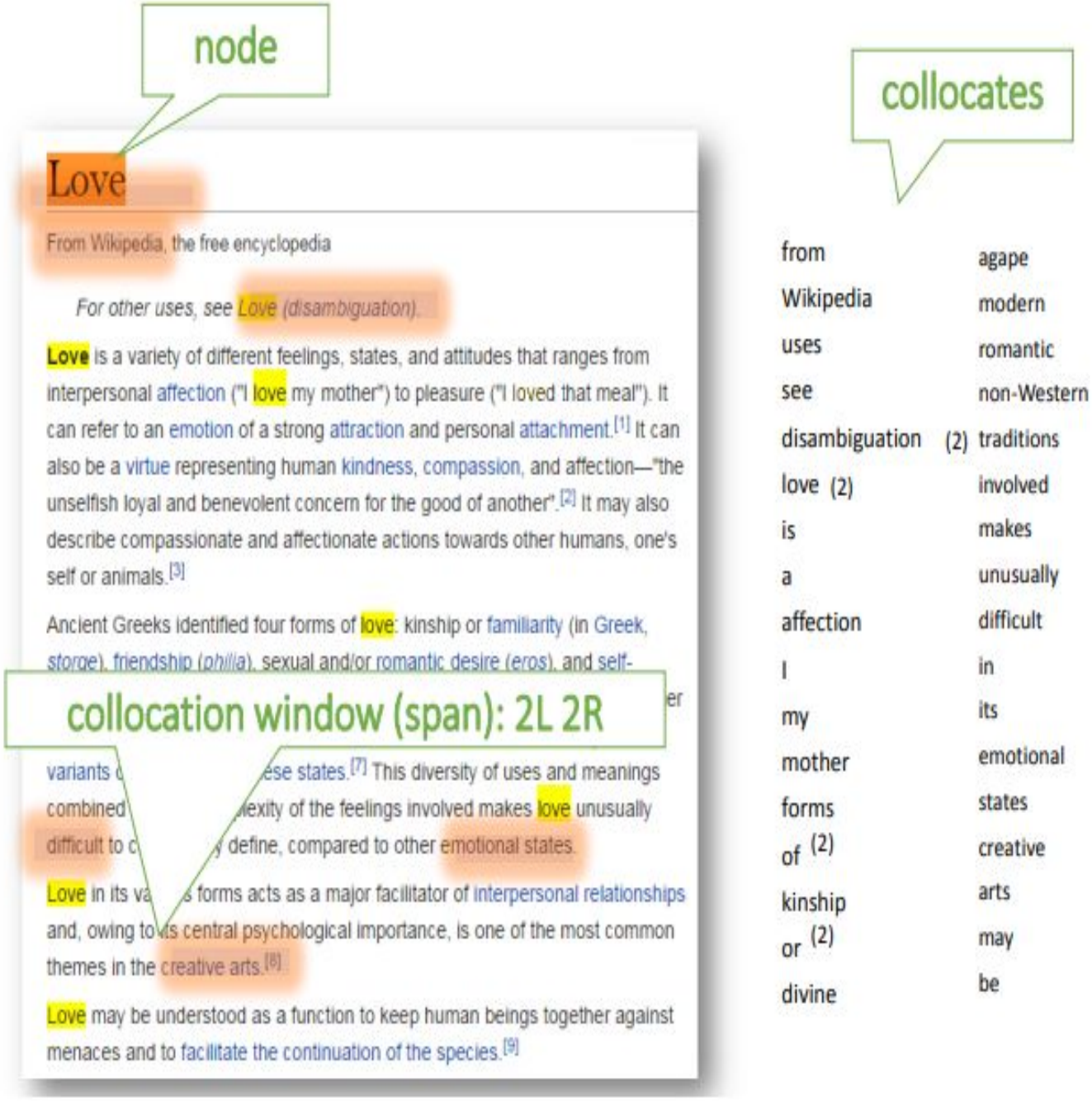
Summing up

- Collocates and keywords are important techniques in corpus linguistics – you will come across the terms many times on this course
- They can tell us ‘about’ texts
- They can tell us about change over time
- They can help us decode argumentation strategies
- And more besides!


the
Impossible 2
quiz

GraphColl: Collocations in #LancsBox

- Collocation is systematic co-occurrence of words in text and discourse that we identify statistically


node
collocates
Love
From Wikipedia, the free encyclopedia
For other uses, see Love (disambiguation).
Love is a variety of different feelings, states, and attitudes that ranges from interpersonal affection ("I love my mother") to pleasure ("I loved that meal"). It can refer to an emotion of a strong attraction and personal attachment.[1] It can also be a virtue representing human kindness, compassion, and affection—"the unselfish loyal and benevolent concern for the good of another".[2] It may also describe compassionate and affectionate actions towards other humans, one's self or animals.[3]
Ancient Greeks identified four forms of love: kinship or familiarity (in Greek, storge), friendship (philia), sexual and/or romantic desire (eros), and self-
collocation window (span): 2L 2R
variants
states.[7] This diversity of uses and meanings
combined
lexity of the feelings involved makes love unusually
difficult to c
define, compared to other emotional states.
Love in its va
forms acts as a major facilitator of interpersonal relationships
and, owing to
central psychological importance, is one of the most common
themes in the creative arts.[8]
Love may be understood as a function to keep human beings together against
menaces and to facilitate the continuation of the species.[9]
from
Wikipedia
uses
see
disambiguation (2)
love (2)
is
a
affection
I
my
mother
forms
of (2)
kinship
or (2)
divine
agape
modern
romantic
non-Western
traditions
involved
makes
unusually
difficult
in
its
emotional
states
creative
arts
may
be

BNC

Love: 22,265 hits in 1,983 different texts in 100M words

Collocate	Frequency
of	3,345
i	3,282
and	2,973
in	2,879
to	2,804
the	2,306
you	2,288
with	1,947
for	1,192
a	1,151

Collocate	MI score
affair	6.3261
fallen	5.8542
falling	5.5687
fell	5.0409
fall	4.9721
god	4.4238
making	3.7614
story	3.5276
'd	3.4879
true	3.3484

association measure

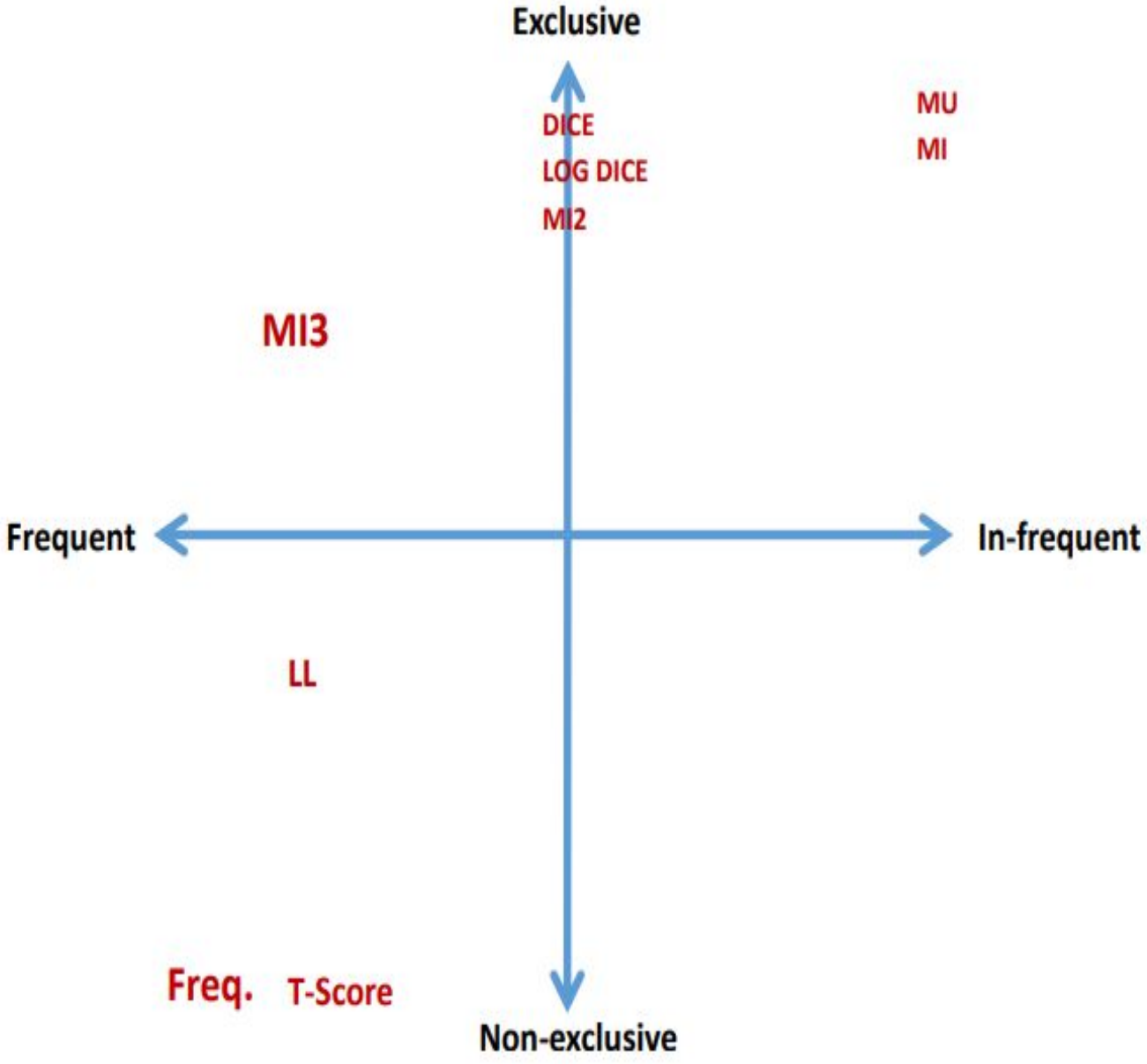
Collocation

Criteria:

1) distance -> span (e.g., L5, R5)
2) frequency
3) exclusivity

} statistic, e.g. MI, MI3, LL, Log Dice...

ID	Statistic	Equation	ID	Statistic	Equation
1	Freq. of co-occurrence	O_{11}	8	T-score	$\frac{O_{11} - E_{11}}{\sqrt{O_{11}}}$
2	MU	$\frac{O_{11}}{E_{11}}$	9	DICE	$\frac{2 \times O_{11}}{R_1 + C_1}$
3	MI (Mutual information)	$\log_2 \frac{O_{11}}{E_{11}}$	10	LOG DICE	$14 + \log_2 \frac{2 \times O_{11}}{R_1 + C_1}$
4	MI2	$\log_2 \frac{O_{11}^{\ 2}}{E_{11}}$	11	LOG RATIO	$\log_2 \frac{O_{11} \times R_2}{O_{21} \times R_1}$
5	MI3	$\log_2 \frac{O_{11}^{\ 3}}{E_{11}}$	12	MS (Minimum sensitivity)	$min\left(\frac{O_{11}}{C_1}, \frac{O_{11}}{R_1}\right)$
6	LL (Log likelihood)	$2 \times \begin{pmatrix} O_{11} \times log \frac{O_{11}}{E_{11}} + O_{21} \times log \frac{O_{21}}{E_{21}} + \\ O_{12} \times log \frac{O_{12}}{E_{12}} + O_{21} \times log \frac{O_{22}}{E_{22}} \end{pmatrix}$	13	DELTA P	$\frac{O_{11}}{R_1} - \frac{O_{21}}{R_2}; \frac{O_{11}}{C_1} - \frac{O_{12}}{C_2}$
7	Z-score	$\frac{O_{11} - E_{11}}{\sqrt{E_{11}}}$	14	Cohen's d	$\frac{Mean_{in\ window} - Mean_{outside\ window}}{pooled\ SD}$


Exclusive
DICE
LOG DICE
MI2
MU
MI
MI3
Frequent
In-frequent
LL
Freq.
T-Score
Non-exclusive

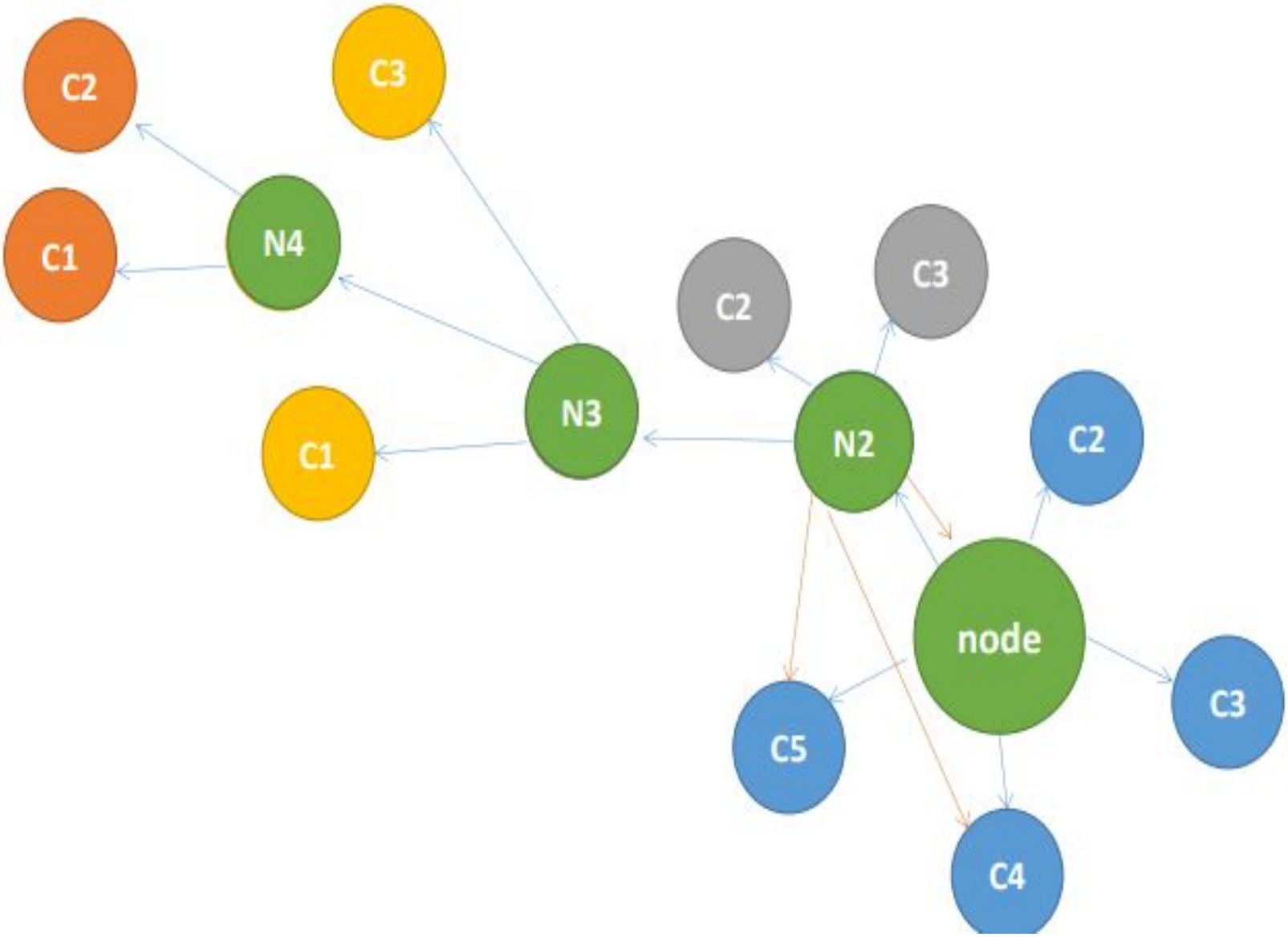
Collocation (cont.)

Criteria:

1) distance -> span (e.g., L5, R5)
2) frequency
3) exclusivity

} statistic, e.g. MI, MI3, LL, Log Dice…

4) dispersion
5) directionality: Delta P
6) type-token distribution
7) **connectivity**


C2
C3
C1
N4
C2
C3
N3
N2
C2
C1
node
C3
C5
C4

Collocation (cont.)

Brezina, V., McEnery, T. & Wattam, S. (2015). Collocations in context: A new perspective on collocation networks. *International Journal of Corpus Linguistics*, 20(2), 139-173.

Gablasova, D., Brezina, V., & McEnery, T. (2017b). Collocations in corpus-based language learning research: Identifying, comparing, and interpreting the evidence. *Language Learning*, *67 (S1)*, 155–179.

Practical Activities

Collocations in context with #LancsBox: Collocation graphs and networks

Task 1. Create graphs. Work with the LOB corpus.

a) Build a collocation graph (first-order collocates) around the word *time* using MI score and the default settings.

b) How many collocates does the graph display? Are all of them useful?

c) Change the default settings as indicated in the figure below (MI = 5 and above) and search for the node *time* again.

How many results did you get this time?

d) Which of the collocates occur predominantly to the left of the node *time* and which ones to the right?

Left:

.....

Right:

.....

e) Some of the collocates of *time* such as *t, kungo* might not be completely transparent. Use the right-click function to obtain concordances (KWIC pop-up) and explain these collocates.

t is used as

.....

kungo is used as

.....

Collocations in context with #LancsBox: Collocation graphs and networks

Task 1. Create graphs. Work with the LOB corpus.

a) Build a collocation graph (first-order collocates) around the word *time* using MI score and the default settings.

b) How many collocates does the graph display? Are all of them useful?
315 collocates; no, this is an example of an overpopulated graph.

c) Change the default settings as indicated in the figure below (MI = 5 and above) and search for the node *time* again.

How many results did you get this time? 35

d) Which of the collocates occur predominantly to the left of the node *time* and which ones to the right?

Left:

e.g. *at, long, first, short, same, spare, waste, twenty* etc.....

Right:

e.g. ago, speak, saved, arrived, washing, erect, constants, etc.....

e) Some of the collocates of *time* such as *t, kungo* might not be completely transparent. Use the right-click function to obtain concordances (KWIC pop-up) and explain these collocates.

t is used as .....a mathematical term (*time t*).....

kungo is used as .....proper name in General fiction.....