The linguistic challenges of the transition from primary to secondary school

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The research project

- The language of school seems importantly different from the language that children encounter outside school, but to date there is little linguistic research;

- If there are differences, might these be more of a barrier to accessing the curriculum for children from lower SES backgrounds, partly explaining their under achievement?

- What sort of differences might there be between the language of primary school and the language of secondary school?

- Could these partly explain issues that some students seem to face at KS3?

How to investigate this?

Existing research in linguistics has shown that people- even expert researchers and teachers- are not good at describing and analysing the language that they use. Our brains just aren't wired up to do this.

We therefore decided to collect data, in the form of written texts and transcribed speech, from schools. We need large quantities of data, from as many schools as practical, and therefore we needed to use specialist computer software for the analysis.

Written data
- Worksheets
- Textbooks
- Exams and assessment tasks
- Lesson presentations
- Vocabulary/glossary booklets

Spoken data
- Audio recordings of lessons (teacher talk only)

Subjects: English, maths, science, history, geography

Also: Interviews with pupils and teachers to help us to understand their perspectives and interpret the data.

13 schools have contributed data, across the North of England;

5 secondary, 8 primary, across all Ofsted categories, but skewed towards the higher end;

Of these, 5 primaries feed 3 of the secondaries. 30 students from these 5 were interviewed twice in Y6, and twice again in Y7 after the transition;
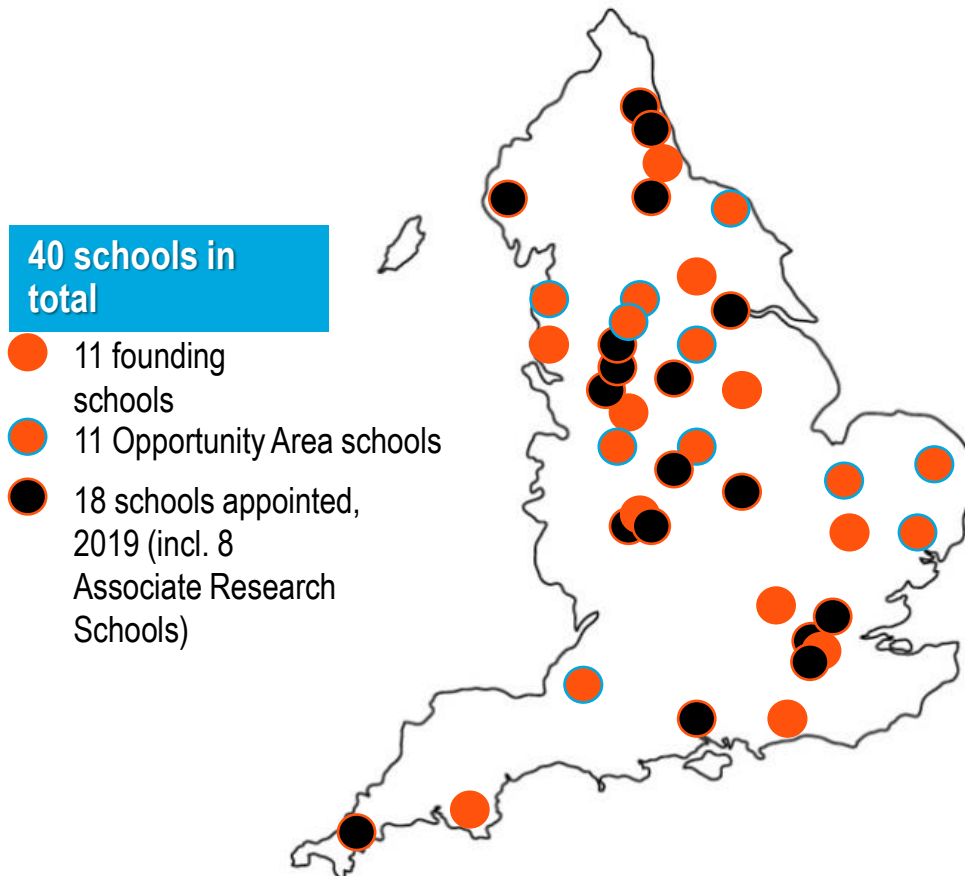
The school materials comprise a huge dataset, 1000s of files, currently 2.5 million words

To collect this, and for other aspects of the research design, we needed advice:

The Research School network

A collaboration (EEF and IEE) to create a network of schools that support the use of evidence to improve teaching practice.
https://educationendowmentfoundation.org.uk/tools/guidance-reports/

40 schools in total

- 11 founding schools
- 11 Opportunity Area schools
- 18 schools appointed, 2019 (incl. 8 Associate Research Schools)

1 Prioritise 'disciplinary literacy' across the curriculum

2 Provide targeted vocabulary instruction in every subject

1 Develop pupils' language capability to support their reading and writing

One size
does NOT
fit all.

What our software can do

Show the most frequent words...

	Lemma	Frequency ?
1	the	20,312
2	.	20,011
3	be	12,305
4	[number]	12,179
5	a	10,825
6	of	9,016
7	to	6,946
8	)	6,706
9	and	6,466
10	,	6,237
11	(	6,104
12	?	5,744
13	in	5,069

	Lemma	Frequency ?
14	you	4,974
15	:	4,133
16	•	3,590
17	#	3,318
18	it	3,246
19	what	2,870
20	do	2,757
21	that	2,524
22	your	2,511
23	have	2,461
24	on	2,359
25	-	2,228
26	s	2,105

	Lemma	Frequency ?
27	can	2,016
28	this	2,001
29	[	1,863
30	]	1,862
31	use	1,785
32	cell	1,776
33	for	1,741
34	how	1,672
35	not	1,583
36	so	1,581
37	or	1,479
38	from	1,418
39	make	1,406

Most frequent words in our KS3 Science corpus

A more useful measure: comparing two corpora to find 'key words'

Word	
1	s	...
2	cell	...
3	force	...
4	your	...
5	energy	...
6	name	...
7	water	...
8	reaction	...
9	light	...
10	how	...

Word	
11	object	...
12	chemical	...
13	what	...
14	acid	...
15	c	...
16	mass	...
17	t018	...
18	mark	...
19	okay	...
20	oxygen	...

Word	
21	b	...
22	explain	...
23	m	...
24	use	...
25	element	...
26	graph	...
27	atom	...
28	variable	...
29	particle	...
30	substance	...

Key words from the KS3 Science corpus compared to a 'reference' corpus of general English texts.

The software has ranked the words that are most frequent in the KS3 corpus in comparison to the reference corpus.

We are using the same technique to compare KS2 and KS3 corpora.

Focus point 1: Amount of words

Our KS2 Science corpus

Years 5 & 6: **223, 894 words in total**, **244 separate files**

Number of different words: **7578**

Our KS3 Science corpus

Years 7 & 8: **324, 719 words**, **672 files**

Number of different words: **8599**

The additional 1,000 words in KS3 are likely to be specialist and challenging. There is also an issue of new meanings of known words.

Focus point 1: The change in science vocabulary

Words that are frequent in our in KS3 science data that don't occur in the KS2 science data. (This doesn't mean that they never occur in KS2, as we've only got a sample, but it indicates that they are probably fairly rare.)

atom element state magnesium copper transfer calculate oxide compound pressure mass speed hydrogen particle sodium alkali chemical kinetic acid combustion decrease objective hazard bunsen

Word selection

Word consciousness involves being aware and interested in words and word meanings
(Anderson & Nagy, 1992)

What words matter most?

A curriculum consideration

- What words/knowledge do you want pupils to know?
- In what order?
- How are you prioritising/amplifying?
- How/when are you checking?

Year 8 science lesson on <u>efficiency</u>:

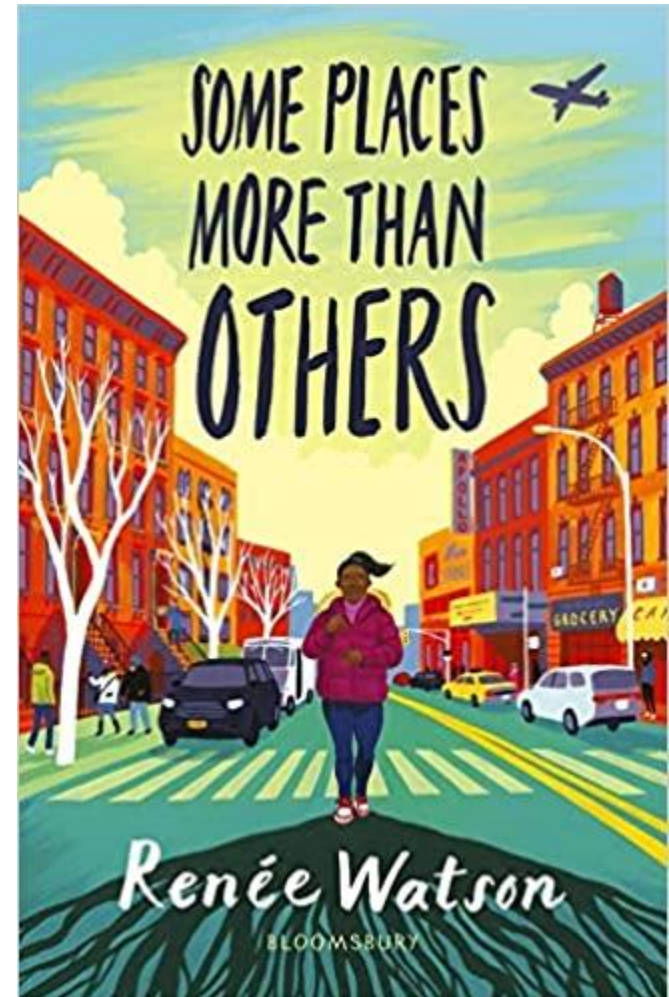<u>Energy</u>

Rate

<u>Proportion</u>

Dissipated

<u>Transfer</u>

Processes

Thermal store

Insulation

Year 6 literacy text:

Amara is being set a project based around selecting items to put in a suitcase that tell us about herself and her family.

I'm glad I'm not t[...] impossible. Mom is an only c[...]. Dad hardly ever talks about [...]se will be.

"First, let me say that I think you'll be surprised at what you'll learn about your family just by asking for the story behind a photo, or blanket, or something as simple as a chair," Mr Rosen says. "Everything and everyone has a story, a beginning." Mr Rosen closes the suitcase and **latches** the lock. He looks at us, and I think he can see that most of us are anxious. "There's no wrong way to do this. You just have to ask questions of your loved ones and **document** what they tell you." Mr Rosen tells us that out suitcases will be on display at the school-wide spring festival. "And the more creative, the better. Maybe your suitcase carries actual, **tangible** items. But some things you won't be able to put in your suitcase; some things are **intangible**, and yet, you carry them with you. Think about how you will **represent** the places you come from, the people who are important to you."

identity

Word selection

a. Look again at existing schemes of learning. What are the key concepts?
b. Pre-test (find the top 10 most troublesome)
c. Avoid picking too many
d. Use the Leeds corpus
e. You might get it wrong

Focus point 2: The changes in maths

Comparing Written Maths Ys 5&6 with Written Maths Ys 7&8, using 'Keywords'.

We used 'Keywords' to find which words are significantly more frequent in KS2 than KS3, and in KS3 than in KS2.

However, just looking at the words by themselves does not tell the full picture. It is useful to look at groups of words:

KS2 maths

	Word			Word			Word
1	fluency	•••	11	santa	•••	21	occupy	•••
2	olo	•••	12	emma	•••	22	measurer	•••
3	cgp	•••	13	inclusive	•••	23	sponsor	•••
4	accept	•••	14	cashew	•••	24	ks2	•••
5	gift	•••	15	session	•••	25	visual	•••
6	peanut	•••	16	teddy	•••	26	holly	•••
7	part-whole	•••	17	imply	•••	27	layla	•••
8	chen	•••	18	condone	•••	28	guide	•••
9	mo	•••	19	pineapple	•••	29	christmas	•••
10	unambiguous	•••	20	tulip	•••	30	lbs	•••

Meta-language, instructions etc

Everyday objects

names

More frequent in KS2

Everyday objects: crayons, flowers, pies, baskets, jars

"Miss Mills is making jam to sell at the school fair. Strawberries cost £7.50 per kg. Sugar costs 79p per kg. 10 glass jars cost £6.90. She uses 12kg of strawberries and 10kg of sugar to make 20 jars full of jam…"

Names: Emma, Layla, Ken

"Tilly has £20. She gives £5.40 to her friend. Tilly now has twice as much money as her friend. How much money did her friend have at the start?"

More frequent in KS3

Technical mathematical language

Probabilities; Median; Mode; Exterior; Elevation; Significant; Interior; Random; Expand; Scatter

Many of these have everyday meanings but are used with specialist meaning:

"Expand the following expressions and simplify where possible"

"Draw a line of best fit, where possible for each of the following scatter diagrams"

Algebraic terms: X, y, a, b, c

If: "If the area of this square is 169cm^2, calculate its perimeter."

From personal to impersonal

Ys 5&6
- Problems clearly related to simple, real-world scenarios
- More familiar, everyday lexis
- Simpler grammar?

Ys 7&8
- Tasks detached from the real-world (e.g. algebra)
- More scientific notation
- New grammar uses?

Reframing texts

"Tilly has £20. She gives £5.40 to her friend. Tilly now has twice as much money as her friend. How much money did her friend have at the start?"

Tilly and her friend have £20 and have shared the money in the **ratio** of 2:1. How much would each child get?

Tilly and her friend share some money in the **ratio** 2:1. Tilly gets £10 more than her friend. How much did they share in **total**?

Two children share £30. Tilly has **x pounds**, her friend has twice as much. How much do they each have?

Focus point 3: tier 2 words

- Tier 1 comprises general, everyday words;

- Tier 2 contains words that are of high utility for mature language users and are found across a variety of domains. Examples include *contradict, circumstances, precede, auspicious, fervent* and *retrospect*... Because of the large role Tier Two words play in a language user's repertoire, rich knowledge of words in the second tier can have a powerful impact on verbal functioning..." (Beck et al, 2002: p. 11).

- **BUT- we found that many (in our data, most) Tier 2 words have more than one meaning.**

Polysemy

Words having more than one meaning; one meaning is everyday (Tier 1), a second meaning is academic (Tier 2)

He searched in his pockets till he *found* a stub of pencil.

The study also *found* that some pollutants are far more damaging when released at higher altitudes.

Tiers and polysemy

Everyday use (Tier 1)	Academic use (Tier 2)
When does she get her A level *results*?	The *results* are shown in the table.

Everyday use (Tier 1)	Academic use (Tier 3)
He's got loads of *energy*. I've got more *energy* in the morning.	The Earth's atmosphere traps some of the *energy* from the sun

General academic use (Tier 2)	Academic use (Tier 3)
Like all other dictatorships, the *element* of terror was crucial	Name the elements in this compound and state the numbers of atoms of each *element*

Spotting the words hiding in plain sight

Geography KS3	English KS3
Location	Reader
Physical	Effect
Natural	Evidence
Development	Analyse
Effect	Theme

Exploring words: beyond a definition

Morphology

Development

Prefix: 'de'

Root: 'velop'

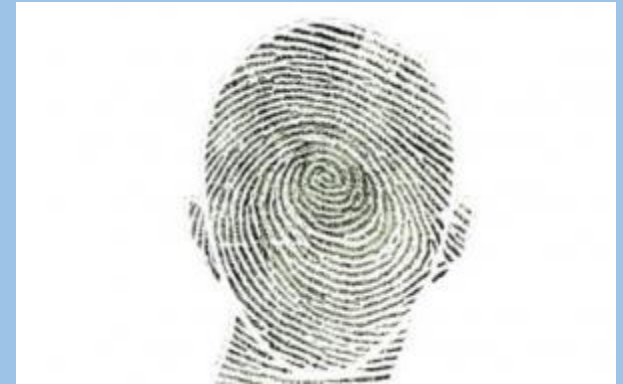Suffix: 'ment'

Etymology

Development

Prefix: 'de' meaning undo

Root: 'voloper' meaning wrap up

Exploring words: Frayer model

What it means	**Picture**
What makes a person who they are	

identity

Linked ideas	**Where the word comes from**
Background	Latin (idem) for *sameness,*
Interests	
Influences	*one*ness. What makes you an
	individual, the only **one** of you

Realistic starting points

- Strengthening the academic transition around 1 subject with 1 feeder primary

- Shared CPD opportunities and collaboration e.g. taster day lessons

- Building word consciousness among teachers and children e.g. strategies for explicit vocabulary instruction

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https://researchschool.org.uk/huntington