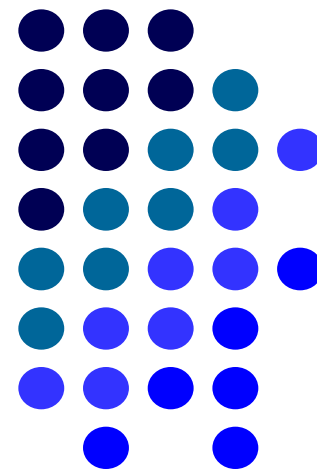


# A Computational Linguistic Analysis of the Development of L2 Writing Proficiency

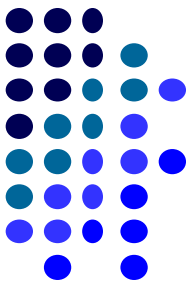
Evidence from EFL Young Learners'

Written Essays

Jenny Lontou & Dina Tsagari

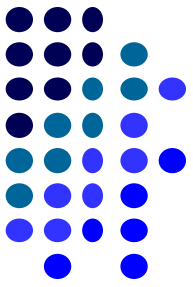


# Literature review



- Analyzing **writing development** as a function of grade level is important in middle school children because the developmental patterns are **strongest** at a young age and the opportunity to develop **successful interventions** is most likely (Berninger *et al.*, 1994; Haswell, 2000; McNamara *et al.*, 2010; Perfetti & McCutchen, 1987).
- A common approach to assessing **writing quality** is through the analysis of **linguistic features** such as **cohesion**, **elaboration**, **abstractness**, **sophistication** and **diversity of ideas** (Hillocks, 2002, McCarthy & Jarvis, 2010; McNamara *et al.*, 2010; Weston *et al.*, 2011).

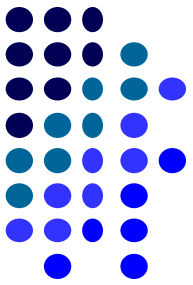
# Aim of the research



Investigate the development of EFL young learners' writing proficiency as a function of grade level.

**QUESTION:** To what degree can essays written at different grade levels be distinguished from one another using a number of linguistic features?

# CEFR: Writing Descriptors



## OVERALL WRITTEN PRODUCTION

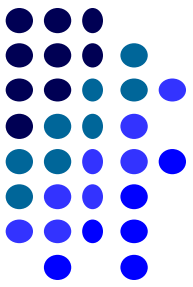
B1	<i>Can write straightforward connected texts on a range of familiar subjects within his field of interest, by linking a series of shorter discrete elements into a linear sequence.</i>
A2	<i>Can write a series of simple phrases and sentences linked with simple connectors like 'and', 'but' and 'because'.</i>
A1	<i>Can write simple isolated phrases and sentences.</i>

Note: The descriptors on this scale and on the two sub-scales which follow (Creative Writing; Reports and Essays) have not been empirically calibrated with the measurement model. The descriptors for these three scales have therefore been created by recombining elements of descriptors from other scales.

B2	<i>Can write an essay or report which develops an argument systematically with appropriate highlighting of significant points and relevant supporting detail. Can evaluate different ideas or solutions to a problem.</i>
	<i>Can write an essay or report which develops an argument, giving reasons in support of or against a particular point of view and explaining the advantages and disadvantages of various options. Can synthesise information and arguments from a number of sources.</i>
B1	<i>Can write short, simple essays on topics of interest. Can summarise, report and give his/her opinion about accumulated factual information on familiar routine and non-routine matters within his/her field with some confidence.</i>
	<i>Can write very brief reports to a standard conventionalised format, which pass on routine factual information and state reasons for actions.</i>
A2	<i>No descriptor available</i>
A1	<i>No descriptor available</i>

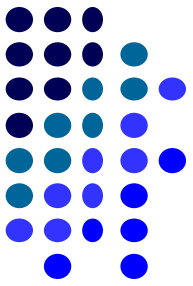
## REPORTS AND ESSAYS

# Research data



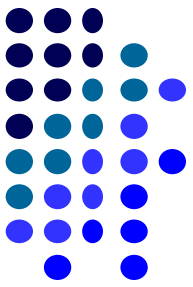
- ❑ 70 EFL students 9-11 years old
- ❑ 10 written essays per student
- ❑ Corpus of 700 written essays (100-150 words)
- ❑ ≈70.000-105.000 words in total
- ❑ Descriptive prompts based on school course book
- ❑ Nation's Vocabulary Test
- ❑ Cambridge Key English Test-KET
- ❑ Student's Questionnaire

# Prompts for essays



1. Describe your daily routine
2. Describe your hobbies
3. Describe your neighbourhood
4. Describe your favourite season
5. Describe your holidays
6. Describe your favourite animal
7. Describe your favourite job
8. Describe your favourite film
9. Describe your favourite dish
10. Describe a famous person

# Text processing tools



**Coh-Metrix 2.1 & 3.0** (Graesser *et al.*, 2004; McNamara *et al.*, 2014)

**Web VocabProfile 4.0** (Cobb, 2003)

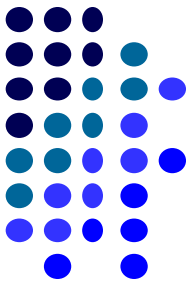
**Gramulator 5.0** (McCarthy & Jarvis, 2010; Min & McCarthy, 2010)

**GPAT** (Lamkin & McCarthy, 2011; Rufenacht *et al.*, 2011)

**LIWC 2007** (Pennebaker, 2003; Tausczik & Pennebaker, 2010)

**Wordsmith Tools 6.0** (Scott, 2006)

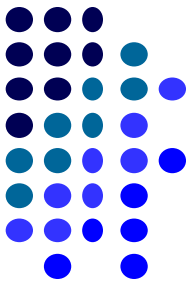
# Text Variables: Categories



- 1 Basic Descriptive Indices
- 2 Readability & Easability Indices
- 3 Word Frequency Indices
- 4 Lexical Richness Indices
- 5 Text Abstractness Indices
- 6 Syntactic Complexity Indices
- 7 Cohesion Indices
- 8 Additional Word Information

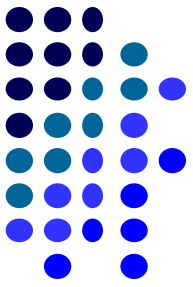


# Descriptive Indices



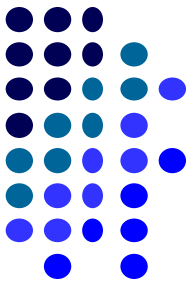
- 1 No. of words in text (tokens)
- 2 No. of different words in text (types)
- 3 Word families in text (mean)
- 4 Syllables per word (mean)
- 5 Characters per word (mean)
- 6 Words per sentence (mean)
- 7 No. of sentences
- 8 No. of paragraphs
- 9 Sentences per paragraph (mean)

# Readability & Easability



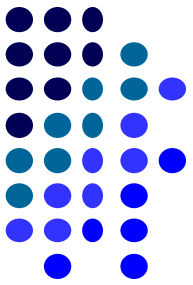
- 10 Flesch Reading Ease
- 11 Flesch-Kincaid Grade Level
- 12 Dale-Chall Grade Level
- 13 Spache Grade Level
- 14 Gunning's Fog Index
- 15 Fry Readability Graph
- 16 Syntactic Simplicity
- 17 Word Concreteness
- 18 Deep Cohesion
- 19 Verb Cohesion
- 20 Connectivity
- 21 Temporality

# BNC Word Frequency



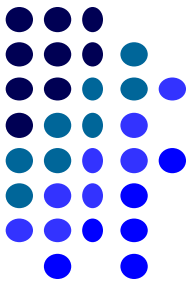
- 22 K1 Words (1-1000)
- 23 K2 Words (1001-2000)
- 24 K3 Words (2001-3000)
- 25 K4 Words (3001-4000)
- 26 K5 Words (4001-5000)
- 27 K6 Words (5001-6000)
- 28 K7 Words (6001-7000)
- 29 K8 Words (7001-8000)
- 30 K9 Words (8001-9000)
- 31 K10 Words (9001-10000)
- 32 Academic Word List
- 33 Greco-Latin Cognates

# Lexical Richness



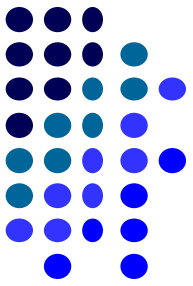
- 34 vocd-D
- 35 MTLD
- 36 MAAS
- 37 Tokens/Family
- 38 Types/Family
- 39 Apax Legomena
- 40 Dis Legomena
- 41 Relative Text Entropy
- 42 Lexical Density
- 43 Content Words Frequency (CELEX)
- 44 All Words Frequency (CELEX)
- 45 Minimum Sentence Word Frequency (CELEX)

# Text abstractness



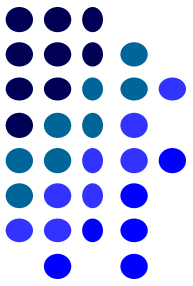
- 46 Noun Hypernym (WordNet)
- 47 Verb Hypernym (WordNet)
- 48 Content Word Polysemy (WordNet)
- 49 Content Word Concreteness (MRC)
- 50 Content Word Imagability (MRC)
- 51 Content Word Familiarity (MRC)
- 52 Content Word Age of Acquisition (MRC)
- 53 Content Word Meaningfulness (MRC)
- 54 Average LSA Sentence Givenness
- 55 Latent Semantic Analysis (adjacent sentences)
- 56 Latent Semantic Analysis (all sentences)

# Syntactic complexity



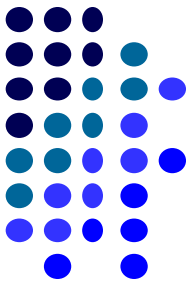
- 57 Higher level constituents
- 58 Modifiers per Noun Phrase
- 59 Words before main verb
- 60 Noun Phrases
- 61 Verb Phrases
- 62 Adverbial Phrases
- 63 Negative Phrases
- 64 Passive Voice Forms
- 65 Syntactic structure similarity (adjacent sentences)
- 66 Syntactic structure similarity (all sentences)
- 67 Propositional Density

# Cohesion



- 68 Referential Cohesion
- 69 Causal cohesion
- 70 Causal content
- 71 Intentional cohesion
- 72 Intentional content
- 73 Temporal cohesion
- 74 Spatial cohesion
- 75 Logical operators
- 76 Conditional operators

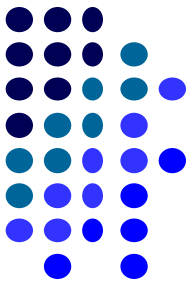
# Referential Cohesion



- 77 Global Noun Overlap
- 78 Local Noun Overlap
- 79 Global Argument Overlap
- 80 Local Argument Overlap
- 81 Global Stem Overlap
- 82 Local Stem Overlap
- 83 Global Content word overlap
- 84 Local Content word overlap
- 85 Global Anaphor Overlap
- 86 Local Anaphor Overlap

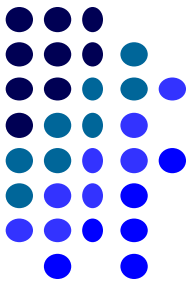


# Connectives



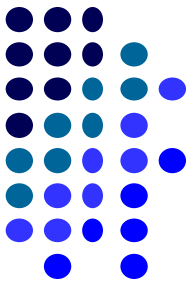
- 87 All connectives
- 88 Positive connectives
- 89 Negative connectives
- 90 Additive connectives
- 91 Temporal connectives
- 92 Causal connectives
- 93 Logic connectives
- 94 Contrastive connectives

# Word Information



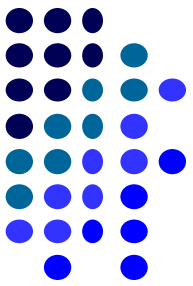
- 95 Gerunds
- 96 Infinitives
- 97 Nouns
- 98 Verbs
- 99 Adjectives
- 100 Adverbs
- 101 Personal pronouns
- 102 1st person singular pronouns
- 103 1st person plural pronouns
- 104 2nd person pronouns
- 105 3rd person singular pronouns
- 106 3rd person plural pronouns

# Word Information



- 107 Idioms
- 108 Phrasal Verbs
- 109 Question Marks
- 110 Past Tenses
- 111 Present Tenses
- 112 Future Tenses
- 113 Auxiliary Verbs
- 114 Prepositions
- 115 Numbers
- 116 Articles

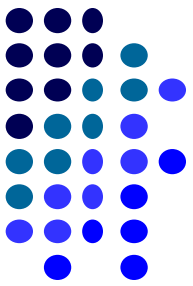
# Lexicogrammatical differences



	4 <sup>th</sup> Grade	5 <sup>th</sup> Grade	t	df	Adj. sig.
	Mean	Mean			
1. Words /Sentence	9.04	10.10	-2.357	498	.019
2. Syllables/Word	1.32	1.35	-2.153	498	.032
3. Letters/Word	3.95	4.02	-1.996	498	.042
4. Syntactic Simplicity	44.98	55.01	3.900	498	.001
5. Word Concreteness	74.60	71.00	1.339	498	.006
6. Referential Cohesion	80.46	68.91	5.153	498	.001
7. Connectivity	5.94	10.01	-2.397	498	.001
8. Lexical Diversity	36.71	41.88	-4.324	498	.001

Results of Independent samples t-tests between 4<sup>th</sup> & 5<sup>th</sup> grade essays

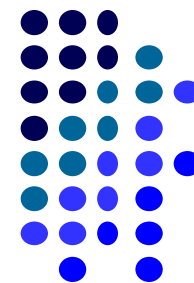
# Lexicogrammatical differences



	4 <sup>th</sup> Grade Mean	5 <sup>th</sup> Grade Mean	t	df	Adj. sig.
9. Noun overlap-adjacent sentences	.311	.231	3.459	498	0.001
10. Argument overlap-adjacent sentences	.652	.576	3.218	498	0.001
11. Stem overlap-adjacent sentences	.371	.271	4.163	498	0.001
12. Content word overlap-adjacent sentences	.203	.180	2.803	498	0.005
13. Noun overlap-all sentences	.254	.184	3.390	498	0.001
14. Argument overlap-all sentences	.573	.493	3.418	498	0.001
15. Stem overlap-all sentences	.306	.213	4.266	498	0.001
16. Content word overlap-all sentences	.172	.153	2.444	498	0.015

**Results of Independent samples t-tests between 4<sup>th</sup> & 5<sup>th</sup> grade essays**

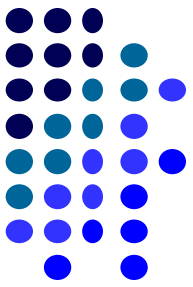
# Lexicogrammatical differences



	4 <sup>th</sup> Grade	5 <sup>th</sup> Grade			
	Mean	Mean	t	df	Adj. sig.
17. Logical connectives	27.19	32.23	-2.295	498	0.022
18. Temporal connectives	5.31	15.52	-7.094	498	0.001
19. Intentional verbs	21.94	30.56	-4.462	498	0.001
20. Modifiers per noun phrase	0.69	0.77	-3.386	498	0.001
21. Passive voice density	0.40	2.60	-4.408	498	0.001
22. Adverbial density	16.12	28.26	-6.537	498	0.001
23. Prepositional density	60.05	92.34	-9.790	498	0.001

Results of Independent samples t-tests between 4<sup>th</sup> & 5<sup>th</sup> grade essays

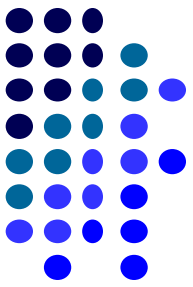
# Lexicogrammatical differences



	4 <sup>th</sup> Grade	5 <sup>th</sup> Grade			
	Mean	Mean	t	df	Adj. sig.
24. Content word familiarity	591.38	587.82	4.827	498	0.001
25. Content word concreteness	413.10	395.88	4.837	498	0.001
26. Content word frequency	2.514	2.453	2.888	498	0.004
27. Content word meaningfulness	448	444	2.123	498	0.034
28. Coh-Metrix L2 Readability	30.70	28.72	2.435	498	0.015
29. Present Tenses	12.07	8.97	7.558	498	0.001
30. Past Tenses	0.73	2.46	-6.894	498	0.001

Results of Independent samples t-tests between 4<sup>th</sup> & 5<sup>th</sup> grade essays

# Sample essays



## 4<sup>th</sup> Grade: Describe daily routine

Hi, my name is Despina and I'm nine years old. My dad's name is Thanasis and my mum's name is Katerina. I also have a sister. Her name is Dimitra. My hobbies are painting and dancing. I have brown hair and brown eyes. I wear glasses. My best friend is Joanna. We like dancing together. My favorite subject is History and English. My favorite food is pizza. In my free time I listen to music, I watch TV, I read books and I play with my sister. I like to wear jeans and dresses. When I grow up I want to be a teacher because I love children....

## 5<sup>th</sup> Grade: Describe daily routine

Hi! My name is Andrew and I am eleven years old. I go on the sixth grade of Primary school. I always get up at 7:15 am. I eat breakfast, I brush my teeth and I go to school at 7:45 am. School starts at 8:15 am and school is over at 4:30 pm. At school we do Maths, Geography, English, History, and other kinds of subjects. We have many different teachers who are all very kind to us. In the afternoon I do my homework and then I play PC games or football with my friends. Sometimes I just stay at home and watch action movies. I go to bed at 9:30 pm or at 10:00pm. Before I go to bed I always have a bath and I never forget to brush my teeth...



# Sample essays

## 5<sup>th</sup> Grade: A trip I will never forget

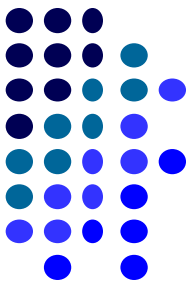
Dear Mary,

I'm writing to you about my trip to New York. Last summer I gone with my family to New York to visit my relatives. When I'm traveling, I was see the mountains, the sea and other beautiful things. My relatives were waiting us at the airport. We were going to their house. The next day we were going to visit the Statue of Liberty and we taked a lot of photos. When we finished the trip, we came back to Greece. I think it was a trip I will never forget. Write back soon.

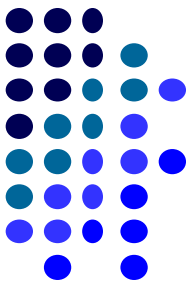
George.

*Last summer I travelled to New York with my family.*

*On our first day, we went to our hotel, which was in the city center. When we got to our room, it was clean and nice. We had booked the room for three days. In the afternoon we went to the Broadway theatre to watch the Phantom of the Opera. It was amazing! On the next day, in the morning, we went on the New York Aquarium. We saw different kinds of tropical fish and even sharks . Then we went to a huge theme park, full of roller-coasters and other attractions. Then, we left our hotel and went straight to the airport. It was the best trip of my life.*

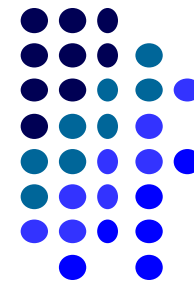


# In a nutshell...



These findings support the notion that:

1. There seems to be a close relationship between EFL learners' **writing development** and **their grade level**.
2. Writing development seems to be related to producing **more elaborate** texts with more **abstract words**, **more complex sentence structure** and more **diverse vocabulary** as a function of L2 lexical growth.



**Thank you for your attention!**

