

A Corpus Analysis of Pedagogical Monologues in a Content-based EFL Context

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A corpus approach was adopted as a methodological experiment in exploring the pedagogical monologues of two secondary teachers, teaching academic subjects through English in an EFL context. Through an analysis of word frequency and associated grammatical patterns, both instructional and regulative registers (Christie, 2000) were identified in the monologues, which indicated teachers followed a similar pedagogical direction, regardless of the subject matter, in formulating academic concepts. However, differences were found between the teachers in the ways they communicated the content to the classes and the ways they engaged students with the subject matter, regarding positioning of participants, and choices of independent and dependent clauses and verbs. This, we argue, resulted in two different learning environments. The corpus approach, while not unproblematic, enabled us to discern lexico-grammatical and discursal patterns of the monologues by processing the data differently from labor-intensive line-by-line analysis of text in discourse analysis. The small-scale corpus approach provides a level of confidence that it can be applied to similar investigations on a larger scale. The findings help raise awareness of educators in bilingual classrooms of the workings of monologues in teacher-fronted subject teaching, and of different discourse orientations of two superficially similar semiotic events.

Key words: corpus study, pedagogical monologues, secondary bilingual subject teaching

INTRODUCTION

Demand for English medium secondary schooling in Chinese (Cantonese-speaking) Hong Kong is high mainly because English is regarded as a crucial means to social mobility. More schools are offering subject learning through English despite government attempts to promote mother tongue schooling. This has obvious implications for learning and teaching. As a foreign language, English must be learnt as well as the subject content by students of various learning abilities. In coping with subject learning through English, teachers and students face overcrowded subject curricula (Morris, 1997). Thus, it is not uncommon to find that classes tend to be transmission-oriented with teacher monologues ubiquitous, the teacher delivering subject content, while students listen and refer to textbooks and rarely ask questions in English in class. This study is an attempt to find out what happens in monologic teaching through a corpus analysis of the lexicogrammatical and discoursal features of the lessons. Specifically, we set out to understand

1. How is meaning constructed in two instances of teacher monologue register?
2. How might observed differences affect accessibility for students?

We made attempts to answer the questions with a small scale corpus study of monologic episodes from two junior secondary subject classes, one geography and one science. The research questions and methodology embody a systemic functional linguistics (SFL) perspective, drawing mainly on the work of Halliday (e.g., 1985) and Christie (e.g., 2002), which has a track record in providing appropriate tools for making explicit the relationship between meaning in context and linguistic form. The value of electronic corpora in such linguistic studies is also confirmed by Halliday, 2004a, p. 29).

LITERATURE REVIEW

Register

Pedagogical monologue is taken as a register. Following Halliday (2004a, p. 27), register is defined in this study, as ‘a functional variety of language – the patterns of instantiation of the overall system associated with a given type of context (a situation type)’. These patterns of instantiation show up quantitatively as adjustments in the systemic probabilities of language; a register can be represented as ‘a particular setting of systemic probabilities’ or a patterning of lexicogrammatical and discoursal choices (ibid). The contextual elements of ‘register’ or the ‘components of the context of situation’ (Martin, 1992) are referred to as ‘field’, ‘tenor’ and ‘mode’. In short, ‘field’ refers to what the participants are actually engaged in, involving language, or loosely, the ‘subject matter’ of the text; ‘tenor’ refers to the statuses and role relationships among the participants; and ‘mode’ refers to the role of the language in the situation including the channel (spoken or written), and the rhetorical mode (persuasive, didactic etc). Any discussion of linguistic text-forming resources must take into account those of the context (Martin, 1992, p. 405) as far as possible.

Types of Meaning and their Realization in SFL

An SFL perspective on language sees every message as about something; addressed to someone; and a cohesive, organized sequence of discourse (Halliday, 2004a, p. 30). This functionality is the ‘architecture’ of language, which must be taken into account for an understanding of any instance of language. Teacher monologues are talk (the mode component of register in SFL); about academic concepts (the field component), involving institutionalized semi-formal relationships between one relative expert and a certain number of learners (the tenor component).

In SFL, the ‘field’, or informational message, is ‘strongly predictive of’

(Martin, 1992, p. 505) a type of meaning called ‘experiential’. Experiential meaning makes sense of human experience, and is realized grammatically by the transitivity system in terms of participants (prototypically nouns); processes (prototypically verbs) and circumstances (prototypically adverbs). The ‘tenor’ or social variable is ‘strongly predictive of’ (ibid.) a type of meaning called ‘interpersonal’. Monologues express interpersonal meaning, and enact ‘exchanges’ (Halliday, 2004a, p. 29) in that they obviously involve listeners, even though the listeners do not take turns to speak. Interpersonal meaning is realized by grammatical choices in mood (e.g., interrogative or declarative clauses), interpersonal adjuncts (e.g., ‘actually’, ‘apparently’, ‘frankly’), modality (e.g., modal verbs, modalized clauses) and interpersonal deixis (e.g., pronouns).

SFL Research on Spoken Pedagogical Registers

In her study of a sustained curriculum cycle, Christie (2002), after Bernstein, elaborates two registers in secondary school spoken classroom discourse, namely, the ‘instructional’ and the ‘regulative’ (ibid: 15). In view of on-going contestations of ‘register’ (e.g., Martin, 1992), these registers are referred to here as ‘sub-registers’, since monologues have already been defined as a register. The two sub-registers are the ‘instructional’ and the ‘regulative’ (ibid: 15). While the instructional sub-register involves ‘language choices to do with the ‘content’’, the regulative sub-register involves the dimensions of shaping (or re-contextualizing) the instructional field (its unique ways of doing, reasoning and thinking) with students, as well as classroom management. Christie observes that the regulative sub-register is foregrounded (frequent, prominent) particularly at the beginning of a curricular cycle (a coherent series of lessons). Foregrounding of the regulative sub-register means the teacher is positioned as agent of symbolic control of the subject matter, and the students are positioned as receivers (Christie, 2002, p. 179). The regulative sub-register ‘projects’ (following Halliday, 2004a, p. 444) the instructional sub-register, and it is important that

the regulative sub-register include 'pedagogically helpful metalanguage' (Christie, 2000, p. 169) to apprentice students in talking and writing the subject, especially where a foreign language is used. This is an observation we return to in our discussion. Christie's SFL-based studies, among others, illustrate how the types of meaning outlined above are realized in the instructional and regulative sub-registers. That is, each sub-register is expressed by language choices simultaneously constructing experiential (logical), interpersonal and textual meanings.

Other Research on Spoken Pedagogical Registers

Relevant to our interpretation of interpersonal meaning defined above, is Biber et al's (1999) conceptualization of enactment of interpersonal meaning through 'stance'. Stance refers to speakers' comments on the status of information in a proposition (epistemic stance), and/or reports speakers' personal feelings to the actions or events in the propositions (attitudinal stance). Elaborating the concept of stance, Berman et al (2002) suggest 'orientation' as the perspective from which a message is constructed, i.e. the sender ('I think'), the text ('in considering the topic of...'), or the receiver ('you know') (ibid: 257).

Analyzing spoken interaction in university classes, Biber, Conrad, and Cortes (2004, p. 399) found mixed 'oral' and 'literate' characteristics in the use of lexical bundles with more extensive use of discourse organizing bundles than normal conversation and more referential bundles than academic prose. Swales (2001, p. 35) shows that lectures are 'heavily signaled and signposted', and that they are 'apologetic and even confessional'. Flowerdew (1992, p. 202) found that in science lectures one definition occurred about every two minutes, and that definitions 'signposted the logical structure of the subject, or help[ed] to maintain comprehension as the discourse progress[ed]'. Notwithstanding these, there remain few studies into academic spoken discourse according to Biber et al, (2004), especially at secondary school subject level in bilingual contexts, according to Mohan

(2001, p. 119). This is despite problems documented in this area (e.g., Marsh, Hau & Kong, 2000) and the substantial number of secondary school students, particularly in Asia, expecting good teaching in English from teachers for whom English is a foreign language.

METHODOLOGY

Corpus approaches are commonly used in linguistic and educational research studies. We utilized a corpus approach in analyzing the monologues as a methodological experiment, expecting the corpus to help us discern the lexicogrammatical and discoursal patterns of the monologues processed differently from the labor-intensive line-by-line analysis of text in discourse analysis.

“Monologue” in this study is defined as “an uninterrupted stretch of discourse of more than 100 words, which, on the surface, deals with content, not classroom procedures”. Our small corpus comprised twenty-one stretches of teacher monologues from two video-recorded 40-minute lessons, 15 from a secondary one (grade 7) geography lesson and seven from a secondary three (grade 9) science lesson. The geography monologues ranged from 120 to 460 words with a total of 3242 words; while the science monologues ranged from 100 to 350 words with a total of 1374 words.

The two teachers in the study, one male and one female, are native speakers of Cantonese Chinese, both experienced, having taught their subject more than five years. The content of the geography lesson was weather, and that of the science lesson was refraction. The first monologue in the weather lesson occurred six minutes into the lesson after a series of teacher questions and student answers; with 14 following monologues about textbook diagrams with realia. The first monologue of the science lesson occurred immediately at the outset, with six further monologues referring to diagrams of phenomena. The students were of above average academic ability, attending English medium schools where most subjects are taught in English. They

would have had more than six years of English language learning before entering secondary school.

In our attempt to understand the pedagogical discourse, we followed the common practice in corpus studies, namely, a frequency-driven approach in data analysis, by first compiling a frequency list and examining the top 50 lexical words of each lesson. Words with lower frequency are usually assumed to have far less impact on the classroom discourse and hence less impact on students. This initial word frequency information was then extended to an exploration of ‘grammatical associations’, investigating how the linguistic features are systematically associated with grammatical features in the immediate context” (Biber, Conrad, & Reppen, 1998, p. 6). This entailed two procedures - a transitivity analysis, at clause level, of participant, process, and circumstances around a key (high frequency) word; and a mood and modality analysis of (high frequency) pronouns and modal verbs. A third analysis was to categorize lexical bundles (Biber et al., 2004), which is a way to observe the “building blocks of discourse” (ibid) not immediately evident from the frequency list. Only representative cases are reported in each category due to space limitations.

The results of the two monologues were compared and interpreted based on local knowledge and the paralinguistic information from the video data. Implications were drawn to enable our discussion of accessibility, since the crux of student learning actually lies in how a teacher makes available specific content to students (Lo, Pong & Chik, 2005; Marton & Tsui, 2004). It is reasonable to assume that the nature of the instructional field (subject) and the level of the students could influence the teaching (e.g., strategies, resources, student tasks). However, it remains valid to compare the instructional events and contrast their linguistic realizations (as in Christie, 2000; 2002) because the function of all forms of pedagogic discourse is to construct technicality (Unsworth, 2001, p. 130) and ‘pedagogic discourse is not formed independently in relation to a particular content to be relayed’ (Williams, 2000, p. 112, after Bernstein). This is why, for example, non-specialist educator-observers may intuit the quality of specialist lessons.

We realize that the frequency-driven approach precluded some analyses which might be expected by SFL purists, such as Theme analysis in the realization of textual meaning, which is beyond the scope of this paper.

RESULTS

Analysis of Word Frequency

Analysis of word frequency was the initial step towards our understanding of the monologues. Table 1 below shows the categorized list of the top 50 words in each lesson.

TABLE 1
Frequency Lists: Categorization of the Top 50 Words

		<i>Geography Lesson</i>		<i>Science Lesson</i>	
<i>Word class</i>	<i>Type</i>	<i>Item & token</i>		<i>Type</i>	<i>Item and token</i>
Lexical noun	11	temperature(49)	index(22)	9	lens(31) rays(19) light(11)
		thermometer(30)	rain(20) weather(19) air(17)		focus(10) lenses(10) board(8)
		degree(17) atmosphere(16)	book(15) day(15) gauge(14)		action(7) axis(7) symbol(7) = 110
		= 215			
Lexical verb	6	is(121) look(21) see(21)	are(20) be(20) put(14) = 217	5	is(30) have(22) are(18)
					know(7) draw(6) = 83
Adjective	3	Right* ¹ (42) Maximum(26)	minimum(18) = 86	6	Okay*(30) principal(19)
					convex(16) concave(11)
					similar(8) parallel(6) = 90
Adverb	4	so*(50) there(31) down(28)	here(24) = 133	5	so*(21) down(10) there(8)
					here(7) very(7) = 53
Pronoun	8	you(80) it(72) this(65)	that(46) we(35) when(22)	7	you(36) we(35) it(23) this(14)
			your(16) they(14) = 350		I(12) what(10) those(7) = 137
Preposition	7	of(78) to(55) in(50) on(36)		6	of(26) to(26) for(16) on(13)

¹ This classification was the original, before inspection of the word in context, which revealed their operation as other word classes. However, word class reallocation did not affect the overall picture of the 2 monologues.

		at(24) about(21) inside (19) = 283		in(11) at(7) = 99
Auxiliary verb	3	will(58) can(26) have (to)(12) = 96	4	can(15) do(13) will(13) (be) going(7) = 48
Article	2	the(318) a(56) = 374	2	the(100) a(29) = 129
Conjunction	4	and(78) then(46) or(24) if(20) = 168	1	and(29) = 29
Number	2	two(19) one(16) = 35	2	F*(16) two(13) = 29
Vocal insertion	0		3	um(20) er(11) huh(10) = 41
Summary	10	651 lexical items 1306 grammatical items	11	336 lexical items 483 grammatical items
Lexical density		0.33		0.41

Table 1 above shows that the two lessons shared a similar range of word coverage (in terms of word classes), exhibiting items from the lexical domain (noun, verb, adjective and adverb) and grammatical domain (pronouns, prepositions, auxiliary verbs, articles, conjunctions and numerals) with the majority of the items falling into the latter category. Vocal insertions such as ‘um’, ‘er’, ‘huh’, not belonging to word classes, appeared in the top 50 wordlist of the science lesson only.

Two types of lexical nouns were identified in the top 50 word lists. Using Halliday’s concept of ‘technical’ language (Halliday, 2004, p. 29), and Christie’s categorization of language as instructional or regulative, the first type construed the subject matter or instructional field such as ‘temperature’, ‘thermometer’, ‘index’ and ‘rain’ (in geography); and ‘lens’ ‘rays’, ‘light’ and ‘focus’ (in science). The second type construed the regulation of the subject matter such as ‘book’ and ‘day’ in the geography lesson and ‘symbol’ and ‘board’ in the science lesson.

Two types of lexical verbs were also identified in the high frequency list. One was the copula ‘be’ in its various forms (singular/plural) and the others were dynamic verbs such as ‘look’ and ‘see’ in the geography lesson and ‘know’ and ‘draw’ in the science lesson. The various forms of copular ‘be’ (around 150 instances in all) were found to relate to the ‘field’ of the lessons, defining and/or describing of subject matter in the instructional field. The

dynamic verbs construed the regulative register, either focusing students' attention on the concepts conveyed (e.g., look/see), or directing physical action (e.g., draw/put).

The adjectives in the top frequency lists functioned as modifiers in noun groups, contributing to the construction of the experiential meanings in the lessons, for example, 'maximum/minimum temperature' in the geography lesson; and classifying types of lenses such as 'convex/concave lenses' in the science lesson. The few adverbs in the frequency lists either functioned as deictic (e.g., here and there) or as part of (lexical) phrasal verbs (e.g., write down).

We identified a number of similarities and differences with regard to the top 50 wordlists. First, similar to other face-to-face interaction, both lessons contained a larger number of grammatical words (tokens) than lexical words. Probably due to the small corpus size (fewer monologues), the lexical density of the science monologue was a little higher than that of geography. Lexical density is an indicator of 'writtenness' (Halliday, 1985), which has implications for our inquiry on accessibility. We will return to this issue in our discussion. Second, we found a large number of deictic pronouns such as 'that', 'those', 'this', 'it' in the frequency lists (type and token), construing reference in the utterances/texts; and addressee/addressor-oriented pronouns in face-to-face interaction such as 'you', 'we' and 'your' etc. Third, the most frequent types of auxiliaries were similar in both lessons, indicating action in the future such as 'going to', and probability/ability 'can'. Auxiliary 'do' was only used in the science lesson (see 'you' analysis below).

Analysis of Grammatical Association

Our analysis of grammatical association revealed how the high frequency items were used in context, and the relations of the items to the other clausal components in construing meanings at clause level.

Taking 'temperature' from the geography lesson as an example, two types of grammatical functions were identified. Out of a total of 47 instances,

'temperature' was used in 19 as subject/actor participant; 14 as object/goal participant; four cases as 'modifier' (pre- and post), and one as 'attribute', all of which construed the technical concept 'temperature'. The charts below illustrate the categories.

'Temperature' as Subject/Actor Participant

NP		VP
the	} temperature	fall[s]
the minimum		rise[s]
the maximum		is used
the lowest		is measured
the highest		is written
this		is stable

'Temperature' as Patient/Goal Participant

VP	NP	PP
report [about]	} the temperature	of the day
record		of its surrounding
mark		of today
measure		on a particular day
test		
specify (about)		
show		

'Temperature' as Modifier/Classifier of NP

NP	
the change <u>in the temperature</u>	} post-modifier
the different[ence] <u>in the temperature</u>	
the maximum <u>temperature</u> thermometer	→ pre-modifier

Playing several grammatical roles, the instances of ‘temperature’ in all the cases above represented the experiential/knowledge aspect of the monologues in instructional register.

Apart from the instances above, we also found instances of ‘temperature’ forming the regulative register, where the teacher shapes the technical/subject knowledge for pedagogical purposes. The charts below represent these instances. Presenting speech functions instead of the above grammatical functions is to illustrate how the regulative register represents a convergence of experiential and interpersonal meanings (Christie, 2000), engaging the audience in the interaction. The speech functions were ascertained from inspection of the intact transcript.

‘Temperature’ in the Regulative Sub-register

Instance	Speech Function
What kinds of temperature of today? do you know what temperature there?	} demanding information
look at the temperature	→ directive
concerning with the temperature,	→ discourse/topical focus
call it the temperature	→ labeling
understand the temperature	→ engaging cognitively
“Temperature tells us...”	→ quoting from textbook

The above analyses were repeated for the science lesson data. Similar patterns were observed in the case of ‘lens(es)’ in the science lesson, where the key word occurred in both technical/instructional language and regulative language.

'Lens(es)' as Subject/Actor Participant

NP			VP
a convex lens	}	will	converge
the lens			diverge
the convex lens			thicker
concave lens			thinner

'Lens(es)' as Patient/Goal Participant

VP		NP		PP
fall onto	}	the lens	}	from this side
		the concave lens		
		a convex lens		
		the convex lens		

'Lens(es)' as 'Circumstance'

to the plane of the lens	→	}	circumstance
as a concave lens			
similar to a convex lens			

'Lens(es)' as 'Qualifier' of a NP

(the) two types of <u>lenses</u>	→	qualifier
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'Lens(es)' in the Regulative Sub-register

Instance			Speech Function
draw	the lens	→	directive
study	the lens	}	content focusing
learn	the action of a concave lens		
compare			
For the convex lens			→ discourse focusing
[drawing 2 rays]		}	demonstrating
[writing down "action of rays"]			

Summary of Analyses of Grammatical Associations

Though sharing common features, the two lessons also demonstrated differences. First, a larger variety of VPs were associated with the key item in the geography lesson than with that in the science lesson (14 vs 4). Among the four VPs associated with 'lens' in the science lesson, three represented material processes of transitivity - one intransitive (for example 'fall onto the lens') two transitive ('convex lens converge rays', 'concave lens will diverge the light rays') and one relational ('convex lens is thicker'). All these cases were finite verbs in unmarked clauses, that is, active declarative clauses. In contrast, the VPs associated with 'temperature' in the geography lesson were more complex. Some were finite verbs, others were infinitives ('to record the lowest temperature'), gerund ('Measuring the temperature'); some in active voice ('the temperature falls') and some in passive ('the temperature is measured'). Apart from material and relational transitivity, verbal processes ('mark', 'report', 'show') and mental processes ('understand') were also found. Second, the science lesson had approximately three times more instances of regulative sub-register (that is, 56% vs. 18%) such as 'draw 2 rays', 'compare the action of a concave lens' etc.

As far as grammatical categories were concerned, the analysis of the patterns associated with the key words ('temperature' and 'lens') indicated two different approaches to meaning construction in the two lessons. While the geography teacher preferred to use a variety of complex linguistic structures (in the sense of marked clauses and a range of transitivity types) with little visual support in formulating the experiential meanings, the science teacher used simple structures with a limited number of linguistic structures supported by visual aids (diagrams and words on the board) and engaged students both physically (drawing) and cognitively (compare). The fewer instances of regulative sub-register indicates that the geography monologues exhibited less pedagogical work on the concepts; while the science monologues, despite a higher lexical density, exhibited more regulative talk or, in other words, more reshaping of the field for pedagogical purposes.

Multi-word Clusters

Our analysis of multi-word clusters led to the identification of the following lexical bundles. For this analysis we went back to the intact monologues from which we generated the lexical bundles/ clusters, instead of using the key words from the frequency lists.

TABLE 2
Lexical Bundles in the Geography and Science Lessons

Geography Lesson	Science Lesson
Instructional sub-register	Instructional sub-register
a short period of time	different types of convex/concave lens
the temperature falls	there are two different
it is hot or cold	two different types of
highest temperature of the day	action of convex lens
the maximum and minimum	action of a concave
thermometer	convex lens is thicker
layer of air called	thicker in the middle
the amount of rain	cross section of a convex
to avoid direct sunshine	have light rays fall onto
under a matte sheet	joining F and F-dash

Geography Lesson	Science Lesson
to use a kind of	rays passing and leaving the
it will move the index	call it convex lens
want to measure the	in a similar manner
often put inside a wooden box	than at the edge
	will be brought closer together
Regulative sub-register	Regulative sub-register
book on page 50	draw the convex lens
we're to talk about	do you want to guess
you can look at	please draw the convex
if you look at	we're going to study
look at the book	
when we talk about	'pedagogically helpful use of a
talk about the weather	metalinguage' (Christie, 2000, p.169)
about the condition	the foci is the plural form
Convergence of instructional and	Convergence of instructional and
regulative sub-registers	regulative sub-registers
where it's supposed to	so that it can
we have to use	
seems very much the	
so this is how the	
this is how the	

Analysis of lexical bundles revealed operation of the two sub-registers in the monologues - one instructional, conveying experiential meaning, and the other the regulative, converging experiential and interpersonal meanings. The geography lesson involved some discussion on temperature ('high' and 'low'), measuring instrument ('maximum' and 'minimum thermometer', 'index' and 'Stevenson box'), weather ('layer of air') in general and specific (rain). This was done through labeling ('layer of air called'), describing the working principles/functions of the measurement instrument ('it will move the index'/ 'put inside a wooden box'), inferring ('where it's supposed to') and summarizing ('so this is how the'). The regulative aspect of the geography lesson included mainly directives ('you can look at book on page 50') and some framing moves ('we're to talk about'). Textbooks seemed important in this lesson as the word 'book' occurred many times in the multi-word clusters. The science lesson focused on a comparison of the two types of lenses ('convex' and 'concave'), their actions ('rays passing through') and

differences ('thicker in the middle') between the two types. It involved labeling ('call it convex lens'), comparing ('in a similar manner'/'than at the edge'), summarizing ('so that it can'), and describing the working principles of the lenses ('have light rays fall onto'). The science lesson, in comparison, contained more variety in regulative functions than those in the geography lesson. That is, framing the topic to be discussed ('we're going to study'), involving students in the lesson ('do you want to guess'), directing physical action ('please draw the convex') and working on language ('the foci is the plural form'). The last item, 'the foci is the plural form', is worth noting. This is, according to (Christie, 2000, p. 169) 'pedagogically helpful use of a metalanguage', which is considered crucial for content-based EFL classrooms, but very rare in the monologues examined and in our experience in classrooms. In addition, we also identified instances which converge the instructional and regulative sub-registers. While these instances were basically concerned with the subject matter, they were framed regulatively for pedagogical purposes. We revisit this in the discussion.

Analysis of Pronouns and Modal Verbs

Grammatical words, especially pronouns such as 'you', 'I' and 'we' help us understand how the meanings of the monologues were orientated and conveyed interpersonally to the classroom audience. Table 3 shows the personal pronouns in the frequency lists.

TABLE 3
Personal Pronouns in the Top 50 Wordlists

Geography Lesson		Science Lesson	
You	3 rd	You	2 nd
It	6 th	We	3 rd
We	18 th	It	11 th
		I	27 th

Approximately 92% of the total instances of 'you' in the geography lesson were declarative sentences in six major linguistic patterns, with the seventh

being interrogative.

Subject	Finite/predicator	Complement
<u>You</u> }	(can) see look at find }	dependent clause NP
<u>You</u> }	(will) understand (should) know }	dependent clause NP
<u>You</u> }	are (should) have (can) get (may) got (will) become }	NP

Connective	Subject	Finite/Predicator	Complement
If Because Where When Why If Once }	<u>you</u> }	want to measure have to measure put do use make stuck }	NP NP

Subject	Finite/Predicator	Complement
I }	have to tell cannot }	<u>you</u> } dependent clause
This It }	will tell }	<u>you</u> } dependent clause

WH(Interr)	Finite	Subject	Predicator	Complement
How	do	<u>you</u>	read spell	NP

In contrast to the geography lesson, approximately 42% of 'you' instances in the science lesson were in interrogative mood. The following chart presents the three major linguistic patterns found in the science lesson.

Finite	Subject	Predicator	Complement
Do Can	<u>you</u>	know think guess learn	dependent clause NP

Finite	Subject	Predicator	Complement
Would	<u>you</u> please	draw write clean give complete	NP

Subject	Finite	Predicator	Complement	Complement
I	will (have)	give show/shown ask	<u>you</u>	NP

In spite of the difference in mood, the two teachers seem to have followed a similar way of constructing the meaning as far as mental and verbal verbs were concerned. In such instances, the independent clauses were followed by a dependent clause, or a long NP in most instances, which resulted in two constructions in the messages. The first construed the projecting process (for

example, mental process ‘do you know’ -- science; ‘you will know’ -- geography; verbal process ‘I will ask you’ -- science; and ‘It will tell you’ -- geography etc.) and the second construed the projected proposition. In other words, the subject’s (or in some instances the textbook’s) technicality was framed pedagogically, by engaging students mentally in the projecting independent clause and by expressing and modeling the technical experiential meanings in the projected, relativized, dependent clauses. This observation thus highlights the most salient inter-clausal relationship in the monologues – that of projection. This relationship is essentially prescribed by the pedagogical context in which the teachers tried to scaffold technical knowledge (in textbooks) in the regulative register in their monologues. Since teaching IS field recontextualization, this socio-pedagogical purpose is realized, in the inter-clausal relationship, through independent and dependent projecting clauses.

A related point of similarity between the two teachers is that although the experiential, technical meanings were construed in receiver-oriented clauses, ‘you’ as the direct addressee was not necessarily used to elicit responses or direct actions from the audience as commonly found in face-to-face interaction. This was especially true when declarative mood structures were concerned in the geography monologues, where ‘you’ was a starting point to frame a message (experiential meanings) embedded in the NP or the dependent clauses.

Overwhelming use of ‘you’ instead of other personal pronouns (e.g., ‘I’ or ‘we’) to orient messages is an interesting phenomenon. It seems that the geography teacher chose not to make explicit his epistemic stance on the experiential meanings to be conveyed in the complement clauses. By using a neutral framing structure, e.g., ‘you can see/you can find’ plus a complement clause, the teacher remained anonymous with respect to the source of information. In comparison, the science teacher seemed to be more explicit by using the first personal pronoun in addressing her students as in ‘I have shown you the symbol already’ and ‘I will give you a hint’. Epistemic stance did not seem to be the concern of either teacher, however. Their lack of overt stance can be seen from the fact that no evaluative adjectives or adverbs occurred in the frequency wordlists. That is, the teachers seldom made

evaluative comments on the content they conveyed in the complement clauses. A further brief point of interest was that pronoun ‘we’ seemed to equal not only ‘you’ (the novice-addressees) and ‘I’, but also other members of ‘the discourse community’ (Swales, 2001) of geographers/scientists ‘doing [science]’ (Martin, 1990), as in ‘we call it the maximum temperature’. This ‘we’ was associated with the present tense in the instructional register. However, when progressive aspect and future ‘will’ were used, ‘we’ seemed to be associated with regulative register as in ‘we are going to compare it...’.

Table 4 below shows the modal verbs and semi-modals in the frequency wordlists. The discussion focuses on ‘can’ since ‘will’ was used mostly as a present tense marker (e.g., the lens will converge), common in HK English.

TABLE 4
Modals and Semi-modals in the Frequency Wordlists

	Geography		Science
Will	6 th	Can	15 th
Can	21 st	Will	49 th
Have (to)	32 nd	Would	50 th

Our analysis revealed several linguistic patterns regarding the teachers’ attitudes towards the actions in the propositions.

Geography Lesson: Teacher’s Attitudinal Stance

Subject	Finite	Predicator	Adjunct	Complement
You	can	see...		dependent clause
		look at...	here	
		find out...	(outside) there	dependent clause
We	can	tell	in the book	NP
		travel	from the...	
		understand		
I	can	tell		NP
		combine		

Science Lesson: Teacher's Attitudinal Stance

Subject	Finite	Predicator	Complement
You	can	think guess do give complete	NP
We	can have	make call draw	it simple it principle focus NP
It	can	refract have a mean	NP

In the geography lesson, approximately 78% of 'can' instances appeared together with verbs directing actions such as 'see', 'look at' and 'find' in the independent clause with 'you' as its subject, followed by definitions and descriptions of the concepts in the dependent clause. This high frequency of 'can' stating students' ability to or possibility of acting (Biber et al., 1999, p. 485), is interpreted as the teacher playing the role of mediator between the textbook and the minds of students in the class. In contrast, in the science lesson, 'can' appeared almost exclusively to give permission. When associated with a receiver oriented 'you', 'can' was regulative (for example, 'You can complete...'), indicating the teacher's authority over the class in directing students' physical and mental attention.

DISCUSSION

The corpus analysis shows that the pedagogical monologues were realized in the instructional and regulative sub-registers. The instructional sub-register, defined by Christie (2002) as ‘language choices to do with the ‘content’’, was realized in the use of certain types of lexical items, e.g. the most frequently used nouns (i.e., nouns + modifiers) representing the content-focus of the monologues; and the most frequently used verbs (VPs) representing the definitions, explanations etc. of the key concepts addressed through transitivity. The construction of regulative sub-register, defined in Christie (2002) as shaping the instructional field with students, was less straightforward in terms of lexico-grammatical representations than that of the instructional sub-register. While the instructional register was represented in the subject-related high frequency lexico-grammatical items, the regulative register was realized through a combination of lexical items (e.g., multiword clusters) and grammatical items such as pronouns and modal verbs etc. The nouns involved in shaping content knowledge were management related items such as ‘board’, ‘book’, ‘diagram’ etc. One type of verbs related to the regulative register were dynamic types of verbs (cf., ‘copular’ for instructional sub-register) such as ‘draw’ ‘complete’ etc. Another type in this category was mental and verbal process verbs in complex sentence structures, projecting propositions (instructional register) in the dependent clauses and foregrounding the receivers in the independent clauses. These kinds of lexical items were grammatically associated with pronouns and modal verbs, indicating the stance of the speaker towards the subject-knowledge. This corpus-based analysis enabled us not only to see the relationship between different constituents within a clause, but also inter-clausal relationships in the projecting clause + projected clause. In other words, the analysis makes visible the simultaneity of the instructional and regulative sub-registers in operation in construing meanings for the audience/learners. As demonstrated previously, the regulative register was scaffolding technicality (subject matter) pedagogically in the form of independent clauses while the instructional

register construed technicality in the form of dependent clauses. The independent clauses and dependent clauses thus formulated an inter-clausal relationship of projection.

Having established that the two teachers followed a similar direction in construing the technical concepts as well as in regulative language, comparison between the lessons indicated several points of divergence which potentially influence the accessibility of the content. The divergences were concerned with 1) participants' positioning through mood; 2) instruction-related student activity through verbs associated with the key words; and 3) the variance in the grammatical functions of the key words. Firstly, we have seen that the geography teacher's talk comprised 90% declarative clauses with 'you', while that of the science teacher was almost 50% interrogative mood. The geography teacher thus took up the role of information 'giver' in lecture mode with complex structures resulting in more 'literate' characteristics (cf., Biber, Conrad & Cortes, 2004). The science teacher, on the other hand, assumed a role more like an interlocutor, demanding students' cognitive involvement, positioning students as face-to-face interlocutors, thus making the monologic teaching virtually dialogic, and creating more space for student intellectual engagement.

Secondly, the science teacher's students were co-constructing knowledge/technicality in the sense that the object of learning (lens) was handled in a pedagogically richer way. That is, verbs construing the regulative register (what the participants actually did) were more frequently associated with 'lens', indicating how the teacher demonstrated content (drawing, writing), and how the students had more opportunities for varied desk work, physically engaging with the content and the language for expressing it (draw, guess, study, notice language 'foci is the plural form'). This richness in presenting the subject knowledge compensated, to a certain extent, for the higher lexical density of the science monologues, making the lesson more accessible to the students. In contrast, in the geography lesson, there were less rich opportunities for co-construction of knowledge. The regulative language associated with 'temperature' was far less frequent, indicating that the students engaged with

the object of learning less, and in fewer, less dynamic ‘hands on’ ways (‘look at’ ‘understand’), since the engagement predominantly centered on the textbook. Meanwhile, verbs clustering with the two key entities (temperature and lens) indicated that the students contended with a similar number of knowledge structures. That is, in the science lesson, students experienced comparison, definition, summary, and description, while in the geography lesson students experienced definition, description, inference, and summary. Given the less rich concept-related activity in the geography lesson combined with similar demands in terms of thinking, the overall cognitive demands on students may have reduced the geography lesson’s accessibility.

Thirdly, as we have seen, the science teacher presented the content in a fairly limited, focused grammatical environment (in terms of the grammatical roles played by key words), consistent across the lesson, implying a more manageable linguistic load for students. The redundancy of the science teacher’s vocal insertions was also likely to be effective in creating more time for student comprehension, as indicated by the video evidence. On the other hand, the geography teacher, who exhibited no vocal insertions, presented the content in a more diverse and complex grammatical environment (in terms of range of transitivity types and marked clauses), implying less linguistic manageability in a bilingual context. It may be argued that grammatical diversity provides better acquisition opportunities, but this could be achieved, without compromising comprehensibility, across a unit or course rather than across a lesson, especially at junior levels.

Finally, in addition to permitting answers to our two research questions, our experiment with corpus has revealed some nascent register features of secondary school pedagogical monologues in this particular bilingual context, namely few plural nouns indicating minimal generalization, an absence of past tense in dealing with content; frequent and explicit use of ‘you’ in independent clauses as attention getters for the content projected in the following dependent clause; and use of ‘we’ meaning ‘discourse community’, though without evaluative (let alone apologetic or confessional) stance toward the content, implying that any sense of authority was more related to

classroom procedures rather than to the instructional field.

Notwithstanding the apparent usefulness of corpus to our endeavours, we did experience some difficulties in carrying out the corpus analysis. Because of the simultaneity of metafunctional representations within a clause, it was sometimes difficult to categorize the linguistic items into instructional and regulative sub-registers. The difficulty relates to the analytical unit, and was particularly evident in the multi-word cluster analysis. This was because the clusters emerging on the printouts were not constituents, but were randomly fragmented. A much larger context has to be taken into consideration when doing such analyses (see also Matthiessen, 2007, p. 829).

CONCLUSION

Our corpus-based frequency-driven analyses are experimental in the secondary school context, as most linguistic studies at this level employ non-electronically assisted analyses. The findings enabled by this small-scale, electronic corpus provide a level of confidence that the approach can be applied to similar investigations on a larger scale. The corpus provided tools by which we could make apparent the workings of two instances of monologic teaching, with tentative evaluations of their accessibilities. The methodology laid bare linguistic features which provided empirical evidence of initial intuitions that the science teacher made more instructionally effective linguistic choices. This potentially helps teacher educators, and novice and experienced teachers raise our explicit awareness of the workings of teacher language in bilingual contexts.

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