Original Research

An SF-MDA of the Textual and the Logical Cohesive Devices in a Postgraduate Accounting Course

Hesham Suleiman Alyousef[1] (iD)

Abstract

The use of cohesive devices in academic discourse not only improves the quality of writing but also enhances our learning experiences. This study aims to explain how the multimodal accounting discourse is constructed by postgraduate business students through the cohesive ties. Halliday and Hasan's and Halliday's cohesion analysis schemes were employed in the systemic functional multimodal discourse analysis (SF-MDA) of the cohesive devices in the multimodal accounting texts. The schemes are based on systemic functional linguistics (SFL) which suits the context of this study as it considers language as a social semiotic resource for making meaning. Its linguistic tools are capable of explaining the way we construct and make meanings. The SF-MDA findings showed the first and most frequently occurring cohesive device type in the orthographic texts was lexical cohesion, in particular repetition of the same lexical items, followed by reference and conjunctions. Lexical cohesive devices were higher in the tables than in the orthographic texts. Conjunctions were only employed in the orthographic texts to signal extension and enhancement relationships. One of the key features that characterize financial statements is the abundance of implicit hierarchically networked lexical ties that bind the separate lexical strings, thereby organizing the discourse of financial statements. The results contribute to our understanding of the complex multimodal meaning-making processes in accounting discourse.

Keywords

accounting discourse, business discourse, cohesion analysis, multimodal, systemic functional linguistics, systemic functional multimodal discourse analysis

Introduction

Systemic functional linguistics (SFL)-based investigations of the use of cohesive devices in tertiary business discourse were limited to finance and management accounting (Alyousef & Alnasser, 2015a, 2015b). SFL-based studies of tertiary business discourse are sparse (Alyousef, 2013, 2015b, 2016a, 2016b, 2017, 2018; Alyousef & Alnasser, 2015a, 2015b; Alyousef & Alsharif, 2017; Alyousef & Mickan, 2016). Tertiary accounting discourse has been investigated by only two studies (Alyousef & Alsharif, 2017, 2019) which explored, respectively, the construction of the experiential meanings and the construction of Theme/Rheme. Studies of the realization of linguistic cohesive devices in tertiary accounting discourse are lacking. As the study aims to investigate how the Saudi international postgraduate business students construct cohesive multimodal accounting texts, it is pertinent to investigate the textual and the logical cohesive features: reference, substitution and ellipses, conjunctions, and lexical cohesion.

The multimodal texts were on a key topic in the accounting course, namely, accounting financial reports. Following O'Halloran (2009), I used the nomenclature systemic functional multimodal discourse analysis (hereafter SF-MDA) of the cohesive devices as the financial reports typically encompass tables. Pauwels (2012) states "multimodal analysis not only takes different modes into account but also has a strong focus on the effects of their interplay" (p. 250). The SF-MDA is based on Halliday and Hasan's (1976) cohesion analysis scheme and Halliday's (2014) SFL approach. The study thus aims to compare the use of cohesive devices in both the orthographic texts and the financial reports (or the tables). The use of these cohesive devices in academic discourse not

[1]King Saud University, Riyadh, Saudi Arabia

Corresponding Author:
Hesham Suleiman Alyousef, Department of English Language & Literature, Faculty of Arts, King Saud University, Riyadh, Saudi Arabia.
Email: hesham@ksu.edu.sa

only improves the quality of writing but also enhances our learning experiences. Such a study may contribute to our understanding of the salient cohesive features of this discourse. It may also provide pedagogical implications for students and English for Academic Purposes (EAP) course tutors.

Literature Review

Whereas SFL-based studies of tertiary business discourse are sparse (Alyousef, 2013, 2015b, 2016a, 2016b, 2017, 2018; Alyousef & Alnasser, 2015a, 2015b; Alyousef & Alsharif, 2017; Alyousef & Mickan, 2016), a dearth of research studies investigated cohesion in textbooks or academic texts (Hinkel, 2001; Kim & Crossley, 2018; Liu & Braine, 2005; Tangkiengsirisin, 2010) or other disciplines, such as history (Korani, 2012) or literary texts (Gutwinski, 1976). SFL-based business studies were confined to the fields of marketing (Alyousef, 2016b, 2017, 2018), finance (Alyousef, 2013, 2016a; Alyousef & Alnasser, 2015a), accounting (Alyousef & Alsharif, 2017), and management accounting (Alyousef, 2015b; Alyousef & Alnasser, 2015b; Alyousef & Mickan, 2016).

To the best of my knowledge, tertiary accounting discourse was investigated by only two studies, Nga (2012) and Alyousef and Alsharif (2017). Nga (2012) employed Halliday and Hasan's (1976) scheme to investigate the use of cohesive devices in accounting reading texts. The findings showed that the use of lexical cohesion (65.77 %) was twice more than the other grammatical cohesive devices (34.23 %). Alyousef and Alsharif (2017) focused on the construction of the multimodal experiential meanings. The researchers conducted an SF-MDA of the Transitivity (participants, processes, and circumstances) system in these texts. They, however, did not explore the textual and the logical cohesive features. Along similar lines, Alyousef (2018) investigated the experiential multimodal meanings in an undergraduate marketing discourse and found that the most frequently occurring processes in the orthographic texts were material, followed by relational processes; implicit relational identifying processes were the most frequently occurring ones in the tables and the graphs, followed by material processes.

Alyousef (2017) investigated the use of cohesive devices and logical relations in a marketing course, and the results showed that lexical cohesion was the most frequently employed category, followed by reference and conjunctives. The findings showed that lexical sense relations contribute to the organization of marketing discourse. These relations construct hierarchical lexical strings in tables and graphs. They also contribute to the cohesiveness of the multimodal marketing texts through left-to-right syntagmatic and top-down paradigmatic relations. Paradigmatic relations are those between an element and what could have occurred in place of it (vertical), whereas syntagmatic relations are those between an element and what it goes together with (horizontal). The multimodal semiotic resources extensively employ structural condensation through implicit lexical reiterations and the paradigmatic and syntagmatic sense relations (Alyousef, 2017). Conjunctives were primarily used in the marketing discourse to signal extension and enhancement relationships. Similarly, Alyousef and Alnasser (2015a, 2015b) investigated the use of cohesive devices in international postgraduate students' multimodal finance and management accounting texts. Lexical cohesion was the most extensively employed cohesive device in the two studies, and in particular reiteration of the same lexical items followed by reference. The reviewed literature on business studies reveals the lack of research exploring the lexical and the grammatical cohesive ties in the multimodal tertiary accounting course. This indicates the need to investigate how the multimodal accounting discourse is constructed by postgraduate business students through the use of these cohesive resources.

Theoretical Framework

Halliday and Hasan's (1976) cohesion analysis scheme and Halliday's (2014) SFL approach suit the context of this study as it considers language functions in any social communication. As accounting financial reports typically encompass tables, I used the nomenclature SF-MDA, which was coined by O'Halloran (2009) in her study of the multimodal/multi-semiotic mathematical images and symbolism. SFL's linguistic tools are capable of explaining the way we construct and make meaning through three broad language metafunctions: ideational (experiential and logical relations), interpersonal (social roles and relationships), and textual (flow of information).

The three functions correlate respectively with the register variables: field, tenor, and mode. The textual metafunction realizing the mode is represented in texts by the systems of cohesion and Theme and information structure which, with the aid of the experiential and the interpersonal choices, organize the informational structure of texts. Due to space limitations, I investigate the representation of the cohesive and logical structures in accounting discourse. Halliday and Hasan (1976) define a cohesive relation as "the semantic relation between an element in the text and some other element that is crucial to the interpretation of it" (p. 8). The cohesive structures are represented by lexical cohesion, reference, ellipsis, and substitution. A logical structure is built in a text through conjunctive cohesive devices, which are concerned with the representation of the relations between one clause and another (Table 1).

Whereas the textual resources of reference, ellipsis, and substitution are expressed through grammar, lexical cohesion is expressed through lexis, and conjunctions are "mainly grammatical but with a lexical component in it" (Halliday & Hasan, 1976, p. 6) in terms of systems and lexical selections. Conjunctive elements within the same clause have been

Table 1. Types of Cohesion.

General type		Grammatical zone ([location in] grammatical unit)	Lexical zone [lexical item]
Transitions between messages		Conjunction (Unit: clause)	
Statuses of elements	In meaning	Reference (Unit: nominal, adverbial group)	Lexical cohesion (synonymy, hyponymy) (repetition, collocation)
	In wording	Ellipsis and substitution (Unit: clause [complex], nominal group, adverbial group)	

Source. Adapted from Halliday (2014, p. 538).

ignored as they are structural and do not contribute to the cohesiveness of the text (e.g., Cash paid to suppliers *and* employees). Part–whole lexical relationships in a balance sheet have been recognized even when a category follows the sub-categories: for example, cash at bank, accounts receivables, prepaid insurance, office supplies, and Goods and Services Tax (GST) receivable are all meronyms of "Current Assets" which in turn is a hyponym of "Assets," even if "Current Assets" is stated at the end as most balance sheets follow the top-down listing scheme. Instances of collocations were not considered in the analyses (Halliday & Hasan, 1976, pp. 287–288) as they only refer to the probability of co-occurrence of lexical items, within the same clause (e.g., board of directors), rather than to semantic relations between words. Finally, following Halliday and Hasan (1976), elliptical parts that are related by coordination were not considered instances of ellipsis—even when they are written as separate sentences—as they lack the nonstructural, cohesive sense, such as "*Quality Services Ltd* has the capacity to benefit from the asset *and can* deny others access to the cash."

Method

Numerical/quantitative data were employed in the present qualitative study to make my comparisons (e.g., "most," "higher," and "fewer") more accurate and, thereby, more valid. The frequency and the percentage of the occurrence of each cohesive subcategory was calculated by dividing the subtotal number of occurrences of each one by the total number of instances of the relevant category, then multiplying the result by 100 (Alyousef, 2015a). The total percentages add up to 100, equivalent to the subtotal number of ties. Besides, cohesive density was calculated to accurately compare the number of ties per 100 words in each text type (the orthographic texts and the tables). Thus, the total number of cohesive devices were divided by the total number of words and then multiplied by 100. Data coding is "the process of organizing the material into chunks or segments of text to develop a general meaning of each segment" (Creswell, 2009, p. 227). Each cohesive subcategory was encoded manually by relating it to the main category (e.g., "R" for "reference," "L" for "lexical cohesion," and "C" for "conjunctions"; Halliday & Hasan, 1976), thereby facilitating the identification of salient linguistic patterns and trends.

To ensure reliability in annotating the cohesive devices, two procedures were adopted: iteratively cross-checking the annotation codes and having them revised by a fellow linguist.

Results and Discussion of the SF-MDA Findings

Before presenting the SF-MDA, I briefly provide an overview of the context.

Context

The setting of this study was the University of Adelaide in South Australia. The five students were enrolled in the Master of Commerce program, and they were given the pseudonyms Sami, Khalid, Saud, Suleiman, and Waleed. As the participants were from the same cultural and educational backgrounds, all of them speak and write in Arabic as their first language. Both Waleed and Kahlid learned English in private schools from the age 6 to 18, whereas the other three participants studied English in public schools from the age of 12 to 18. All the participants had a professional working experience in accounting before commencing their MA program, except for Waleed whose undergraduate study program was computer science. Upon receiving the Certified Public Accounting (CPA) degree in 2001, Suleiman became a basic member of the Saudi Organization for Certified Public Accountants (SOCPA), whereas Khalid was appointed as a lecturer at a Saudi University upon completing his undergraduate studies.

All the five participants were required to submit an individual assignment. Since the five assignments shared the same social purpose, the requirements of Suleiman's task sheet will be described, which included two similar questions that cover three topics:

- Measurements of profit, income statement, and cash flow statement.
- Accounting and decision-making.
- Conceptual framework and balance sheet.

The first question demanded the preparation of a financial position statement (or a balance sheet). Question 2 demanded the preparation of an income statement, a financial position statement, and "a properly" classified cash flow statement for

Table 2. A Pivot Table of the Participants' Multimodal Accounting Assignment.

Category		Word count			Number of multimodal tables		
Participant	Number of questions	Orthographic texts	Tables	Total	Statements	Calculations of subcategories	Total number
Sami	5	1,026	278	1,304	3		3
Khalid	4	961	199	1,160	2		2
Saud	4	862	206	1,068	2		2
Suleiman	2	680	238	918	3	10	13
Waleed	2	607	214	821	3	6	9
Subtotal	17	4,136	1,135	5,271	13	16	29

Table 3. An Excerpt From Suleiman's Assignment Paper.

Fixtures			
Beginning balance	80,000	4,400	Accumulated depreciation
		4,000	Carrying amount of Fixtures sold
Purchase—(cash outflow)	20,400		
		92,000	Ending balance
	100,400	100,400	

a hypothetical company, Alicia. Students were also asked to answer a few subjective questions that required making a decision, such as explaining why certain transactions such as "capital maintenance" are crucial for the measurement of profit.

Table 2 outlines the key statistics of each participant's text. This includes the number of questions, word count, and the number of multimodal tables.

The number of questions in the task sheets was not similar as the participants enrolled in this course at different semesters. Accordingly, the participants' texts varied considerably in terms of total word count. This, however, did not affect the analyses as frequencies and percentages per the total number of occurrences of each cohesive subcategory were employed. As stated above, all the participants were required to construct multimodal accounting financial reports: a statement of financial position, statement of cash flow, and an income statement. Although Suleiman and Waleed's task sheet had only two questions compared with four or five questions for the other three participants, they preferred to tabulate their calculations of each subcategory (Table 3).

Sami showed the calculations for each subcategory without using tables. Students' success in the construction of accounting knowledge was partly measured in terms of their ability to represent the textual and logical meanings. What follows is the SF-MDA of the participants' accounting multimodal texts.

Findings of the SF-MDA of Cohesion in the Accounting Texts

In this section, I will present and discuss the findings of the SF-MDA of the five individual assignments. The grammatical and lexical cohesive ties employed in the multimodal texts were analyzed and compared. Table 4 presents the frequencies and percentages per the total number of instances identified for that category. The findings showed that more than 70% of the cohesive devices in the orthographic texts were lexical, and in particular reiteration of the same lexical items, followed by reference and conjunctions (Table 4). This finding is in line with some studies (Alyousef, 2017; Alyousef & Alnasser, 2015a, 2015b; Nga, 2012). Nga (2012) investigated cohesive devices in accounting reading texts and found that lexical cohesion was the highest frequently used device (65.77 %), followed by reference and conjunctions. The SF-MDA findings in this study also showed that the lexical cohesive devices were higher in the tables than in the orthographic texts (98.05% and 72.54%, respectively).

Reference was the second most frequently occurring category in the orthographic accounting texts, though pronouns, possessives, demonstratives, and comparatives were minimally used. The greater use of reference devices could be ascribed to the fact that the deictic "the" was annotated as a reference device as it acts as a specifying agent. The participants used the cataphoric reference device the colon in the detailed calculations to tell readers that related information will follow.

Conjunctions were only employed in the orthographic texts to signal extension and enhancement relationships. The most frequent discourse conjunctive devices were the extension subcomponent additive and the enhancement subcomponent causal (Table 4), as given in the following:

> Since [C: Enhancement: Caus.] many third-party users prefer the financial information to be certified by an independent external auditor, many auditees rely on auditor reports to certify their information in order to [C: Enhancement: Caus.] attract

Table 4. SF-MDA of Cohesive Devices in the Five Texts.

Category	Subcategory	Type of tie	Sami Frequency	Sami Percentage	Saud Frequency	Saud Percentage	Khalid Frequency	Khalid Percentage	Suleiman Frequency	Suleiman Percentage	Waleed Frequency	Waleed Percentage	Orthographic texts Frequency	Orthographic texts Percentage	Tables Frequency	Tables Percentage	Subtotal Frequency	Subtotal Percentage
Conjunctives	Elaboration	Apposition	3	0.49	0	0.00	2	0.26	1	0.23	2	0.51	8	0.42	0	0	8	0.28
		Clarification	2	0.33	3	0.44	7	0.92	0	0.00	1	0.25	13	0.68	0	0	13	0.45
	Extension	Addition	18	2.97	6	0.88	5	0.66	8	1.84	10	2.56	47	2.47	0	0	47	1.64
		Variation	1	0.17	2	0.29	2	0.26	0	0.00	0	0.00	5	0.26	0	0	5	0.17
	Enhancement	Temporal	1	0.17	0	0.00	7	0.92	2	0.45	0	0.00	10	0.52	0	0	10	0.34
		Manner/comparative	4	0.66	4	0.59	8	1.05	0	0.00	0	0.00	16	0.84	0	0	16	0.55
		Causal	9	1.48	8	1.16	5	0.66	8	1.84	6	1.53	36	1.90	0	0	36	1.26
		Concessive/conditional	0	0.00	1	0.14	0	0.00	0	0.00	0	0.00	1	0.05	0	0	1	0.03
		Total	38	6.27	24	3.50	36	4.73	19	4.36	19	4.85	136	7.14	0	0	136	4.72
Substitution and ellipsis		Substitution	0	0.00	2	0.29	0	0.00	0	0.00	1	0.25	3	0.15	0	0	3	0.11
		Ellipsis	15	2.47	15	2.19	12	1.58	0	0.00	0	0.00	42	2.21	0	0	42	1.46
		Total	15	2.47	17	2.48	12	1.58	0	0.00	1	0.25	45	2.36	0	0	45	1.57
Lexical cohesion		Repetition	322	53.14	396	57.81	492	64.73	251	57.70	211	53.83	1,119	58.77	553	56.83	1,672	58.11
		Synonym	7	1.15	2	0.29	3	0.39	2	0.46	1	0.25	9	0.47	6	0.62	15	0.52
		Hyponym	30	4.96	50	7.30	51	6.72	33	7.58	41	10.47	86	4.52	119	12.24	205	7.13
		Hypernym	10	1.65	11	1.61	6	0.79	10	2.30	8	2.04	1	0.05	44	4.52	45	1.57
		Meronym	49	8.08	66	9.64	76	10.00	55	12.65	60	15.30	128	6.73	178	18.30	306	10.64
		Antonym	12	1.98	23	3.36	19	2.51	20	4.60	18	4.59	38	2.0	54	5.54	92	3.20
		Total	430	70.96	548	80.01	647	85.14	371	85.29	339	86.48	1,381	72.54	954	98.05	2,335	81.17
Reference		Demonstrative	11	1.81	10	1.45	4	0.52	2	0.46	0	0.00	27	1.42	0	0	27	0.94
		Definite	86	14.20	55	8.03	38	5.00	33	7.60	26	6.64	226	11.87	12	1.23	238	8.28
		Comparative	1	0.17	5	0.73	3	0.39	0	0.00	0	0.00	9	0.47	0	0	9	0.31
		Pronouns	11	1.81	5	0.73	2	0.26	0	0.00	0	0.00	17	0.90	0	0	17	0.59
		Possessive	4	0.66	2	0.29	5	0.66	3	0.69	0	0.00	14	0.73	0	0	14	0.49
		Anaphoric	1	0.17	0	0.00	1	0.14	0	0.00	0	0.00	2	0.10	0	0	2	0.06
		Cataphoric	9	1.48	19	2.78	12	1.58	7	1.60	7	1.78	47	2.47	7	0.72	54	1.87
		Total	123	20.30	96	14.01	65	8.55	45	10.35	33	8.42	342	17.96	19	1.95	361	12.54
		Subtotal	606	100	685	100	760	100	435	100	392	100	1,904	100	973	100	2,877	100

Note. SF-MDA: systemic functional multimodal discourse analysis.

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investors, obtain loans, and [C: Extension: Add.] improve public appearance. (Sami's Text)

As a result of [C: Enhancement: Caus.] paying $6000 from the cash account, that account decrease by the same amount and [C: Extension: Add.] that affects it. (Saud's Text)

Hence [C: Enhancement: Caus.], profit can be calculated from balance sheet (equity section), as long as [C: Enhancement: Temp.] distributions and contributions are known. (Khalid's Text)

In addition [C: Extension: Add.] the recognition criteria for a liability are satisfied because [C: Enhancement: Caus.]. (Suleiman's Text)

Moreover, [C: Extension: Add.] financing and investment activities illustrate that there is a great increase in the asset "$60,400" of the company. However, [C: Extension: Add.] cash position is very risky because [C: Enhancement: Caus.] company cannot pay back the current liabilities. (Waleed's Text)

All the five participants used more additive devices than the other extension subcomponent variation devices (in contrast, rather, on the other hand, alternatively, etc.). This may indicate that the students are not acquainted with the use of these logico-semantic resources of variation devices. Cohesion issues have their origins in undergraduate Saudi students' writing in English (Al Jarf, 2001; Fageeh, 2003; McMullen, 2009). This may be attributed to some factors, including the use of the rhetorical organization in First Language (L1), the Saudi English as a Foreign Language (EFL) curriculum, and instructional strategies in public schools. EFL instruction in public schools is to some extent based on copying and rote learning, and students have limited writing opportunities (Fageeh, 2003). The moderate frequency of conjunctive devices may also be attributed to the fact that the financial tables constituted the major part in the students' accounting assignment.

The enhancement subcomponent temporal conjunctions (*first, second*, etc.) were minimally used by the five participants (Table 4). Enhancement devices are used to show how an event occurs (e.g., in accordance with, according to, and as), to give reason (e.g., because, as a result of, since, to, thus, and then), and to sequence the structure of events (e.g., first and second) and expand a text through the use of circumstances of place, time, cause, manner, or condition. On the other hand, extension devices provide additional related information or make counterclaims (e.g., as well, and, however, also, and then). Khalid used more manner (1.05%) and clarification and temporal (each 0.92%) devices, as given in the following:

First, [C: Enhancement: Temp.] this [R: Dem.] transaction affected cash account. (Khalid's Text)

According to [C: Enhancement: Man.] accrual basis assumption, $1000 must appear in income statement. (Khalid's Text)

So [C: Elaboration: Appos.], the difference between Ending Equity and beginning Equity is $17000 Or [C: Elaboration: Clari.] ending equity= Beginning Equity+Profit-Withdrawals by owners. (Khalid's Text)

The profit according to [C: Enhancement: Man.] revenues less expenses approach Income—expenses. (Khalid's Text)

So [C: Elaboration: Appos.], profit is equal in both approaches as [C: Enhancement: Man.] profit is a part of ending equity (the amount of profit, which appears in income statement, goes to equity section). (Khalid's Text)

Elaboration devices expand a text by redeveloping a message to focus a reader's attention. These devices were minimally used in the orthographic texts (1.10%). The communicative function of accounting discourse was partly reflected by the choice of conjunctives: to inform by explaining information (e.g., Thus, [C: Enhancement: Caus.] if [C: Enhancement: Cond.] contributions and distributions are known then . . .), to culminate in a positive result (e.g., Hence [C: Enhancement: Caus.], profit can be calculated from balance sheet), and to provide further related information (e.g., Also [C: Extension: Add.], the profit is the same in part A and B). Substitution and ellipsis were minimally used by Sami, Saud, Waleed, and Khalid, whereas Suleiman's text lacked the occurrence of these devices (Table 4). The rare occurrence of substitution and ellipsis was confined to the orthographic texts. This finding is in line with a number of studies (Abusharkh, 2012; Hessamy & Hamedi, 2013; Hinkel, 2001; Mohamed-Sayidina, 2010). For example, Hessamy and Hamedi's (2013) study indicated that the students' limited knowledge and the influence of their L1 hindered their use of substitution and ellipsis. The rare use of these cohesive devices seems natural as they are more frequent in spoken texts than in academic texts. The findings in this study showed that ellipsis was used in the accounting discourse for economical purposes. For example, Sami used ellipsis in computing the accounting categories to avoid repeating the same information, thereby serving economical purposes. A whole sentence can be replaced with an empty slot instead of repeating it in the calculations, as shown in the example below from Sami's text:

Cash paid to employees and suppliers

[Ellip.: Cl.] (equals) revenues from operations—cash collected from customers

[Ellip.: Cl.] = 480000-1400000= -920000

Two clausal ellipses were found in the example above. The elided Modal element *Cash paid to employees and suppliers* was presupposed from the preceding sentence. This element consisted of the Subject plus the implicit finite, whereas the residue was represented by the reminder of the verbal group. The use of ellipsis in accounting discourse contributes to cohesion within the text.

Table 5. Cohesive Density Index in the Orthographic Texts and the Tables.

Category / Text type	Orthographic text	Tables	Subtotal
Word count	4,136	1,135	5,271
Number of ties	1,904	973	2,877
Ratio of ties/100 words	46.03%	85.72%	54.57%

The total number of ties as a ratio of the total word count provides a good index of cohesive density in each semiotic resource. The SF-MDA findings showed that the tables had more cohesive devices (85.72 ties per 100 words) than do the orthographic texts (46.03 ties per 100 words; Table 5).

This is not surprising as financial tables constituted the major part of the students' accounting assignment. The SF-MDA findings (Table 4) showed that more than 98% of the cohesive devices in the tables were lexical. To illustrate this, the SF-MDA of Sami's balance sheet (Table 6) revealed that the implicit taxonomic classifications of synonyms, antonyms, meronyms, hyponyms, and hypernyms subtly organize the discourse of financial statements not only through the top-down paradigmatic and left-to-right syntagmatic sense relations but also through the bottom-up and right-to-left sense relations that construct lexical cohesive ties between noun phrases and numeracy.

This finding is in line with Alyousef's (2017) study of marketing texts. Accounting tables condense information through implicit lexical reiterations of the categories. This maintains a reader's focus on the numbers when the categories are not reiterated. The interrelationships among the categories are clearly visible in financial tables, even though the categories are not explicitly reiterated. The cohesive vertical selections within the THEME system form *logogenetic chains* that contribute to the creation of meaning in the course of the unfolding of a text. Halliday (2014) argues that logogensis (or instantiation) "pertains to the entire meaning potential—all the strata and all the metafunctions" (p. 530). The accounting tables included more instances of these taxonomic classifications than did the orthographic texts (Table 4). For example, the following antonyms appeared frequently in the financial statements, compared with their lack in the orthographic texts:

Non-current [L: Ant.] ties with Current

End [L: Ant.] ties with beginning

Sale [L: Ant.] ties with purchase

Decrease [L: Ant.] ties with increase

Payable [L: Ant.] ties with receivable

Inflow [L: Ant.] ties with outflow

The noun phrases in a balance sheet (Table 6) represent the primary categories of "assets," "liabilities," and "equities" and their sub-categories. As Eggins (2004) states, paraphrasing Ferdinand de Saussure, it is "the paradigmatic and syntagmatic relations which give linguistic signs their meaning" (p. 193). Lexical relations between financial statements' categories are organized into a network. Alyousef (2017) states, "lexical sense relations construct hierarchical lexical strings in the accounting tables" (p. 115). A key feature of financial statements is the abundance of hierarchically networked sense relations. This finding contrasts with some English as a second language (ESL)/EFL studies (Abusharkh, 2012; Hinkel, 2001; Liu & Braine, 2005; Mohamed & Omer, 2000; Mohamed-Sayidina, 2010), which found that the lexical sense relations were not used as much as lexical reiteration. Whereas Khalid's balance sheet listed assets in one column and liabilities and equities in another, the other four participants preferred to list all the three accounting categories in one column.

The syntagmatic lexical relations in a balance sheet do not affect the grammatical metaphor as they do not occur in one row, and they do not involve members of different grammatical categories as found in the orthographic text. A paradigmatic relation of hyponymy refers to a relationship between a generic class and its subclass, whereas meronymy refers to a part–whole relation. The general category "Assets," for example, is a hypernym of the subclasses "Current Assets" and "Noncurrent Assets," which are hyponyms of their generic class "Assets" (Table 6). The subcategories "Accounts receivable," "Inventory on hand," and "Prepaid Rent" are meronyms of the subclass "Current-Assets" as their subtotal equals "Current-Assets" which is a hyponym (or part) of "Assets." Similarly, the category "Liabilities" is a hypernym of the subcategories "Current Liabilities" and "Noncurrent Liabilities" which are in turn hyponyms of the general class "Liabilities." The subcategories "Current Liabilities" and "Noncurrent Liabilities" are meronyms. "Equity" is a hypernym and its subclasses are meronyms. Similarly, "Net Assets" is a more superordinate lexical string, a hypernym, and it is calculated by subtracting "Liabilities" from "Assets." As the sum of "Liabilities" and "Equity" equals "Assets," the former two main categories are both hypernyms of their subcategories and meronyms of "Assets." The lexical relations discussed here represent a subset of the lexical-based conceptual processes accounting students engage with during the preparation of a financial report, such as the balance sheet (e.g., Table 6). As Baker et al. (2003) argue, numeracy events are "occasions in which a numeracy activity is integral to the nature of the participants' interactions and their interpretative processes" (p. 12).

Repetition is represented by the lexical Themes "assets," "liabilities," "total," and "current." There are two mentions of the lexical antonyms "Noncurrent," one of "Current," one of "Payable," and one of "End." There are six lexical reiterations of "Assets," five of "Total," five of "Liabilities," two of "Payable," two of "Current," two of "Noncurrent," one of "Accounts," and one of "Equity." Grids 2 to 4 included,

Table 6. A Reproduced Balance Sheet From Sami's Text.

Axis Ltd
Balance sheet
As at 30 June 2017

Assets [L: Hyper.]

Current assets [L: Hyp.][L: Rep.]
Accounts receivable [L: Mer.]
Inventory on hand [L: Mer.]
Prepaid rent [L: Mer.]

Total current [L: Rep.] **assets** [L: Hyp.][L: Rep.]
Noncurrent [L: Ant.] **assets** [L: Hyp.][L: Rep.]
Equipments [L: Mer.]

Total [L: Rep.] **noncurrent** [L: Rep.] **assets**
[L: Hyp.][L: Rep.]
Total [L: Rep.] **assets** [L: Hyper.] [L: Rep.]

Liabilities [L: Hyper.]

Current [L: Ant.] **liabilities** [L: Hyp.][L: Rep.]
Accounts [L: Rep.] payable [L: Mer.][L: Ant.]
Bank overdraft [L: Mer.]
Wages payable [L: Mer.][L: Rep.]

Total [L: Rep.] **current** [L: Rep.] **liabilities**
[L: Hyp.][L: Rep.]

Noncurrent [L: Ant.] **liabilities** [L: Hyp.][L: Rep.]
Loan Payable [L: Mer.][L: Rep.]

Total [L: Rep.] **noncurrent** [L: Rep.] **liabilities**
[L: Hyp.][L: Rep.]

Total [L: Rep.] **liabilities** [L: Hyper.] [L: Rep.]

Net assets [L: Hyper.] [L: Rep.]

Equity [L: Hyper.]
Axis capital-Beginning [L: Mer.] <**missing entry**>
Profit [L: Mer.] <**missing entry**>

Total [L: Rep.] **owner's equity** [L: Rep.] **-end**
[L: Hyper.] [L: Ant.]

Figures shown in diagram: 60,000 / 160,000 / 7,000 → 227,000; 260,000 → 260,000; 487,000; 25,000 / 10,000 / 9,000 → 44,000; 80,000 → 80,000; 124,000; 363,000; 243,000 / 120,000 → 363,000.

respectively, numerate values of each classification; the subtotal for each classification; and subtotal for "Assets," "Liabilities," and "Equities." These values encompass lexical relationships of meronymy (left to right, top-down) and hypernymy and hyponymy (right to left, bottom-up). This emphasizes the importance of lexical cohesion in constructing well-formed financial statements that consist of hierarchical lexical strings.

Halliday (1993) points out that scientific language may reveal two local ambiguities which some students may encounter: complex nominal groups and relational verbs. Accounting students may experience the first local ambiguity when assigning a given classification to its respective category. The second ambiguity, however, does not seem to arise from relational verbs but from the implicit taxonomic sense relations that exist between assets, liabilities, and equities (Table 7). These relations represent the logical metafunction, which is concerned with the representation of the relations between clauses.

Although some accounting students may encounter difficulties in resolving these implicit taxonomic relations, all the participants were familiar with the accounting discourse procedures and conventions, as evidenced by their good marks.

Table 7. Examples of the Balance Sheet Taxonomies.

Assets [L: Hyper.]	Current assets [L: Hyp.]	Noncurrent assets [L: Hyp.]
	Cash [L: Mer.]	Long-term investments [L: Mer.]
	Cash equivalents [L: Mer.]	Property [L: Mer.]
	Short-term investments [L: Mer.]	Plant [L: Mer.]
	Inventory [L: Mer.]	Equipment [L: Mer.]
	Prepaid expenses [L: Mer.]	
Liabilities [L: Hyper.]	Current liabilities [L: Hyp.]	Noncurrent liabilities [L: Hyp.]
	Wages [L: Mer.]	Long-term bonds [L: Mer.]
	Accounts [L: Mer.]	Notes payables [L: Mer.]
	Taxes [L: Mer.]	Long-term leases [L: Mer.]
	Accounts payable [L: Mer.]	Pension obligations [L: Mer.]
	Long-term liabilities [L: Mer.]	Long-term product warranties. [L: Mer.]
Equity [L: Hyper.]	Preferred stock [L: Mer.]	Stock options [L: Mer.]
	Share capital [L: Mer.]	Retained earnings [L: Mer.]
	Common stock [L: Mer.]	Treasury stock [L: Mer.]
	Capital surplus [L: Mer.]	Reserve (accountings) [L: Mer.]

Conclusion and Implications

The study investigated the representation of the lexical and the grammatical cohesive devices in the multimodal accounting discourse. The data consisted of individual assignments written in English by five postgraduate business students. Although the number of participants is not claimed to be a representative sample, the results may provide pedagogical insights. The SF-MDA of accounting discourse revealed that the accounting students engaged with complex lexical-based conceptual processes when preparing the financial reports. Accordingly, lexical cohesive devices were extensively used in the tables than in the orthographic texts, and in particular reiteration. This indicates the importance of lexical cohesion in constructing well-formed financial statements that consist of implicit hierarchical lexical cohesive relations between noun phrases and numeracy that subtly organize the discourse not only through top-down paradigmatic and left-to-right syntagmatic sense relations but also through the bottom-up and right-to-left sense relations.

This study is limited to a subset of the full range of literacy and numeracy practices accounting students engage with. It, however, adds to our understanding of the discourse of accounting and of the learners' texts as they engage in the complex literacy practices of accountancy and employ the lexical and grammatical cohesive resources. The approach to the research in this study is significant for its depiction of knowledge building as a complex fusion of multimodal practices. As the hierarchically networked implicit taxonomic lexical relations in financial statements play a major role, accounting students need to be able to assign the logical connections between each subcategory and its main category in the tables. The application of SFL to subject-specific texts exposes the linguistic construction of text together with visual and numeral semiotic resources. Further studies can investigate intersemiotic logico-semantic shifts from tabular form to written text and complementarity that exists between the two forms.

ORCID iD

Hesham Suleiman Alyousef [iD] https://orcid.org/0000-0002-9280-9282

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