CONSTRUCTING Knowledge via Metaphor in Singaporean Student Writing: A Corpus-based Study

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Abstract: This paper reports on work in progress of a large-scale study which seeks to examine and compare knowledge construction and the development of grammatical metaphor in Secondary 3 (Year 9) student writing in English and Social Studies. Through a combination of qualitative (systemic-functional) and quantitative (via computer-supported tool MMAX2) analyses of a sample of 42 student writings, it is shown that arguing in subject English and arguing in Social Studies employ different grammatical resources and point to different directions. Compared with subject English, which employs rankshifted embedding, Social Studies (and its parent disciplines such as History and Sociology) depends to a greater extent on grammatical metaphors to argue. This kind of work can have important implications for developing students' advanced literacy in that it can deepen our understandings of the textual features of different subject areas and their different underlying value systems.

Introduction

A number of researchers (e.g., Christie 2002; Derewianka 2003; Foley 1998; Halliday 1993a, 1993b, 1994, 2004; Halliday and Matthiessen 1999; Painter, Derewianka and Torr 2007) have pointed out that mastery of grammatical metaphor, i.e. reconstrual of experience into more abstract, general level represents a landmark in the development of children's writing ability and affords them access to educational and school knowledge. Focusing on literacy demands of secondary school subjects, Martin (1993; 2007) further notes that grammatical metaphor serves different purposes in different subject areas. The discourses of history for example show a strong tendency to express cause-effect relationship within a clause rather than between clauses through grammatical metaphor. There is, however, scant comparative, empirical research on how students learn to develop grammatical metaphor across the curriculum. This paper reports on work in progress of a large-scale study which seeks to examine and compare knowledge construction and the development of grammatical metaphor in Secondary 3 (Year 9) student writing in English and Social Studies. Specific questions addressed include:

1.   How do students employ grammatical metaphor in their school writing tasks?

2.   How does metaphorization differ from English to Social Studies?

Grammatical metaphor

Related to but distinct from the approach taken by Deignan (2005) who focuses on lexical metaphor, we adopt the general definition that Halliday (1994: 342) gives for grammatical metaphor: 'for any given semantic configuration there will be some realization in the

lexicogrammar – some wording – that can be considered CONGRUENT; there may also be various others that are in some respect "transferred", or METAPHORICAL'. In other words, once a construal of experience and an enacting of social relations are completed in the form of lexicogrammatical wording, such semantic relations can be RE-construed and RE-enacted in the form of a range of other lexicogrammatical alternatives; grammatical metaphor expands the language's resources to make meaning. It follows that grammatical metaphor falls into two broad types: ideational and interpersonal. By ideational meaning is meant what a text or part of it is about, its content, or subject matter. And interpersonal meaning of a text refers to the manner in which it addresses the intended reader or listener and the subject matter. An example of an ideational metaphor may be seen in the phrase 'engine failure', where the noun 'failure' serves to represent a blend of process (i.e., 'failing') and thing (i.e., an act of 'failing'), as distinct from the congruent version of 'an engine fails', where the verb 'fails' serves to represent a process.

In tracing the language development of children from early childhood to adolescence, Halliday (1993b: 111) has proposed a three-step model of human semiotic development: (1) grammatical generalization as 'the key for entering into language, and to systematic commonsense knowledge'; (2) grammatical abstractness as 'the key for entering into literacy, and to primary educational knowledge'; and (3) grammatical metaphor as 'the key for entering into the next level, that of secondary education, and of knowledge that is discipline-based and technical'. Further work (e.g., Derewianka 2003; Painter, Derewianka and Torr 2007) has found that before children grasp the metaphorical mode of meaning, they may have to grapple with some protometaphorical forms, which include rankshifted embeddings and faded metaphors. Rankshifted embeddings refer to 'a mechanism whereby a unit may come to serve to realize an element of a unit of

the same rank or of a lower rank' (Derewianka 2003: 190). For example, in 'I likede the letter that you gave me', 'that you gave me' would be a clause on its own but serves now only as part of a clause, i.e., at a lower rank than before (Derewianka 2003:191). And faded metaphors are those instances 'which were in origin metaphorical but which have since become established as the norm' (Derewianka 2003:192), e.g., 'do a dance' (versus a process verb 'to dance'), 'make a mistake' (versus a process verb 'to err'), 'take a bath' (versus a process verb 'to bathe'). These protometaphors are believed to model 'the nature of grammatical metaphor for the child' (Derewianka 2003: 192) and hence developmentally significant, although they are in themselves not yet motivated use of grammatical metaphor.

Method

Selection of linguistic features

Halliday (1998: 208-211) and Halliday and Matthiessen (1999: 244-249) categorize grammatical metaphor into thirteen types of elemental transference. Among them, Type 1 is the transference from quality (for instance, 'unstable') to thing ('instability') and Type 2 is that from process (for instance, 'absorb') to thing ('absorption'). Ravelli (1988: 139) incorporates process types into the categorization of grammatical metaphor to give 19 types. In analyzing nominalization in scientific writing, Banks (2003) follows Ravelli (1988) in distinguishing different process types, and so does Derewianka (2003) in analyzing the development of grammatical metaphor from early childhood to adolescence.

In the present study, Halliday and Matthiessen's (1999) categorization was followed as it was our purpose to identify the broad subject area variation in students' writing. Specifically, drawing on Derewianka (2003), Halliday and Matthiessen (1999: 246-248) and Halliday

(1994), an annotation scheme for ideational metaphor was devised, available from the first author upon request.

Selection of students' essays

As part of a large-scale study of pedagogic practices in Singapore schools of a variety of geographical and socioeconomic backgrounds (Luke, Freebody, Lau and Gopinathan 2005), from 2004 to 2005, researchers at the National Institute of Education, Singapore, observed and audio-recorded more than 1200 authentic lessons of Primary 5 and Secondary 3 classroom interactions in 56 schools, and collected over 6500 pieces of students' writings (homework, class work, tests, major assignments and projects) from these lessons. This provides us with a huge database of evidence of contemporary classroom practices and students' performances in Singapore schools. For the purpose of this paper, 24 Secondary 3 student essays in English and 18 Secondary 3 student essays in Social Studies were selected. The type of writing, the genre, selected in both subjects was argumentation.

Subject	No. of Students	No. of Essays	Total running words
English	24	24	8830
Social Studies	18	18	8627

Students' essays used in the study

Analytical procedures

First, the classroom interaction was examined in order to obtain an overview of the lessons and how the writing tasks were set. Second, the associated student writing was analyzed for the occurrence of metaphorical mode of meaning. Finally, similarities and differences

were established between student writings in English and Social Studies.

Three annotators were involved in annotating the 42 essays. Before the actual annotation of the student work, extensive training in grammatical metaphor and annotation tools was provided and pilot annotation carried out to ensure a high rate of agreement among the annotators. The selected linguistic features were annotated with MMAX2 tool (Müller & Strube 2006). And finally, the annotated output was uploaded to the SCoRE online query package (Hong 2005) to extract the results, which were further tabulated for statistical analysis in the next section.

Results

The findings of the study are presented in two sub-sections. First, we present a selective analysis of one Social Studies essay in terms of the use of grammatical metaphor and protometaphor. This serves to illustrate the annotation scheme, the annotation process and the interpretation of the analysis. Second, we present the pattern emerging from the corpus-based analysis of the 42 sample essays.

A sample analysis

The following figure presents a sample analysis of the first two paragraphs of a Social Studies essay. Some explanations are provided for the annotations.

Line no.	The original text	Annotated linguistic features
1	I think [1] territorial [2]	[1]. 'territorial': adjective from
2	dispute was the most	preposition.
3	important [3] cause	[2]. 'dispute': noun from main verb.
4	[4] of [5]international	[3]. 'cause': noun from conjunction.
5	[6] conflicts as	[4]. 'of international conflicts': qualifier.
6	compared to the	[5]. 'international': adjective from
7	other [7] causes like	preposition.
8	[8] conflicts over	[6]. 'conflicts': noun from main verb.
9	ideology, scarce	[7]. 'causes': noun from conjunction.
10	natural resources,	[8]. 'conflicts': noun from main verb.
11	[9]historical [10]	[9]. 'historical': adjective from
12	animosity and	preposition.
13	environmental issues.	[10]. 'animosity': noun from main verb.
		[11]. 'territorial': adjective from
14	[11]Territorial	preposition.
15	[12]dispute often [13]	[12]. 'dispute': noun from main verb.
16	results from other	[13]. 'results from': verb from
17	factors like scarce	conjunction.
18	natural resources and	[14]. 'historical': adjective from
19	[14]historical [15]	preposition.
20	animosity. An	[15]. 'animosity': noun from main verb.
21	example is the [16]	[16]. 'dispute': noun from main verb.
22	dispute [17] between	[17]. 'between Malaysia and Indonesia':
23	Malaysia and	qualifier
24	Indonesia [18] over	[18]. 'over the gas-rich area in the
25	the gas-rich area in	Ambalat region of the Sulawesi':
26	the Ambalat region of	qualifier
27	the Sulawesi, [19]	[19]. 'which is a result of territorial
28	which is [20] a result	dispute over scarce natural resources':
29	of [21] territorial [22]	embedding
30	dispute [23] over	[20]. 'as a result of': preposition from
31	scarce natural	conjunction.
32	resources. In 1962,	[21]. 'territorial': adjective from
33	India and China went	preposition.
34	to war [24] as a result	[22]. 'dispute': noun from main verb.

35	of [25] disputes [26]	[23]. 'over scarce natural resources':
36	over national	qualifier
37	boundaries.	[24]. 'as a result': preposition from
		conjunction.
		[25]. 'disputes': noun from main verb.
		[26]. 'over national boundaries':
		qualifier.

Sample annotation. (Notes: The student's essay is reproduced verbatim, and the errors (if any) in the essay are retained. For ease of reference, line numbers are inserted on the left and serial numbers in square brackets (e.g., [1]) are inserted in front of those sentences whose linguistic features are commented upon in the 'Annotated linguistic features' column.)

In Lines 1 and 2, 'territorial dispute' contains two instances of grammatical metaphor. 'dispute' is here used as a noun, denoting at once both a process and a thing. So it is metaphorical, of the type 'noun from main verb'. 'territorial' is an adjective but denotes a prepositional phrase ('about the territory') and so it is metaphorical. The clause that spans Lines 14-20 is highly metaphorical. Of the several instances of metaphor, 'results from' is a verbal group but denotes a logical relationship of cause-effect congruently realized through conjunction such as 'because'. As 'results from' is at once both a process and a conjunction, it is metaphorical, of the type 'verb from conjunction'. Altogether, these two paragraphs contain 112 running words and 26 instances of grammatical metaphor and protometaphor, on average one instance per 4.30 running words.

Corpus-based analysis
In order to determine the extent of variation of student writing from subject English to Social Studies, we took a corpus-based quantitative approach to analyze the 42 essays by dividing them into two groups

(English and Social Studies) and calculating the normalized frequency and text coverage of protometaphor and metaphor across the two subject areas. Raw frequency, i.e., the actual occurrences of a certain type of metaphor and protometaphor in the texts, can be informative. But, given that not all texts are of the same length, following Biber, Conrad and Reppen (1998) and McEnery, Xiao and Tono (2006: 52-53), a norm of 400 words was decided upon as the typical text length. That is, we sought to compare the normalized frequencies of metaphors and protometaphors in the two groups of student essays. The raw and normalized frequencies of metaphors and protometaphors are presented below.

Categories		English	Social Studies	Total
Metaphor	Actual instances	424	817	1241
	Normalized frequency (Ave per 400w)	19.21	37.88	28.44
Proto-metaphor	Actual instances	165	103	268
	Normalized frequency (Ave per 400w)	7.47	4.78	6.14
Total	**Actual instances**	**589**	**920**	**1509**
	Normalized frequency (Ave per 400w)	**26.68**	**42.66**	**34.58**

Frequencies of metaphor and protometaphor in the students' essays

As shown in the table, for every 400 words of argumentative text, Social Studies essays employ 37.88/19.21=1.97 times as much grammatical metaphor as English essays. Social Studies texts are nearly twice as metaphorical as English ones. As for protometaphor, the proportion is nearly reversed. That is, English essays employ 7.47/4.78 =1.56 times as much protometaphor as do Social Studies essays. While Social Studies strives for compactness realized in grammatical metaphor, subject English strives for diffuseness realized through protometaphor such as embedding. By reference to the Social Studies text analyzed above, for example, the phrase 'territorial dispute' condenses a considerable amount of information.

The following table lists and compares the frequencies per 400 words of various types of metaphors across English and Social Studies essays.

Type of Metaphor		English	Social Studies	Total
Noun from various forms	Actual instances	266	418	684
	Normalized frequency	12.05	19.38	15.67
Preposition from conjunction	Actual instances	15	28	43
	Normalized frequency	0.68	1.30	0.99
Verb from various forms	Actual instances	6	2	8
	Normalized frequency	0.27	0.09	0.18
Adjective from various forms	Actual instances	11	76	87
	Normalized frequency	0.50	3.52	1.99

*Plus Verb	Actual instances	21	7	28
	Normalized frequency	0.95	0.32	0.64
**Plus Noun	Actual instances	0	1	1
	Normalized frequency	0	0.05	0.02
Interpersonal	Actual instances	8	0	8
	Normalized frequency	0.36	0	0.18
Other	Actual instances	97	285	382
	Normalized frequency	4.39	13.21	8.75
Total	**Actual instances**	**424**	**817**	**1241**
	Normalized frequency	**19.21**	**37.88**	**28.44**

Frequencies of different types of metaphor in the students' essays (Notes: *The sub-category 'Plus verb' refers to the phenomenon whereby the 'content' of an action (or state) is expressed as a noun and a verb is inserted ('added') to express the idea that this action (or state) exists or happens. Examples of this sub-category include the 'took place' in 'A serious accident took place' and the 'take' in 'take a bath'. ** The sub-category 'Plus noun' refers to the phenomenon whereby a noun is added to express the idea that some event is a fact, phenomenon, statement, etc. For example, 'the fact' in 'The fact that he passed his exams…')

It can be observed from the table that metaphors involving the shifts to nouns account for more than 50% of all metaphors in both subject area essays, making them the single most frequent metaphor type in the corpus.

At the same time, neither raw frequency nor normalized frequency gives an indication of what proportion of a text one instance of metaphor or protometaphor affects, i.e., its scope at the level of discourse, or how 'powerful' or extensive each instance is. The extent to which metaphors and protometaphors affect or spread across the texts can be captured through the notion of text coverage, which can be measured by the number of words affected by metaphors and protometaphors (i.e., tokens) divided by the running words of the texts and can be expressed in percentages. For instance, in a constructed clause 'This is not what John said at the meeting', 'what John said at the meeting' is an instance of protometaphor (i.e. embedding). The extent to which this clause is affected by this embedding can be obtained by the number of words of the embedding (6 words) divided by the total number of words (9 words), to give $6/9 \approx 67\%$. The following table presents the results regarding text coverage of metaphors and protometaphors in the two subject areas.

Categories		English	Social Studies	Total
Metaphor				
	Tokens	424	817	1241
	Text Cov. (%)	4.80%	9.47%	7.11%
Protometaphor				
	Tokens	165	103	268
	Text Cov. (%)	1.87%	1.19%	1.54%
Total				
	Tokens	**589**	**920**	**1509**
	Text Cov. (%)	**6.67%**	**10.66%**	**8.64%**

Text coverage of metaphor and protometaphor in the students' essays

As can be seen in the table, metaphors in Social Studies essays spread across or infiltrate the texts 9.47% /4.80% = 1.97 times as much as do

the metaphors in English essays. But protometaphors in English essays cover the texts 1.87% / 1.19% = 1.57 times as much as do the protometaphors in Social Studies essays. In other words, comparatively speaking, Social Studies essays are metaphorical while English essays are protometaphorical, which is in accord with a point above.

Discussion and conclusion

This paper has responded to Nesselhauf's (2004: 136) call "to investigate certain areas of grammar, lexis or discourse and go beyond single words" and "to start from functions, not from forms" and to Granger's (2002: 28) call for more interdisciplinary collaboration in the compilation and exploitation of learner corpora. Through a combination of qualitative and quantitative analyses of a sample of student writings, it is shown that arguing in English and arguing in Social Studies employ different grammatical resources and point to different directions. Compared with subject English, which employs rankshifted embedding, Social Studies (and its parent disciplines such as History and Sociology) depends to a greater extent on grammatical metaphors to argue. This provides empirical support for Martin's (1993; 2007) observations based on the analysis of a small number of texts. This kind of work has important implications for teaching advanced literacy as it deepens our understandings of the textual features of different subject areas and their different underlying value systems.

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