



# Lexical cohesion as a predictor of item difficulty

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# Lexical cohesion as a predictor of item difficulty

- Defining cohesive links
- Lexical cohesion applied to test items
- Identifying and quantifying links: some issues
- Study of sample of field tested multiple choice reading comprehension items
- Findings
- Tentative conclusions

## Types of cohesive link: repetition

### Passage

A team of researchers at X University **studied** 65 **mothers** on low income living in an urban area.

### Item stem

What kind of **mothers**<sup>1</sup> did the **study**<sup>2</sup> investigate?

1 simple repetition

2 complex repetition

## Types of cohesive link: synonymy

### Passage

A team of researchers at X University studied 65 mothers **on low income** living in an **urban area**.

### Option/

**poorer**<sup>2</sup> mothers living in a **city**<sup>1</sup>

1 simple synonymy

2 complex synonymy

## Types of cohesive link: antinomy

### Passage

Labour force participation rates by young people decreased by almost four percentage points between 1993 and 2003.

### Option

Youth unemployment<sup>2</sup> increased<sup>1</sup>.

1 simple antinomy

2 complex antinomy

## Types of cohesive link: superordinate & hyponymic

### Passage

The gift ... consisted usually of a sum of money, with **sweetmeats** added if the visitor had a sweet tooth.

### Option

It was not easy to provide appropriate **food**<sup>1</sup>.



### Passage

Photography's capacity for capturing and preserving realistic images of famous people and exotic **places**...

### Option

It led to an increase in travel to exotic **destinations**<sup>2</sup>

1 superordinate repetition

2 hyponymic repetition

## Types of cohesive link: labelling

Passage

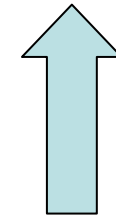
To deviate means, literally, to move away or stray from, set standards.

Option

a **definition** of deviance

# Taxonomy of links

Lexical repetition	Simple (SR)
	Complex (CR)
Synonymy	Simple (SS)
	Complex (CS)
Antinomy	Simple (SA)
	Complex (CA)
Superordinate repetition (SupR)	
Hyponymic repetition (HypR)	
Co-reference	
Labelling (L)	
Substitution	By pro-forms
	By Ø (ellipsis)



stronger

weaker



From MacMillan (2007)



## Research data

- Multiple choice reading comprehension items field tested during development of the PTE Academic
- Authentic text passage (70 - 110 words)+ single multiple choice question consisting of stem and 3, 4 or 5 options
- IRT difficulty values established through linked trials with 200+ responses to each item
- N = 52

## Research hypotheses

1. Items with many cohesive links between question and the passage are easier than items with few cohesive links.
2. Items with strong cohesive links between question and the passage are easier than items with weak cohesive links.

## Items not amenable to analysis in terms of lexical cohesion

- Explicit questions about pronoun substitution
  - “What does *this* refer to in the opening sentence of paragraph 2?”
- Explicit vocabulary questions
  - “Which of the following words is closest in meaning to *allusive* as used by the writer?”
- Questions about writer’s intentions
  - “Why is some of the information printed in bold type?”
- “Inference questions”

## What counts as a link? - the limits of lexical cohesion

### Passage

The approach to the **methodology** of **learning** and teaching has to be comprehensive, presenting all options ... and avoiding advocacy or dogmatism.

### Option

There is no single best **method** for **learning**



## What counts as a link? - chunking

### Passage (1)

In recent years food prices have **increased rapidly**...

### Option

There has been a **rapid increase** in food prices.

### Passage (2)

In recent years food prices have **shot up**...

### Option (2)

There has been a **rapid increase** in food prices

## What counts as a link? - context- (and culture- ) dependent synonymy

### Passage

The issue has led to bitter recriminations **on the floor of the House**.

### Option

The matter has been discussed in **Parliament** standards

### Passage

The proliferation of agreements on **green** product standards ... is likely to engender new tensions between producers and consumers.

### Option

...**environmental** standards...

## Which links to count? - locator and key

### Passage

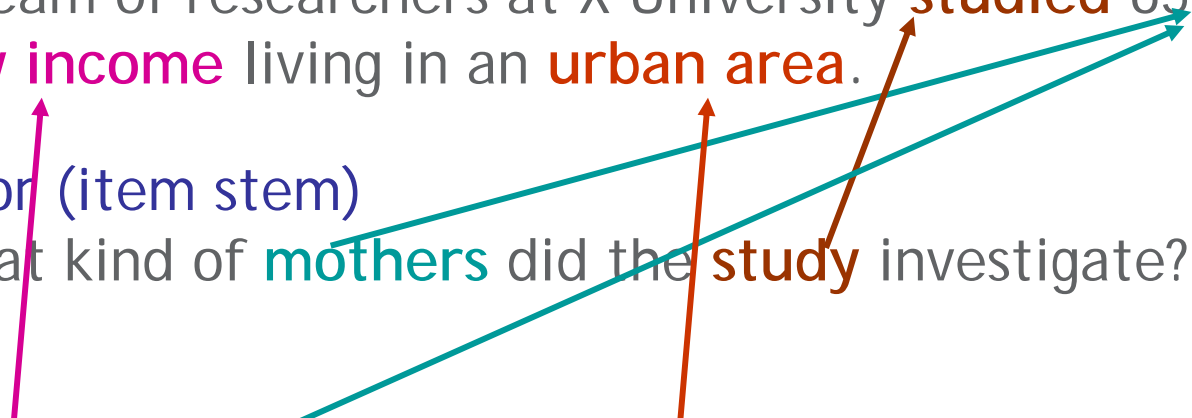
A team of researchers at X University **studied** 65 **mothers on low income** living in an **urban area**.

### Locator (item stem)

What kind of **mothers** did the **study** investigate?

### Key

**poorer mothers** living in a **city**



## Findings: number of links correlated with item difficulty

	Number of links (raw)			
	Loc	Key	Loc + KEY	Key-HighD*
Item difficulty	.025	-.031	-.014	-.117

\*Key - HighD = links in key - links in distractor with highest no. of links



## Findings: number of links correlated with item difficulty weighted (1)

	SR	CR	SS	CS	SA	CA	Hyp	Sup	L
points	8	7	6	5	4	3	2	2	1

Number of links weighted (1)				
	Loc	Key	Loc + KEY	Key-HighD
Item difficulty	.025	-.018	-.001	-.103

## Findings: number of links correlated with item difficulty weighted (2)

	SR	CR	SS	CS	SA	CA	Hyp	Sup	L
points	0.5	0.5	5	4	3	2	1	1	1

Number of links weighted (2)				
	Loc	Key	Loc + KEY	Key-HighD
Item difficulty	.027	-.192	-.155	-.295

## Findings: number of unique option links\* correlated with item difficulty, weighted (2)

\*"Unique option links" = links in Key & distractors but not in Loc

	SR	CR	SS	CS	SA	CA	Hyp	Sup	L
points	0.5	0.5	5	4	3	2	1	1	1

Number of unique option links weighted (2)				
	Loc	Key	Loc + KEY	Key-HighD (not in Loc)
Item difficulty	.118	-.272	-.164	-.352

## The International Adult Literacy Survey - “prose” task facility correlated with item variables

Variable	Correlation with RP80
Type of match	.89
Type of information	.55
Plausibility of distractor	.54
Readability	.28

(N = 34)

Extract from table in Kirsch (2001) p. 27

## Other measures

	Item difficulty
Flesch-Kincaid	.143
Type/token	.218
Tokens 1 <sup>st</sup> 1000 most freq. words	.086
Tokens 2 <sup>nd</sup> 1000 most freq. words	.077
Tokens AWL	-.271
Types 1 <sup>st</sup> 1000 most freq. words	.099
Types 2 <sup>nd</sup> 1000 most freq. words	.154
Types AWL	-.119

## Conclusions

- Simply counting cohesive links does not offer a reliable way of predicting item difficulty
- Lexical cohesion may be a moderate predictor of item difficulty when links are assigned differential values and considered in combination with other factors
- Further investigation needed into the unexpected influence of straightforward lexical repetition

# References

Halliday, M. and R. Hasan (1976). *Cohesion in English*. London, Longman.

Hoey, M. (1991). *Patterns of lexis in text*. New York, Oxford University Press

Kirsch, I. (2001). *The International Adult Literacy Survey (IALS): Understanding What Was Measured*. Princeton, NJ, ETS.

MacMillan, F. (2007). *The role of lexical cohesion in the assessment of EFL reading proficiency*. *Arizona Working Papers in SLA & Teaching* 14: 75 - 93.

Nation, I.S.P. (2005) *RANGE computer program*, Wellington, Paul Nation