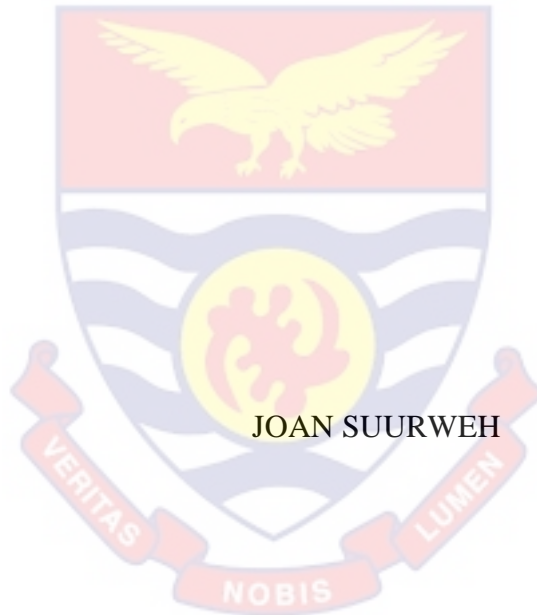


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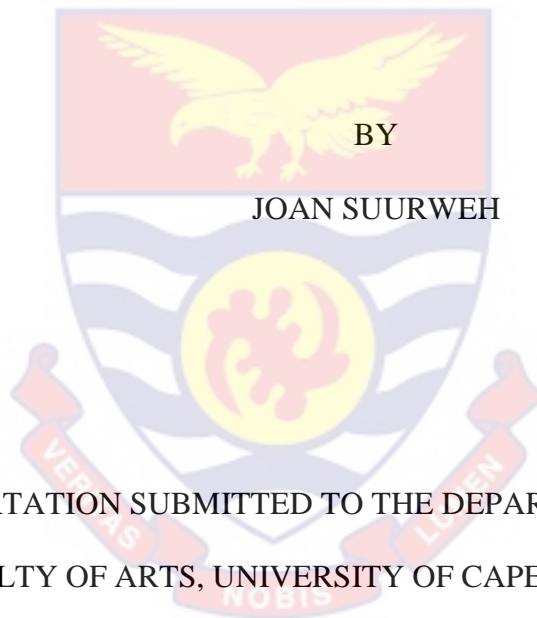
REGISTER VARIATION AND LINGUISTIC COMPLEXITY ACROSS  
READING COMPREHENSION PASSAGES IN GHANAIAN SHS  
ENGLISH LANGUAGE TEXTBOOKS



2023

UNIVERSITY OF CAPE COAST

REGISTER VARIATION AND LINGUISTIC COMPLEXITY ACROSS  
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LANGUAGE TEXTBOOKS OF GHANA



BY  
JOAN SUURWEH

DISSERTATION SUBMITTED TO THE DEPARTMENT OF ENGLISH,  
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FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF  
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NOVEMBER, 2023

## DECLARATION

### Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Signature: ..... Date:.....

Name: JOAN SUURWEH

### Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's Signature: ..... Date:.....

Name: DR. ISAAC N. MWINLAARU

## ABSTRACT

This study investigated text complexity and register variations across the reading comprehension passages in the three English Language textbooks for Senior High Schools in Ghana. It examines the texts on the basis of the socio-semiotic processes represented in the passages, the clause complex relations, and lexical density. The study was guided by three research objectives. This study adopted qualitative research design and employed discourse analysis to examine the data. Multi-stage sampling technique was used to select 55 comprehension passages for the study. Results revealed that there were six socio-semiotic processes or registers in the three textbooks namely: *exploring*, *expounding*, *recreating*, *recommending*, *reporting* and *sharing*. Exploring was most frequently used while both sharing and recommending were used sparingly. Recreating register had the highest level of paratactic and hypotactic relation in comparison to the remaining three dominant registers. The three textbooks possess extremely high level of lexical densities. Exploring had 13 and Expounding had 9.3 mean lexical density as the highest and the least lexical density respectively. The remaining two, Reporting had 11 and Recreating had 10 mean lexical density. The study, therefore, recommends that authors adopt appropriate registers to reflect the rich cultural resource of every subsystem. Teachers of English should make a concerted effort at enhancing students' registerial repertoire by providing multiple choice questions on comprehension tests and adopting appropriate teaching strategies to aid students' understanding.

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## **DEDICATION**

This research is specially dedicated to my parents, Mr. Basilide Basileus

Suurweh and Madam Assumpta Kongfiirong Suurweh.

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## CHAPTER ONE

### INTRODUCTION

Linguistic complexity of textbooks hinders the effectiveness of textbooks as learning materials for students (Green, 2019; Gyasi, 2013; Sibanda, 2020; To, 2018; Yamoah, 2012). The present study explores the linguistic complexity and registerial cartography of textbooks used in Ghanaian senior high schools. The study provides ample insight into the applicability of Systemic Functional Linguistics (SFL) to enhance the linguistic components of English textbooks (Green, 2019; Matthiessen et al., 2022; Sibanda, 2020). This chapter presents the background of the study, the problem statement, research objectives, research questions, the significance of the study, the delimitation and organization of the entire study.

#### **Background of the Study**

Textbooks are major sources of information for any subject of study, even though they are used outside educational settings (Green, 2019; Ozyildirim, 2014; To, 2018; Zhao et al., 2022). Literature (Ozyildirim, 2014; Borza, 2013; To, 2018) described textbook as a book containing comprehensive information, compilation and instructions, used as a benchmark or standard for the study of a given subject. The significance of textbooks in the teaching and learning process is paramount because they are reference resources that students and teachers consult for relevant information (Gyasi & Slippe, 2019; Zhao et al., 2022). Through textbooks, teachers can guide students to learn meaningful knowledge about a subject and, more importantly, achieve the objectives of any lesson, subject or even curriculum (Borza, 2013).

For several decades, textbooks have been considered fundamental in school education, determining what and how teachers teach (Panzai & Channa, 2017; Sikorova, 2011). To (2018) and Green (2019) assert that the textbook is inevitable to academic success and is the fabric that connects experts and learners to share knowledge for meaningful understanding.

These authors, To (2018) and Green (2019), alongside Sibanda (2020), added that textbooks can be notoriously linguistically heavy, making them difficult for learners to read and understand. In their observation, Yamoah (2012), Green (2019) and Sibanda (2020) discovered that when teachers do not recommend a particular textbook to their students, it is a sign that the textbook is not suitable according to the teacher's evaluation. The teachers' evaluation, however, is not always formally documented to provide insight for researchers and textbook stakeholders about the perceived challenges associated with the book (Korbey, 2023). Due to the need to assess textbooks formally through empirical studies to ascertain their suitability, credibility, and potential resourcefulness, the area of textbook studies has received attention globally.

Goodarzi et al. (2020) observe that the importance of textbooks in English language teaching requires an assessment of the textbooks to ensure they are efficient and consistent in covering the objectives of the curriculum and the expected outcomes of language instruction. Ozyildirim (2014) projects the need for textbook assessment because authors of textbooks and users of the textbooks (students) are not in the same setting or academic levels, and this disparity could be a possible cause of dense language and complex grammatical structures and other problems that are found in English language textbooks as well as all other textbooks in general.

In their view, Fang et al. (2006) argued that the differences in academic language and social language of students compound the challenge of developing academic literacy. Textbooks are regarded as learning resources to bridge the gap between academic language and social language. Therefore, there is an investigation of how textbooks could provide that touch between the students and the teacher even when the students are at home. It is said that textbooks are written examples of what is taught in language studies (Korbey, 2023).

Therefore, through textbooks, students can learn both in school and at home the skills, information, activities, and terms that are required to master the second language. Irrespective of the place of textbooks in curriculum design and implementation, there is still the need to understand factors that could make textbooks more helpful to students. Regarding the language of textbooks, it is essential to understand their linguistic complexity and registerial features to ensure that those two factors do not pose difficulty to the intended users.

Halliday (1978) and Matthiessen (2015) consider register as a socio-semiotic process and define it as any activity within a field, and such activity could either be “primarily social or primarily semiotic”. By his definition, Matthiessen (2015) means that primarily social activities relate to interactive behaviour within a field, while primarily semiotics refer to activities involving the exchange of meaning. This study, thus, considers the socio-semiotic process as the content of Senior High School English textbooks that aid the co-creation of knowledge through interactive behaviour and the exchange of meanings.

Based on this premise, numerous researchers have shown an interest in exploring the language used in these books. There are several aspects of textbooks that are worth investigating, including their cultural, social, and

textual elements. Generally, the language used in the texts becomes increasingly sophisticated, especially at the lexical level, in accordance with grade level progression, to cater for students' intellectual development (Putra & Lukmana, 2017). Linguistic complexity, therefore, becomes an area of concern for discourse analysts of English language textbooks.

Linguistic complexity arises from the number of linguistic elements and their interrelationships (Becerra-Bonache et al., 2018; Pallotti, 2015). Becerra-Bonache et al. (2018) and Pallotti (2015) argue that linguistic complexity can manifest at three primary levels: structural, cognitive, and developmental complexity. These authors further indicated that linguistic complexity can also be understood as structural complexity, which refers to the texts and linguistic systems that arise from the number of elements and the relationship among the elements. It is a product of the relationship among morphemes, words, phrases, clauses and sentences.

On the other hand, cognitive complexity refers to the cognitive resources that are required to process a complex text. The developmental complexity explains the difficulties associated with learning and mastering a second language as a second language learner (Pallotti, 2015). Linguistic complexity has usually been considered a product of linguistic features such as grammatical complexity, lexical density, and other grammatical intricacies. The difficulty of language resulting from its grammatical rules is regarded as grammatical complexity. In contrast, the difficulties arising from the proportion of content words comprising (verb, noun, verb, and adverb) to grammatical function words (conjunction, preposition, auxiliary verb and pronouns) are regarded as lexical

densities (Amer, 2021; Becerra-Bonache et al., 2018; Halliday, 1978, 1985; Maufiroh, 2022).

While some discourse analysts have explored linguistic complexity from the perspective of readability of the textbooks (e.g. Owu-Ewie, 2014; Gyasi, 2013; Srisunakwa & Chumworatayee, 2019; Amer, 2021; Maufiroh, 2022), others have conducted a Systemic Functional Linguistic (SFL) analysis of the lexico-grammatical items of the textbooks in order to ascertain the complexities of textbooks (e.g. Halliday, 1993; To, 2018; To & Mahboob, 2019).

Moreover, other researchers have considered the communicative language teaching framework as a guide to ensuring English language textbooks are suitable and linguistically friendly to second language learners (Ahmad et al., 2019; Goodarzi et al., 2020; Namwung, 2016). There are several studies on how registerial issues could account for the linguistic complexity of textbooks. These studies consider register as a cause of textbook complexity (Finegan & Biber, 1994; Haliday & Hasan, 1991; Lewandowski, 2010; Matthiessen, 2015; Miestamo, 2008). In this light, the field of linguistic studies on textbooks has been clearly defined.

### **Statement of the Problem**

Text complexity is based on the premise that students become stronger readers by reading increasingly challenging texts (Lapp et al., 2015). One of the skills by which educational curricula can achieve the goals for which they are stated is the learner's ability to read textbooks (Al-Jawarnah, 2008). This indicates that the linguistic features used in constructing the texts in textbooks, especially those in English Language textbooks, need to be given a special focus.



It is beneficial to investigate the complexities of these materials to inform pedagogy and curriculum development. There are textbook studies on text complexities (Banks, 2002; Gao & Webster, 2020; Larsen, 2016; Newnh, 2013; Putra & Lukmana, 2017; Vajjala, 2015). These studies, however, have been primarily limited to the developed world.

Studies on linguistic complexity revealed that science textbooks have complex language (Halliday, 1993), and non-science texts could be linguistically complex (To & Mahboob, 2019). Also, To and Mahboob (2019) found non-science texts to be comparatively less complex than science texts.

Several studies (To, 2018; To & Mahboob, 2019; Sibanda, 2020) and many others have employed the Systemic Functional Linguistic framework as an analytical tool. According to Schleppegrell (2004), text analysis through functional grammar ensures that several categories of learners are exposed to an approach of observing the relationship between form and meaning in the different alternatives available in the English language grammar systems as well as the approaches used by schools for their interpretation of knowledge.

Schleppegrell (2004) further adds that through Systemic Functional Linguistic (SFL), learners develop their ability to use language in different contexts. Hence, SFL can be considered a valuable tool for textbook analysis (Almurashi, 2016 ; Putra & Lukmana, 2017). However, it appears few studies have used SFL in textbook analysis (Almurashi, 2016; Schleppegrell, 2014). Moreover, the available studies seem not to include an analysis of the registerial features of the textbooks.

Meanwhile, Fang et al. (2006) observed that the register or socio-semiotic process, is key to helping students appreciate academic language and

that the pedagogy should be geared towards raising students with competence in grammatical resources and lexical items used in textbooks and academic language. This author's observation shows the need to investigate how linguistic features influence textbook complexity.

In the context of Ghana, there appears to be a dearth of literature on textbooks, and the few studies conducted are on readability. For instance, Owu-Ewie (2014), and Gyasi and Slippe (2019) studied the linguistic complexity of comprehension passages in English language textbooks and the readability of Distance Education course books, respectively. The studies found that the textbooks were relatively complex, with high readability scores. Their findings show that textbooks were challenging to read.

While Borza (2013) study on textbooks failed to use SFL theory, Yamoah (2012) employed it in her study of English textbooks focused on ascertaining the impact of gender-related content of textbooks on learners. Hence, to the best of my knowledge, it appears limited studies have been done using SFL to ascertain the linguistic complexity in the English Language textbooks in Ghana. The present study, therefore, uses SFL as a framework to examine the text complexity of selected passages in three English Language textbooks for Senior High Schools in Ghana, which were published in 2016 and distributed in 2018 by the Ministry of Education.

### **Purpose of the Study**

This study is intended to investigate the complexity in the English Language textbooks for Senior High Schools in Ghana. It examines the registers presented across the passages, the differences that exist in the clause complex

relations, and the lexical density across socio-semiotic processes in the reading comprehension passages of the SHS English Language textbooks of Ghana. This research, therefore, intends to examine the English Language textbooks for Senior High Schools in Ghana, using SFL to reveal the complexity of these resource materials.

### **Objectives of the Study**

The study is guided by three specific objectives. These are listed below.

1. To identify the socio-semiotic processes represented in the reading comprehension passages in the SHS English Language textbooks of Ghana.
2. To examine the differences that exist in the clause complex relations across socio-semiotic processes in the reading comprehension passages in the SHS English language textbooks of Ghana.
3. To investigate the variations that exist in the lexical density across socio-semiotic processes in the reading comprehension passages of the SHS English Language textbooks of Ghana.

### **Research Questions**

For the purpose of giving this study a clear direction, three research questions have been formulated. These are delineated below.

1. What socio-semiotic processes are represented in the reading comprehension passages in the SHS English Language textbooks in Ghana?
2. What differences exist in clause complex relations across the socio-semiotic processes represented in the reading comprehension passages of the SHS English Language textbooks in Ghana?

3. What variations exist in the lexical density across socio-semiotic processes in the reading comprehension passages of SHS English Language textbooks in Ghana?

### **Significance of the Study**

Biber (2012) argued that registers are not universal, so to investigate grammatical patterns and make them appear universal is problematic. Biber argues that texts or textbooks should be assessed linguistically to reveal the unique grammatical and lexical patterns of each register to aid students' understanding. The present study is, therefore, relevant as a way of probing the linguistic complexity and register variation of English language textbooks in Ghana.

The study anticipates making sound recommendations toward the goal of textbook improvement based on the empirical evidence in the study about linguistic complexity and register of the English language textbooks. The task of researchers, educators and student researchers alike is to unearth the specific complexity issues that hinder the effectiveness of English language textbooks as resource materials in the hands of students and teachers. It is anticipated that the findings of this research may provide evidence of areas of complexity in English language textbooks, based on which evidence recommendations can be made as to how authors could address those complexities to make textbooks easy to read and understand.

Further, the researcher expects that this work contributes to research on linguistic complexity as well as register studies founded on the SFL approach. Extant literature on English language textbooks has been skewed towards the readability assessment of the textbooks as an effective yardstick for determining

complexity. While such studies have usually yielded quantitative results indicating the reading difficulty of textbooks, readability studies alone cannot provide a complete picture of the complexities that exist in English language textbooks.

The present study explores linguistic complexity from the discourse and SFL perspectives, where grammatical and lexical features will be examined to ascertain their patterns as well as causal elements that result in linguistic complexity and difficulty in English language textbooks. Such addition to readability studies and, for that matter, linguistic complexity will help provide a holistic picture of how textbooks should be produced in terms of their content features to meet the demands and abilities of students who use such textbooks. This will provide ample insight into the role of textbooks in the performance of students and how that role is mitigated by linguistic complexity.

The present study is significant because the only study in Ghana, as far as I know, employing SFL within the context of textbooks did not consider linguistic complexity. Hence, the present study will provide new evidence to the literature on textbook analysis in Ghana. For instance, Gyasi's (2013) study used the Cloze Test readability indexes to examine the readability of the Science textbooks used in Ghana. However, SFL is viewed by applied linguists as very instrumental in addressing the focus of this study (Fang & Schleppegrell, 2008; de Oliveira, 2010, 2011a, 2011b; Montemayor-Borsinger 2009), and other several researchers have shown how SFL can inform language teaching and that we can better understand how grammatical and lexical choices facilitate students' capacity at co-creating knowledge and exchange meanings for communicative purposes.

Additionally, analysis of texts using the SFL framework is capable of discovering what is effective in a specific context situation. The analyses of linguistic features of texts are especially of great essence for students preparing for further studies in tertiary institutions. Hence, conducting this study through the SFL lens will give varied yet important findings.

Furthermore, the study will contribute to pedagogy by adding to the growing works on textbooks and communicative language teaching that the linguistic complexity of textbooks is a vital component in achieving communicative competence through textbooks. Therefore, the findings will be of practical value to the Ministry of Education of Ghana. In this regard, the study will augment knowledge and deepen insight into what constitutes a fit-for-purpose English textbook in linguistic terms. This is especially important given the role of textbooks as reference materials for both students and teachers (Radencich, 1995; Sibanda, 2020; To, 2018).

### **Delimitation of the Study**

The study is delimited to English Language textbooks in Senior High Schools in Ghana. The present study's emphasis on English Language textbooks is a result of the fact that readability studies on English Language textbooks in Ghana have shown that the language is complex for students, even though such studies did not provide in-depth descriptions of the linguistic features of the textbooks, except the raw scores of readability formulas (Gyasi, 2013; Gyasi & Slippe, 2019; Owu-Ewie, 2014).

Also, the present study is delimited in terms of the analytical framework used to conduct the discourse analysis. The current study settled on the SFL analytical approach, especially its register variation, instead of other analytical

approaches such as readability analytical tools, critical discourse analysis or even multimodal analysis, which are equally relevant in assessing the language features of textbooks. The use of SFL is found to be consistent in literature, and it possesses special concepts such as the context of register: tenor, field and mode as well as metafunctions of language: ideational meaning, interpersonal meaning and textual meaning, which are relevant to the current discourse analysis of the textbook genre.

### **Organization of the Study**

This study is categorized into five chapters. Chapter One has presented the background to the study, the statement of the problem, research objectives and questions, significance of the study, delimitation of the study, and organization of the study. Chapter two presents a review of empirical studies to establish further the research gap of the study as well as the theoretical framework that guides the study. Chapter three provides a detailed presentation of the methods that are used to gather data and to analyse the data in order to provide answers to the research questions that underpinned the study. Chapter four provides the results of the study as well as analysis and discussion of the result in relation to extant literature. Chapter five serves as the concluding chapter that provides the summary of the entire study, the recommendations, and the limitations of the study.

### **Summary of Chapter**

This chapter has pointed out that linguistic complexity, when explored from an SFL perspective, could improve English language textbook assessment, especially their linguistic features. The chapter showed the limited literature on such areas in the Ghanaian setting as a lacuna that is worth investigating. The

chapter outlined the research objectives and research questions as well as established the significance of the study to literature, pedagogy and curriculum development. The chapter added the delimitation of the study to textbooks in the English language and SFL framework and ended up with how the entire study is organized.



## CHAPTER TWO

### LITERATURE REVIEW

#### Introduction

This chapter is primarily oriented towards a critical review of previous studies closely related to the focus of this current investigation. The review facilitates the retrieval of valuable theoretical, conceptual and empirical support for the study. An in-depth examination of previous studies was done with the objective of underscoring register variation the level of linguistic complexity across reading comprehension passages of English language textbooks in second-cycle schools in Ghana. The result of the review deepens insight into the main and specific objectives of the study and provides useful information for the resolution of the research problem.

The review in this chapter is structured into three-pronged categories. The first segment reviews conceptual issues. It covers the concepts of Linguistic Complexity and Register in language teaching. The second section entails a review of a theoretical framework. This entails a review of the framework of Systemic Functional Linguistic (SFL) theory with a particular focus on the Dimension of Instantiation and the Notion of Register. The last segment reviews empirical studies. The study adopts a thematic approach for clarity and emphasis on the implications of previous studies on specific objectives of the present study.

#### Conceptual Review

##### Ghanaian Educational System: Senior High School

Worldwide, the main objective of education is to enhance the development of students into responsible citizens, equipped with

communicative skills to build competence so as to effectively interact and participate with colleagues and others in the global economy (Adu-Agyem & Osei-Poku, 2017; Corazza et al., 2022). Lending credence to educationl focus, Zwolinska et al. (2022) indicated that every form of education is oriented towards the creation of requisite knowledge, skills, awareness, attitudes and skills with the chief objective of satisfying the needs of the present and future generations in human society. This align with the fourth goal of the United Nations (UN, 2015) “2030 Agenda for Sustainable Development, which 193 countries, including Ghana, has acceded to. The agenda mandate every member country to ensure that in their territory, every child and citizen is accessible to equitable and quality education.

Globally, educational systems and structures differs from one country to the other. Language policy in educational system constitute a major point of diversion in the educational systems of several countries. For instance, while in the United Kingdom, Japan, South Korea, South-Africa and Ghana has five-level of educational structure, their language policy differs. Anyidoho (2018), Mouton et al. (2013) and Owu-Ewie (2017) indicated that local languages are used as language of instructions from kindergarten to Grade 3 in Ghana and South Africa, while English is used as language of instruction from Grade 3 to the tertiary levels. This is vastly different from the educational systems of the United Kingdom where English is the language of instruction from kindergarten to the tertiary levels.

The second level of Ghanaian educational system comprises the Senior High School. At this level English is learnt as a Second Language (ESL). This means, student are taught various ways to improve their communicative skills.

Poku (2008) indicated the processes of learning English in Ghana is mainly prescriptive because it often involve gauging students' literary production and pronunciation against the received native English standard. Hence, learning often revolve around identifying errors in students' work and rectifying them so as to promote proficiency in the received native English, especially British English. As part of the aims of the English curriculum for this level (Senior High School), students' capacity at achieving higher performance in the WASSCE, a standardized examination designed to ascertain whether SHS students are adequately equipped for tertiary education in Ghana.

As a crucial pedagogic genre in Ghanaian ESL classroom, textbooks are highly instrumental to providing clear direction to English teaching and learning. Texts in English textbooks constitutes a key resource in ESL classroom. Hence, the next segment deepen knowledge on the role of English textbook in the teaching and learning of English language in second cycle schools (SHS), an important segment of the Ghanaian educational system.

### **Textbook Role in Genre Pedagogy**

As a product of genre-based teaching approach, textbooks is invaluable to reducing inequality in education (Ahn, 2012; Wallden, 2019). Textbooks contains tasks that are oriented towards teaching subject-specific literacy, not only in one level of education, rather, at all levels of education including the second cycle level (Bakken & Andersson-Bakken, 2021; Magnusson, 2021).

As a reference resource, texts in textbooks are provides a clear guide on what students learn and how they should be taught in a given subject. This means, in the ESL classroom, as stakeholders of education, teachers must effectively use textbooks to develop students' skills in literacy. While the textbook does not replace curriculum, they are highly instrumental to attainment of English

language curriculum for the SHS if text are well written and effectively enacted and interpreted by English teachers (Bakken & Andersson-Bakken, 2021; Deng, 2015).

In line with the focus of this study, every text in the textbook must be written to link students' writing development with reading strategies. Essentially, according to Montgomery (2022), the textbook should be a resource to teaching literacy and promoting students' skills at making meaningful construction and production in the English language. Hence, the text in textbooks should be writing as a particular type of "text" that meets educational conventions designed to develop students' literacy. This means texts in the book should be well written so that its purposes and conventions are readily negotiated by students and a meaningful social interaction can occur between the author and reader or listener.

Teachers using textbook should conform to the four levels of genre pedagogy to aid notable development in learners' literacy. However, teachers can only conform to the four steps if the textbook is written as a "text" type suitable for the particular level.

The four steps comprise 1) written to meet the context or level of readers. This will enhance teachers' capacity at ensuring students' acquire the content knowledge to aid their capacity at producing similar texts or ideas in their personal productions, 2) the text should be modelled. This means, the textbook must contain passages, articles or tasks to aid reading and discussion during the process of teaching and learning, 3) Provide clear guide on text construction. This entails designing collaborative assignments, individual assignments and feedback tailored towards the creation of required genre during practice

sessions, 4) personal creation of texts. Students should be assisted to produce “text” on their own and to write comprehension or ideas and essay using their own words.

Though textbooks are highly valuable to raising students’ literacy and writing skills, several authors have argued that some of the textbooks possess linguistic complexity. What is linguistic complexity and how does it affect students’ capacity at understanding and creating texts individually, the next segment tackle these questions.

### **Linguistic Complexity**

Occupying an important position in the evaluation of L2 linguistic proficiency, performance and development, linguistic complexity, according to Qian et al. (2021), is difficult to define. While Juola (2010) agreed to their claim, Tawfik (2022) and Lan, Li and Zhang (2022) deepened insight into the reason for the lack of consensus regarding an exhaustive definition of linguistic complexity. Palloti (2014) provided a general definition of linguistic complexity as “aspects of a language that make communication easier or simpler, when speaking or to describe features of linguistic production” (p. 38). Lan et al. (2022), in consonance with Dahl (2011), consider the definition as insufficient to capture the concept of linguistic complexity.

Both Dahl (2011) and Lan et al. (2022) observed that Palloti’s definition might be inadmissible to some linguists, such as information theorists, since they conceive linguistic complexity in objective terms. By objective terms, they mean complexity is seen in relation to the property, features or characteristics of an object or language. On the other hand, Frantz et al. (2015) and Tawfik (2022) indicated that several linguists view complexity from an absolute

perspective, that is, from the context of the speaker or writer through evaluation of the level of difficulty, cost, or verbosity, which Sweller (1985) calls cognitive load, invoked to process the text.

A close examination of the two perspectives in relation to texts, from my perspective, revealed that while the objective approach is reader-centred, the absolute approach is text-centred. Giving credence to this conclusion, Clercq and Housen (2017) outline the two major causes of complexity, which are text-based features, syntax, lexical, grammar, morphology, and reader-based factors (cognitive abilities, interest and motivation). The relationship that could be deduced from the objective and absolute approach to complexity is that, though different, they are mutually exclusive and dependent on each other.

This means a high absolute score of complexity could lead to a high relative score requirement of the user's cognitive resources. On the other hand, a high objective score will mean a low absolute score of complexity to the reader. In this light, this study employs the absolute approach to complexity (Clercq & Housen, 2017; Kusters, 2008).

This is very appropriate because this study revolves around the interaction between the "text" and "readers" or SHS students. The absolute approach is highly instrumental to understanding the nature of relationship between the reader and the textbook within and across each textbook. Clercq and Housen (2017) further indicated that it occupies the basis for measuring the intermittent relationship between the reader and each of the textbooks under study. Thus, the absolute approach deepens insight into the level of the user's cognitive resources for understanding the textbooks under consideration.

Addressing the nexus of obfuscation in definitions and gaps in the conception of complexity among scholars and linguists, Sinnemaki (2011) opined that linguists are not able to accurately or reliably measure complexity due to the divided opinion concerning what constitutes linguistic complexity among researchers. As a result, based on a critical examination of Juola (2010), Sinnemaki (2011), Lan et al. (2022), Park (2022) and Tawfik (2022), I see that there is a need for clarification due to the varied stance or perspective of linguists and researchers. This will aid in the resolution of the dichotomy of definitions.

To aid in the resolution of the gap, Dahl (2004) argued that the notion of difficulty must be separated from complexity because the description of a language is independent of the level of operation or fluency. This was supported by Hawkins (2009) when he stated that it would ensure an understanding of how users process responses to either difficulty or complexity. In this sense, varying types of complexity can be identified.

Providing additional insight, Miestamo (2008) contended that complexity should not be dependent on users because there are several categories of language users, such as those speaking or listening. Also, there are first and second-language acquirers. It is, therefore, prudent to evaluate complexity based on an objective or theoretical measure that cuts across all categories of users since individual experiences (1st acquirer is different from 2nd acquirer', likewise speaker from listener) differ.

Text complexity, according to Frantz et al. (2015), refers to the level of sophistication or challenge a reading text poses to readers. Frantz et al. attributed text complexity to the difficulty of vocabulary, language variables

such as structure, grammar and other sociolinguistic variables such as the ability of readers to connect existing knowledge to new knowledge. One metric for determining text complexity that Frantz et al. (2015) alluded to was the Common Core State Standards (CCSS) for English Language Arts and Literacy. The CCSS is an initiative purposely to derive the relevance of students' capability to read complex texts (Frantz et al., 2015); cited Common Core State Standards Initiative, 2010). CCSS provides a three-dimensional method of measuring text complexity, which is the qualitative nature of the text, readability scores of the text and reader and task considerations.

Frantz et al. (2015) underscore that the significant weakness of CCSS is less emphasis on the syntactical features that contribute to text complexity. Filling the gap concerning syntactic complexity, Quian et al. (2021) conducted an investigation into syntactic complexity among Chinese EFL learners, and Song (2022) examined syntactic complexity among L2 learners through a scientometric review of articles on Web of Science from 2010 to 2022.

However, in addition to syntactic complexity, Gruber and Gibson (2004) discovered that morphological complexity also affects L2 writing. By morphological complexity, Gruber and Gibson mean the lexical complexity of the text. This coincides with the focus of this study since it is oriented towards an in-depth exploration of linguistic complexity from the perspective of the word and sentence level to ascertain whether the textbooks for senior high schools in Ghana are linguistically complex or otherwise.

In view of the reviewed studies, the identified gaps and the overall objective of this study, the working definition of linguistic complexity is based on Piperski's (2014) definition that linguistic complexity is a result of the



complexity of correspondence relation. In effect, linguistic complexity, from my perspective, is a product of the relationship between meaning and form.

This means that during this study, the complexity of the linguistic form and linguistic meaning dictates the determination of linguistic complexity. Hence, Piperski's (2014) linguistic complexity graph underpins this study. The measure provides an objective assessment of the interaction between meaning and form, especially within the context of the reader.

Piperski's graph epitomize the disparate postulation on what constitute complexity. His work simply used a graph to underscore the various differences in the usage of a form under varied circumstances and situations. This means it help to recognize complexity when a given word or form is not used appropriately in a given context thereby creating difficulty or obfuscation. For example, language forms for SHS1 should commensurate with their accumulated academic competence which is quite smaller in comparison to SHS2 students and SHS2 is also smaller to SHS3 students. Hence, with the aid of Piperski graph, it is possible to decipher whether the linguistic item used is higher or commensurate with the target level.

The graph measures the linguistic complexity of a text in English and other languages, such as German and Swedish, based on the relationship between the form and the meaning of the linguistic items.

To understand more about linguistic complexity, especially in relation to the linguistic as well as sociolinguistic features, the concept of register from M. A. K. Halliday, Grim Martin and Douglas Biber is worth discussing.

## Concept of Register

Coined by Reid in 1956, register has been variously defined by scholars and linguists. For example, defining it within the context of discourse, Halliday (1978) referred to register as the variety of language in use. In my perspective, this is simplistic because it does not touch on the appropriateness and context within which language is used. However, Yule (2010) provided a comprehensive definition by stating that register is “a conventional way of using language that is appropriate in a specific context, which may be identified as situational (e.g. in church), occupational (e.g. among lawyers) or topical (e.g. talking about language).

Providing additional insight on register, Nordquist (2019) posited that variation of the choice of words, tone or body language as dictated by several factors such as social occasion, purpose, audience and context is called register. It is worth noting that while Nordquist (2019) did not emphasize the difference between ‘register’ and ‘style’, Kabellow et al. (2019) and Gerald (2021) did.

Kabellow et al. (2019) and Gerald (2021) posited that though both register and style are collections of words used for specific purposes and context, register is related to specific vocabulary choices expressed in a particular speech context, while style revolves around grammatical variation and in connection with social meaning. By virtue of styles in linguistics, it is possible to distinguish syntax, phonetic and lexical variations.

Considering register from a broad perspective, Holmes (2001) defined it as a variety of language that is determined by situational factors such as setting, task, topic and purpose of communication. On the other hand, Holmes indicated that in situations where register involves specific-vocabulary use in specific

situations, it is considered a narrow view. Holmes (2001) admitted that the narrow view of register is not accepted in register studies as clearly defining register.

Ferguson (1983) considered register variation from two approaches, namely, the parameter approach and the label approach. The parameter approach determines register variation based on classifying register of a text into different dimensions such as field, tenor, mode, participants and others. The label approach considers a general description of the register based on raw analysis of the text (Ferguson. 1983).

However, Lewandowski (2010) critiques Ferguson's parameter approach as restricting register analysis, while the label approach lacks a framework to guide the analysis. In this case, Lewandowski (2010) considers Halliday's (1978) triadic framework of register variation as preferable.

Halliday (1978) shows that register is determined by three variables: mode, field and tenor. The mode refers to the medium used in communication, be it writing or speech, whereas the tenor refers to the relationship between speaker and hearer. The last variable, field, refers to the setting, including the time, subject matter and purpose of the communication.

This triadic framework by Halliday (1978) confines register variation to be dependent on the setting, channel and participants. However, as Lewandowski (2010) observes, the three variables are interdependent in that one can affect the other. For instance, the classroom setting could demand speech and necessitate an instructor-student relationship. Likewise, the textbook as a mode is written with the author and reader as participants, and the setting

depends on the conditional factors defined by the author or reader, for instance, historical or contemporary setting (Lewandowski, 2010).

Halliday's triadic framework was expanded into seven-dimensional variables by Biber and Conrad (2009). Biber and Conrad (2009) divided the tenor into participants and participants' relationships where the participants are the addressers and addressees; and the participant relationship is based on their shared knowledge and interaction among the participants. The authors divided the mode into channel and production circumstances.

The channel is the basic medium used, whether written or spoken, while the production circumstances refer to the situation surrounding the channel, whether it is real-time or recoded, permanent or transient (Biber & Conrad, 2009). Lewandowski (2010) cited telephone calls, face-to-face conversations as transient, while textbooks as well as tapes are permanent. Biber and Conrad (2009) subcategorized the mode into setting, communicative purposes and topic. The setting deals with the place, whether it is private or public. Likewise, the communicative purpose could be general-purpose or factuality. The topic refers to what is being discussed (Lewandowski, 2010).

Biber and Conrad (2009) provided procedures for determining the lexico-grammatical features that are typical of a particular register. They suggested that to determine lexico-grammatical features associated with a particular register, the analyst should conduct a comparative analysis by comparing different grammatical characteristics that are present in different sampled texts.

Second, the analyst should conduct a quantitative analysis of the grammatical features present in different texts to determine their frequency in

the texts (Lewandowski, 2010). It also involves using representative samples that reflect the original texts. Finally, there should be a factual interpretation of the analysis based on the presence of the linguistic features and what they mean in communicative terms.

In an earlier work, Biber (1988) designed the multidimensional approach to register. This approach helps define the patterns of register variation in a language. According to Özyıldırım (2014), the multidimensional approach to register contains six dimensions. The first dimension discusses the interactional discourse versus the informational discourse (Biber, 1988). The interactional discourse establishes affective relations in the discourse by using personal pronouns, wh-questions, and wh-complement clauses, as well as causative adverbial subordinators and amplifiers.

On the other hand, informational discourse communicates information in the discourse by using nouns, adjectives, stative forms, relative clauses and postpositions (Özyıldırım, 2014). The second dimension deals with narrative discourse versus non-narrative discourse (Biber, 1988). The narrative discourse presents information in a narrative structure, while non-narrative discourse presents information in other forms of compositions. The other dimensions mentioned by Biber (1988) in the multidimensional approach are implicit versus explicit reference, overt expression of persuasion, abstract versus non-abstract and then in-line information production. With this approach, discourse analysts can categorize the register of a text into their appropriate dimensions for descriptive purposes.

Regarding types of register, Halliday and Hasan (1991) tried to group register into different kinds. They identified four kinds of register: action-

oriented register and talk-oriented register, and then open or closed register. Action-oriented register is based on the large use of non-linguistic activities to communicate meaning (Halliday & Hasan, 1991). For instance, the register for coaching, cooking, or any activity-based genre demands action-oriented register. On the other hand, talk-oriented register is based on the large use of linguistic features in the discourse. Examples of registers that demand this type of register include lectures and textbooks, among others (Lewandowski, 2010). Open register refers to the use of vast lexico-grammar, such as conversation textbooks, among others, whereas closed register refers to restricted or fixed meaning, such as used in military communication and secretive communication (Lewandowski, 2010).

In another categorization, Finnegan and Biber (1991) differentiated explicit register and greater economy register. The explicit register focuses on the clarity mandate, while the greater economy register focuses on the ease mandate register (Lewandowski, 2010). Lewandowski (2010) concluded that the categorization of register is, however, a difficult task. Lewandowski (2010, p. 76) defines register as situationally conditioned variety that is linked with a situation that calls for the use of specific language.

Matthiessen (2015) also proposes a registerial cartography to guide the systematic selection of texts across registers for research. Matthiessen (2015, p. 1) asserts that “Registerial cartography is the activity of systematically describing the registers that make up a language.” Describing registerial cartography as the register map of a language, Matthiessen (2015) observes that register variation describes the overall meaning potential of language used in

relation to the context of culture and the instantiation of the meaning potential of a language.

Matthiessen (2015) observed that registerial cartography should be based on the context of tenor, mode and field. Focusing on field or 'field of activity' as Matthiessen (2015) termed it, he describes registerial cartography in relation to types and subtypes of field. The following are the eight types of the registerial fields of activities he identified. Each type has two subtypes:

**Reporting** concerns recording events which concern certain human events to enable listeners or readers to review the events. Chronicling and Surveying are the subcategories of this semiotic process.

**Recreating** is narrating the flow of occurrences of specific human events, creatively to accomplish an aesthetic outcome. The subcategories of this are Narrating and Dramatization.

**Sharing** involves the context where there is exchange of experiences and beliefs with one another to help maintain a relationship between the interactants. Experiences and Values are sub-categories of Sharing.

**Doing** context involves people engaging in social activities collectively to complete a mission through the use of language. The task is achieved with one member of the group directing the rest or all members cooperate with one another. Collaborating and Directing are subcategories of the Doing Process.

**Enabling** is the context in which people are aided to carry out an activity. This is achieved by either regulating the activities of the people or coaching them on the way to go about the activity. This foreshadows the 'Doing Context' The subcategories of this semiotic process are Instructing and Regulating.

**Recommending** deals with getting people undertake an activity by advising or encouraging them to do it. In advising them, they (addressees) stand to benefit and in inducing them, the speaker stands to benefit. Recommending has the subcategories as Advising and Promoting.

**Exploring** involves ascertaining public values and ideas. These ideas and values can be debated upon. The subcategories are Reviewing and Arguing. He notes that cartography is a metaphorical term that explains how a semantic system is represented in longitude and latitude poles to communicate instantiation and stratification. In registerial cartography, as described by Yule (2010) and Matthiessen (2015), the primary objective is to chart a segment of semantic space in a manner that portrays the differentiation of context into institutional categories and, within those categories, various situational types.

Matthiessen and Teruya (2019) discussed register from the perspective of types and subtypes within a register. Using the tenor of activity, they noted that the semiotic process in language could seek to explain, recommend, explore, do, advise, recreate, or share. They considered register variation within the types of semiotic process that is used to communicate meaning.

In a nutshell, the concept of register is a product of language in context. Unlike action-oriented register, which focuses on non-linguistic features, talk-oriented register dwells on the prominent use of linguistic features. An example include textbook, which forms an important source of data for this study. It is, therefore, expected that authors of English textbooks will employ appropriate registers to promote the doing, enabling, sharing, recreating, recommending, expounding, reporting and exploring among teachers and students in the



classroom. Thus, for this study, the term ‘register’ will be used interchangeably with ‘socio-semiotic processes’.

Textbooks have been widely studied from various perspectives, including socio-semiotic processes of comprehension passages (Miestamo, 2017; Piperski, 2014), syntactic and lexical complexity (Jacobs, 2019), morphological and semantic complexity (Fitriana & Wirza, 2020) and variations in lexical density (Lim & Tan, 2018).

Studies on socio-semiotic processes of comprehension passages in textbooks reveal that globally, languages are prone to exhibiting complexities across cultures (Juola, 2010; Miestamo, 2008, 2017; Piperski, 2014). These complexities are reflected in the socio-semiotic process of languages in the form of lexical density, complex linguistic, grammatical forms, and sociolinguistic features. The findings of these studies coincide with the focus of this study since they demonstrate that writers of textbooks could be affected by the propensity of complexities in every language and, as a result, employ complex grammatical forms, lexical density and difficult sociolinguistic features.

In view of the aforementioned, there is a knowledge gap regarding factors influencing authors of textbooks in their selection of cultural resources in the socio-semiotic process as they compose the content of the textbooks with a view to enhancing students’ ease of reading, comprehension and learning experience. A general rule cannot be applied to all educational textbooks because they are written to meet a subsystem and subtype in the large system of language. A one-by-one basis investigation into the socio-semiotic process of comprehension passages in SHS English textbooks is prudent.

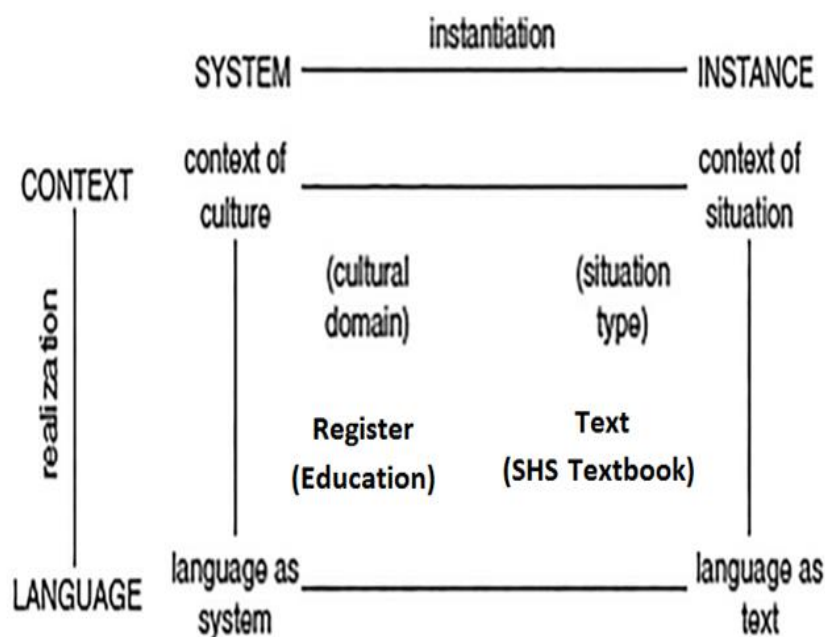
The review conducted under this section deepens knowledge of the important role of conducting an in-depth investigation into register since it will facilitate students' better understanding of linguistic and sociolinguistic features used in a textbook.

## **Theoretical Framework**

### **Systemic Functional Linguistic Theory: Cline of Instantiation**

In their insightful works, Halliday and Matthiessen (1999) and Halliday (2013) postulated that the dimension of meaning is comparable to a sub-system within a larger and encompassing system. Halliday and Matthiessen referred to the subsystem in their notable systemic functional linguistics as 'cline of instantiation'.

Halliday and Matthiessen (2014) provided ample postulation on the complex organization of language in several contexts through the various concepts of SFL. These concepts include stratification, metafunction and cline of instantiation (Hasan, 2009; Halliday, 1978, 1974; Matthiessen, 2019, 2022). The concept of instantiation, in line with McCabe (2021) and Matthiessen (2022), forms the third phase of the SFL framework reviewed. The diagram in Figure 1 depicts the cline of instantiation.



**Figure 1: Cline of Instantiation**

*Source: Adapted from Halliday & Matthiessen (1999) and Hasan (2013)*

A close study of Figure 1 revealed that there is a “constellation of related systems from which any one feature acquires value in the overall meaning potential” (Halliday, 2013, p. 25). In an effort to explore the constellation of features in the subsystem with meaning potential, several studies have investigated the cline of instantiation and have proffered varied explanations in a variegated manner within the context of multimodal discourse analytic, socio-semiotic, and systemic functional linguistic literature (Martin & Rose, 2003; Hasan 2013; Rossolatos, 2017). As a result, within the framework of Systemic Functional Linguistics (SFL), I provided ample insight into the relatedness of the cline of instantiation with the focus of the current study.

Prior to elaborating instantiation, it is worth noting that the framework lends credence to Matthiessen’s (2015) registerial cartography because it provides insight into several cultural resources the author of a textbook will select from, especially in relation to the subsystem and subtype of a particular

field. This coincides with Matthiessen (2015) in describing the types of text in a textbook within the context of tenor, mode and field. This will aid in the precise identification of the meaning potential to prospective readers. The framework of the cline of instantiation within the context of register is provided below.

As depicted in Figure 1, and in harmony with the focus of this study, culture at the upper left corner represents the broader systemic constellations from which a writer makes semiotic choices. The register is at the bottom left corner and entails a second-cycle school register, which is available to the writer for selection. At the bottom right-hand corner is the text type, which constitutes the content of the SHS textbook, which is written according to the cultural resources of second-cycle educational institutions. In consonance with the theoretical framework of the cline of instantiation, cultural resources necessitate the writer to write within the specific context and level of SHS students.

It is noteworthy that the cultural domain, alongside the cultural practices in second-cycle schools with the style of writing, forms the sub-system. Additionally, the register of individual courses and subjects of SHS students and their cultural resources constitute the sub-types. For example, for those offering Science courses, such as Physics or Chemistry, the writer must employ the cultural resources peculiar to their context. Hence, all the subtypes within the subsystem must coincide with the context and peculiar settings of individual students. This is very important because, at each level of the cline, there is instantiation for an increased concrete level of meaning potentials embedded in the subsystem.

Halliday (2005) deepens understanding regarding what constitutes cline of instantiation in the following statement:

The concept of the “system” represents language when viewed from a broad perspective, emphasizing its semiotic potential. Conversely, the term “text” pertains to language when examined closely, focusing on specific instances that arise from this potential. In essence, there is a single phenomenon at play here, rather than two distinct entities; langue and parole are merely contrasting vantage points for observation (p. 248).

A close reading of Halliday’s comment above demonstrates an outright criticism of Ferdinand de Saussure’s conception of language. Saussure, as cited in Mambrol (2020), conceived ‘langue’ and ‘parole’ differently. To Saussure, Langue embodies a set of regulations, conventions, significances, and configurations that result from human language creation abilities and are collectively adopted by a particular linguistic community. On the other hand, Parole can be equated with spoken or written expressions. It represents the tangible manifestation of a system that has been collectively internalized, and also showcases an individual speaker or writer’s personality, creativity, and physiological aptitudes.

It is clear from Saussure’s statement above that langue and parole are distinct. However, Halliday (2013) asserted that they are not different. They are only one phenomenon. He substantiated his point, using a cline of instantiation. He indicated that while the system of rules, usages and meanings in a language (langue) refers to the semiotic potential of a language, parole, which Saussure conceived as different, is a result of a close-up view of the system, Halliday referred to as another observational position (subsystem).

In effect, parole is intimately connected with the system since it is an important part of the system in a more localised and contextualised setting. Hence, as earlier explained, every textbook is a subsystem with subtypes. As a result, the writer writes it to meet the cultural resources of education and the subsystem, which is the course, and then the subtype, which refers to the subject under consideration.

Notwithstanding, some critics (Chen, 2019; Cleirigh, 2022; Martin, 2006, 2008, 2010) have questioned the non-inclusion of the reader or the reading process in Halliday's cline of instantiation. In other words, they claimed that successful interaction between the system, text and the reader should be cognizant of some of the traits or attributes of the reader and the process of understanding the writers' thought as influenced by the cultural resources of the subsystem and subtypes.

The third phase of SFL, according to McCabe (2021) and Matthiessen (2022), focuses on how, as individuals, we continually expand our registerial repertoires based on our experiences and interactions with varied registers in institutional settings. During this period of linguistic development, Halliday (2013) stated: "For a linguist, to describe language without accounting for text is sterile; to describe text without relating it to the system is vacuous" (p. 196). Halliday's (2013) expression lends credence to the cline of instantiation. According to Halliday and Matthiessen (2014), as individuals expand their registerial repertoire in an institutional setting such as secondary school, they must relate their knowledge between an instance and the subsystems. Subsystems in this sense, as earlier indicated, depict the cultural resources of register associated with the particular setting and context of the individual.

Halliday (2013) argues that as an individual relates with text as influenced by the subsystem or subtypes, over time, he or she increases registerial repertoires. Notwithstanding, some linguists have criticised the extent to which cline of instantiation influences the comprehension of textbooks in secondary schools. For example, Cleirigh (2022) opined that the relation between the system and a text, as explicated by Halliday (2013) in the cline of instantiation, is vastly different from an individual relationship between “reading” and “a text”.

Cleirigh (2022) claimed that reading, in metaphoric terms, is incomplete without a reader and the process of reading alongside the text that is being read. To Cleirigh, “variant ‘reading’ of one text includes variant readers and/or variant reading processes” (p. 2). Essentially, according to Cleirigh (2022), the cline of instantiation only accounts for “a relation between (variant) texts and the system which is an instance, it does not include readers or the reading process” (p. 2).

Hence, Cleirigh (2022) asserted that cline of instance should have been influenced by the reader and the reading process because as long as the reader is concerned with “actual texts” read in a textbook (subsystem/subtype), then both the reader and the reading process intercept cline of instantiation. I agree with Cleirigh because any benefit the reader will derive from his or her relationship with the text is dependent on several factors, including the careful selection of cultural resources of the subsystem/subtype by the writers, the reader’s personal attributes and the reading process. In effect, extrinsic (the writer, text type) and intrinsic (readers’ attribute and reading process or

approach to reading) factors are highly instrumental to any interaction between the reader and the text.

In view of Cleirigh's (2022) argument regarding the reader and reading process, this study considers the reader's attributes as they influence the socio-semiotic process of reading a text, which could be with ease or difficulty dependent on the system behind the text. In this respect, Matthiessen (2019, 2022) indicated that both syntactic and lexical complexity could influence the level of learners' interaction or relation with the text.

This section has shown that the cline of instantiation disproves the long-held conception that *langue* and *parole* are distinct, with *langue* referring to the systems of language. In contrast, *parole* represents the collectively internalised system of the speaker influencing his or her personality and capabilities as an individual writer. The cline of instantiation demonstrated that both *langue* and *parole* are not different or distinct from one another; they are one phenomenon, although representative of two different observational or contextual considerations of language.

Hence, this section showed that the texts used in SHS textbooks constitute a close-up, a subsystem with subtypes and an instance of language derived from the system with a constellation of potentials for meaning-making. The cline of instantiation thus places much emphasis on the writer and the selection of cultural resources in the register to suit the context and potential readers so as to increase their registerial repertoire.

Considering the result of the review, I discovered that in addition to investigating clause complex relations and lexical density across socio-semiotic processes in SHS English language textbooks, the socio-semiotic processes of



the reader as influenced by his or her personal attributes should also be investigated.

### **The Notion of Register: Dichotomous Approaches**

The previous section provided ample information on how register is situated within the theoretical framework of the cline of instantiation. Unlike the section on the concept of register, this section deepens knowledge of the caveat surrounding the English language register, which this study attempts to fill. It is, therefore, prudent to critically examine the differences of opinion among scholars and how it affects the overall objective of this study.

The notion of register has been a hotbed of controversy due to misconceptions, varied perspectives and approaches to explicating register in the English language. For example, while Lyons (1977) defined register as “systematic variation in relation to talk social context” (p. 48), Halliday (1978) sees it as “the way in which the language we speak or write varies according to the situation” (p. 32).

Viewing the issue from a different dimension, Chaika (1982) contended that both register and style are the same thing, and as a result, register is a “style that is associated with a particular social occasion. She further stated: “one uses a different style at a funeral than at a barbecue; there is a register appropriate for each” (p. 22). Yule (1985) agreed with Chaika (1982) that for every specific situation, there is variation in the way we speak or write, and all these are captured in a register. Hence, we have an educational register, a religious register, etc.

In spite of the dichotomy of opinion among experts and linguists on the notion of register, critical evaluation of the definition, as mentioned earlier, has

a thread that runs through them. In my perspective, all of them underscore the fact that for every situation or context, there is a register and that one text can only use one register at a time. For the sake of clarity and comprehension, a writer cannot make use of texts in several registers.

In connection with the conception of register, the researcher aligns herself with Fowler (1991), who argues: “Just as I find it misleading to think of language as consisting of a set of registers or modes, so I find it a distortion and inhibiting to think of a text as being in much – and – much register or mode or dialect. I would prefer to say that modes and registers and dialects are in texts” (p. 137).

Lending credence to Fowler’s (1991) assertion, Mohamed and Negm (1997) provided empirical evidence to support the conception that registers are related and experts should refrain from a dichotomous approach when investigating it or writing about it. Several texts were extracted and analysed by Mohamed and Negm (1997) with a view to concretize the notion of register as being interrelated, and experts could employ several registers within the same text. Text from prose discourse, academic discourse, poetic discourse and discourse of puzzles all contain glaring cases of situations where writers used more than two registers. For example, in the case of academic discourse, both formal and informal forms of register were discovered in an academic text, thus proving that registers are interrelated and writers, for reasonable purposes, could use two or more registers in a text.

Supporting the outlined feature of the notion of register by Mohamed and Negm (1997), Jacobs (2019) indicated that the individual persona experience often influences the selection of cultural resources by a writer. This

harmonizes with the notion that a widely read writer could incorporate texts across several registers with a view to buttressing or emphasising a giving point. For example, a teacher in the classroom could regularly use a formal register in discussing several topics during teaching and learning of the English language; however, as in the case of Mohamed and Negm's (1997) study, he may need to use an informal register or local dialect to make a subject matter more transparent. In that instance, he has used both standard and substandard registers as a result of his capability of speaking the local dialect fluently.

Similarly, in line with Jacobs (2019), register "is seen as the total retexture of varieties of words (technical or non-technical) ...and that influences the style or variety of writing" (p. 6). Jacobs' definition resonates with Biber (1988) that several components come into play in a writing situation to yield "situational context" for the writing event. These components, according to Biber, include but are not limited to content, message, norms of interactions, writer-reader interception, channel, and purpose for which the text was written. All these components influence the writing situation, especially the situation of the reader or audience to whom the writing is targeted.

From those mentioned above, it is clear that the notion of register is not restricted to the use of only one register for a text; instead, depending on the experience of the writer, the context and the targeted audience or reader, the writer can select cultural resources of several registers in the systems, subsystem or subtype to make his or her point understandable. In effect, experienced writers are versatile and resourceful, and the blend of experience, versatility and resourcefulness often produce rich text containing several registers aligned to

the context of issues, field or discussion at hand. This could also be applicable within the context of a writer for SHS textbooks for English language.

In situations where the writer is not very experienced, perhaps he or she is not even in the given field but, as a result of political influence, was required to write the textbook for second-cycle school. In effect, in line with Jacobs (2019), the textbook could be poorly written with reading difficulty for students since it may be substandard.

Hence, it is vital to investigate the type of register employed in writing selected reading comprehension passages in the SHS English textbook with a view to understanding whether a mix of registers was used or only one standard register was used. This is important because it will affect clause complexity and lexical density.

This section has underscored the knowledge gap regarding register. It was shown that the capability of a writer to select cultural resources from several registers carefully could have either a positive or negative impact on the textbook composition, including the reading comprehension passages. It could either make the textbook standard or substandard. Hence, it is paramount to investigate whether the comprehension passages in the SHS textbooks were written to facilitate students reading processes and make them less stressful.

### **Review of Empirical Studies on Textbooks**

This sub-section critically examines previous studies related to the focus of this study. The review is topical, based on dominant ideas of prominent authors within the context of the objectives of this study. Hence, following a topic in connection with the objectives of the study, literary works of prominent

authors were grouped and reviewed to deepen insight on registers and textbooks as a communicative language teaching resource.

### **Influence of Theoretical Frameworks on Cultural Resources of English Language Textbooks**

In their notable article for the Proceedings of the Thirteenth Conference on Applied Linguistics (CONAPLIN, 2020), Fitriana and Wirza (2020) conducted an in-depth investigation regarding the socio-semiotic processes of sections of English textbooks. Critical evaluation of their study, in terms of methodology, theoretical framework, and analysis and results provided ample insight into how individual writers select and compose contents of textbooks through careful selection from relevant registers. Fitriana and Wirza (2020) highlighted several segments of the textbooks to underscore how the composition influences students' capacity to read, comprehend and improve academic status in the English language.

Fitriana and Wirza's (2020) study underpins the focus of this study because they adopted the theoretical framework of Halliday's SFL as the conceptual framework for buttressing relevant issues on socio-semiotic processes among students in the second cycle schools. The research approach was mixed methods while the research instrument comprised selected comprehension passages in senior high school textbooks alongside interview guides and questionnaires.

Employing SFL was very appropriate; however, they could have adopted the cline of instantiation as one of the underpinning concepts since it highlights how writers select cultural resources of the system from the educational register to coincide with the subsystem and subtype as underscored

under the cline of instantiation. This is noteworthy because the cline of instantiation would have helped identify the various components of the textbook, in terms of cultural resources, with a view to pinpointing whether these resources enhanced or impeded students' mental or relational process within the context of the comprehension passages in the textbook.

In their insightful study, Bezemer and Cowan (2020) are primarily drawn to exploring relevant theories and methods in connection with reading textbooks or other materials in social semiotics. Bezemer and Cowan's study was underpinned by Halliday's (1978) SFL theory for the present study. However, Bezemer and Cowan criticised the narrow conception of reading, which has formed the culture of several English-medium schools worldwide and in Ghana. In this respect, the Department of Education (2013) in England described the two dimensions of reading as "1) word reading (where phonic decoding is emphasised) and 2) comprehension (stressing the importance of vocabulary and grammar). Bezemer and Cowan criticized the narrow conception as limiting students' critical thinking capacity as well as their ability to expand the socio-semiotic process or register. They claimed that, in consonance with Kress (1997), Kress (2003) and Lim and Tan (2018), students are often immersed in a world of multimodal representation of text and, in line with one of the features of a socio-semiotic process, the mode within which an individual receive reading material often influences his or her ability to interact, engage and decipher the orientation of the text.

I support Bezemer and Cowan's (2020) criticism because most of the students in second-cycle schools are usually confronted with analysing multimodal texts in several subjects such as biology, chemistry, physics,

geography and information technology (such as when surfing the internet). In line with the theoretical framework of the cline of instantiation, textbooks of the subjects mentioned earlier, and fields reflect multimodality in their subsystem and subtype to aid students' critical thinking processes as well as their capacity to decipher and employ relevant information in their reading for secondary purposes.

It is noteworthy that the theoretical framework of SFL helps in determining complexity in relation to the writers or composers of a textbook. However, critical evaluation of Halliday (1978) and Kress (2010) reveals that SFL and Kress' theory on meaning-making is not explicit on how to measure student capacity for meaning-making based on what is being read. I mean, how will an independent observer decipher whether a student sees the textbook as either comprehensible or incomprehensible?

It is essential to fill this knowledge gap because, according to Kress (2010), Bateman, Hiippala, and Wildfeuer (2017) and Bezemer and Cowan (2020), reading and comprehension of a text means different things to different people under different contexts. In view of this knowledge gap, I will include interviews and questionnaires in the research instrument for data collection. This approach is helpful in understanding the value system of readers, their conception of the textbook under consideration and pertinent information regarding the appropriateness of its composition within the context of a socio-semiotic process.

### **Cultural Resources and Text Complexity in English Language Textbook**

Rezeki and Sagala's (2021) study is noteworthy because it was directed towards ascertaining salient components of textbooks viewed as inevitable to

effective teaching and learning process. This means Rezeki and Sagala lend credence to the process of mapping out the meaning potential of a textbook through a systematic approach to highlight the tenor, mode and field of the text in the textbook.

Rezeki and Sagala (2021) argued that in line with the focus of the socio-semiotic framework, authors of textbooks must select relevant cultural resources in respective register(s) (the subsystem and subtype) to meet the cognitive development of SHS students. In effect, writers should accurately capture the cultural dimensions, feelings, hopes, orders, wishes and statements of realities. By following the framework of SFL (cline of instantiation) and Matthiessen (2015), Rezeki and Sagala (2021) accurately mapped out, described and outlined the nature of texts in the subsystem (register) and subtype (text). Studies on text complexity in textbooks have been conducted across various aspects of the textbook, which include the types of text complexity, text complexity in different subjects, languages and across different grade levels.

### **Text Complexity in Textbooks: Syntactic**

Clercq and Housen (2017), which investigated syntactical complexity from the perspective of cross-linguistic complexity in L2 development. They discovered that the reductionist approach focuses on the clausal level rather than the entire syntactic levels, such as the phrase and clause. Clercq and Housen (2017) sampled and analyzed 100 English and 100 French second-language oral narratives from adolescent native speakers of Dutch who belonged to four proficiency levels: beginner, medieval and advanced levels.



The authors discovered that syntactic elaboration and syntactic diversification in both learner groups were evident in all the syntactic dimensions except in the area of clause types, where the native speakers differed from the learners. From Clercq and Housen's (2017) study, it is evident that the use of syntactic dimension as a determiner of complexity in L2 development is very relevant in guiding the current study.

Frantz, Starr, and Bailey (2015) also examined syntactic complexity as a component of text complexity. Frantz et al. (2015) used Common Core State Standards as a way to probe its weakness in measuring complexity. The authors consented that CCSS has been effective in aiding the assessment of text complexity in order to match them to college students' grade levels. In so doing, Frantz et al. (2015) discovered that syntactical complexity as a variable of complexity does not account for the text complexity in the CCSS measure of complexity. Based on extant literature, Frantz et al. (2015) discovered that the syntactical complexity of text varies based on subject area as well as genre-specific areas. In the subject areas, the authors discovered that mathematics tend to use long, dense noun phrases and grammatical metaphor as a syntactical feature to communicate mathematical problems in words.

Science texts are essentially authoritative and impersonal in tone, thereby using more noun phrases, technical vocabulary, declarative sentences, and passive sentences to communicate scientific concepts and theories. Social sciences and history are more interpretive in tone; hence, there is excellent use of noun phrases and descriptive devices. Frantz et al. (2015) concluded that the variation in register of the different subjects as showcased by literature (Frantz et al., 2014; Graesser et al., 2011; Graesser et al., 2014; Schleppegrell, 2001,

2007, 2009) indicate linguistic complexity as equally caused by the syntactical features of a text.

Frantz et al. (2015) is relevant to the present study because it provides a close link from the literature between linguistic and syntactic complexities. Therefore, the present research considered syntactic complexity from the clausal level as a way to determine the linguistic complexity of the textbooks.

Arya et al. (2011) investigated how syntactic and lexical complexity affected the comprehension of science texts among third-grade students. Sixteen expository texts were carefully crafted to exhibit systematic variations in the levels of syntactic and lexical complexity across four science-related subjects (Tree Frogs, Soil, Jelly Beans, and Toothpaste). A Latin-square design was employed to ensure the balanced presentation of these 16 texts.

Following the reading of each text, students completed a post-test comprehension assessment without access to the text. Additionally, external measures of reading proficiency and prior vocabulary knowledge were collected to serve as control variables. The study revealed that lexical complexity significantly impacted comprehension for two out of the four subjects, while syntactic complexity did not influence comprehension performance, regardless of the topic. Moreover, no additional effects were observed for English language learners.

### **Text Complexity in Textbooks: Lexical**

Putra and Lukmana (2017) investigated lexical complexity across several textbooks in SHSs in Indonesia in a comparative study. This study scrutinized three consecutive textbooks published by the Ministry of Education of Indonesia. The research collected and sampled data from the reading

materials within these textbooks, focusing on the examination of lexical density, lexical variety, and grammatical intricacy to assess text complexity. The findings uncovered an inconsistent pattern of text complexity development within each textbook. However, the levels of lexical density, lexical variety, and grammatical intricacy remained consistent across textbooks as students advanced from one grade level to the next. This led to the conclusion that the language used in these texts becomes progressively more sophisticated, particularly at the lexical level, to align with students' intellectual growth.

Toyama et al. (2017) investigated the complexity of leveled passages employed in four classroom reading assessments. They examined a total of 167 passages that had been leveled for Grades 1–6 within these assessments, utilizing four distinct analytical tools for text complexity evaluation. Traditional, two-factor measures of text complexity identified a prevailing pattern of relatively consistent average complexity across grades in the four assessments. However, there was substantial variation observed among the assessments concerning the magnitude of complexity increase from one grade to another, the overall range of complexity, and the within-grade text complexity. These differences among assessments were less noticeable when using newer, multi-factor analytical tools. Additionally, the four assessments demonstrated variances in how well their passages aligned with the text complexity guidelines established by the Common Core State Standards.

Verdiansyah et al. (2020) conducted an analysis of text complexity, with a particular focus on lexical/semantic and syntactical complexity. They examined two English textbooks designed for Grade 10 and Grade 12 students in Indonesian SHS. Four reading texts were selected from each book based on

text genre and word length, and Coh-Metrix 3.0 was employed for the analysis. The study presented descriptive statistics and carried out an Independent T-test to identify differences between the texts in the two textbooks. The findings indicated that, when comparing Grade10 and Grade12 texts, there were no discernible differences in complexity in terms of both lexical and syntactical aspects. However, it was observed that the texts in Grade 10 tended to exhibit significantly more consistent syntactic structures in comparison to those in Grade 12

Berendez and Vajjala (2017) employed automatic measures from computational linguistic research to analyse 2,928 texts from geography textbooks published by four German publishers in terms of their reading demands for morphological and semantic complexity. They employed cohesion-related and morphological characteristics as their primary indicators of text complexity. Only partial support for systematic complexification was found in the results. Significant variations in some of the ten linguistic traits were also found between school tracks and grade levels in the study. Lastly, the publishers differed substantially from one another. Mulyanti and Soeharto (2019) used the SFL theory to study the evolution of text complexity.

To ascertain the degree of difficulty in the texts, they conducted a qualitative analysis of three sequential textbooks (Grades VII, VIII, and IX), concentrating on lexical density, lexical variation, and grammatical complexity. The results demonstrate that as the level increased, there were fluctuations in both lexical density and lexical variance. On the other hand, the results on grammatical complexity showed that texts became less complex as the level

rose. They concluded that the texts needed to be reviewed in order for them to reflect the various phases of the intellectual development of the pupils.

### **Linguistic Complexity in Textbooks: Knowledge Gap**

To ascertain linguistic complexity in textbooks, Piperski (2014) focused on three languages: Swedish, English language, and German. Piperski (2014) discovered that determining the linguistic complexity among languages poses difficulties, such as the presence or absence of zero markers, as well as the difficulty of dividing the linguistic unit into morphemes. Hence, he used the graph theory method to determine the grammatical constructions in different languages. Piperski (2014) found German to be more complex, followed by Swedish, and lastly, English language. The work of Piperski (2014) shows that the task of measuring linguistic complexity across languages is cumbersome and, therefore, measuring the grammatical construction may be more plausible than the entire linguistic complexity.

However, in research on scientific texts, Halliday (2004, 2008), Halliday & Martin (1993), and Martin (2008) found that the rich and nominalized form of scientific writings poses certain challenges for teachers and students (Halliday, 1993). Additionally, despite their straightforward sentence structures, scientific texts have been shown to be quite ambiguous. The main reason for this ambiguity in scientific speech is when a clause is nominalized to become a noun.

We can make references to the parties, procedures, and situations involved in a clause. Nonetheless, most of the semantic information included in a clause is lost when it becomes a nominal group, making it challenging to identify the process participant. A knowledge gap exists in connection with the

English language. Since English was seen to be less complex in relation to German and Swedish Piperski (2014), it is, therefore, imperative to examine English textbooks in relation to clause complex relations.

Flores (2015) considered linguistic complexity's impact on students' performance. The researcher focused on examining test items in relation to the complexity of the items. Flores (2015) discovered that in mathematics, students' performance was affected by the items' density, length, form and structure. Using mixed-method research, Flores (2015) selected 30,000 students and used 400 test items to examine the impact of the complexity on students' performance in Mathematics and the English language.

In the English language, Flores (2015) found that information density and student performance contributed immensely to students' performance in English language tests. With regards to the students' demographics, the subgroups of race and ethnicity contributed to the poor performance of students in English language and mathematics. From Flores' (2015) study, it could be discovered that linguistic complexity, due to its impact on students' cognitive abilities, could affect students' performance on a test. Therefore, the linguistic complexity of textbooks is not only relevant for making the textbooks more suitable and relevant to students, but it also adds to the opportunity to make the students perform better in their examinations and other assessments.

To (2018) examined the linguistic complexity of English language textbooks used in Vietnam. The author selected twenty-four texts and used SFL theory to guide his analysis of the data. Based on the linguistic features of lexical density, nominalization and grammatical metaphor, To (2018) discovered that the linguistic complexity of the textbooks was progressively complex as one

moved from one level to another. The author discovered that nominalization, as well as grammatical metaphor, increased in complexity from one level to another. To's (2018) findings were confirmed in the co-authored work in the following year, showing their findings are credible even though not generalizable. Similar works, like the present, could aid in corroborating the works of To (2018).

Additionally, because the author selected science and non-science texts in the English textbooks, To and Mahboob (2019) discovered that the linguistic complexity of the different text types was not significantly different from each other. To and Mahboob (2019) recommended that authors should include specific genres in English textbooks to enhance students' appreciation of register of the English language.

To and Mahboob (2019) deepened our knowledge of the complexity of registers of English language textbooks by indicating that it often increases from one educational level to another. This is most possible because the same author or groups of authors produce English textbooks for different levels. This harmonizes with Ozyildirim (2014) observation that in several cases, there is a detachment between the textbooks' producers and target users in space, and that possibly causes producer (s) to use complex structures and forms in their textbooks. This assessment evaluates the significance of English language textbooks, providing recommendations for policymakers and suggesting measures that authors can implement to enhance the communicative effectiveness of their textbooks with their intended audience.

To and Mahboob (2019) explored the complexity of English language textbooks based on the use of nominalization and lexical dense language. The

authors used twenty-four texts selected from four English textbooks and analyzed the sampled texts using systemic functional linguistic theory as an analytical tool. To and Mahboob (2019) discovered that the linguistic complexity of the textbooks increased as one progressed from one level to another.

Under this section, the review showed a dichotomy of opinion among scholars and linguists regarding the complexity of English language textbooks. Several studies showed that the English textbook is relatively easy to read and comprehend in comparison to science textbooks as well as textbooks written in other languages, including German.

However, some studies discovered that several English language textbooks are loaded with linguistic complexity, which could be morphological, syntactic or lexical, including clause complex. Hence, it is pertinent to close this knowledge gap. Additionally, it was discovered that there is less work in the area of investigating syntactic dimension as a determiner of complexity in textbooks. Hence, this study has employed syntactic dimensions in that respect.

### **Lexical Density Across Socio-Semiotic Processes**

Globally, studies on variations in the lexical density of textbooks across registers have been conducted at different subjects, fields, locations and grade levels. Notable among them is Özyıldırım (2014), who explored register variation in Turkish law and economics textbooks. Using Biber's (1988) multidimensional approach, especially the first dimension, as an analytical framework, Özyıldırım (2014) analyzed two textbooks each from law and economics for tertiary schools. The author discovered that both textbooks used more informational discourse by including a high percentage of nouns in the



register, stative forms and many other informational discourse features than the interactional discourse features such as pronouns, amplifiers, among others.

Additionally, Özyıldırım (2014) found that the law textbooks presented information in large composition while the economics textbooks presented the information in manageable units. Finally, the economics textbook used more pronouns and interactional features than the law textbooks, which had low interactional discourse features. The work of Özyıldırım (2014) clearly shows that the register of textbooks in different fields may not necessarily be the same because of the field-specific requirements. This analyses the register of textbooks of subjects vital to ascertain their register variation and patterns.

In his critical review of the framework of Systemic Functional Linguistics (SFL), Matthiessen (2015) proposes a registerial cartography to guide the systematic selection of texts across registers for research. Matthiessen (2015) asserts, “Registerial cartography is the activity of systematically describing the registers that make up a language.” (p. 1). He compared his registerial cartography to the register map of a language and indicated that variation is expected in registers in view of its contribution to the overall meaning potential of a language. This is in consonance with the framework of the cline of instantiation (context of culture and context of situation).

Hence, Matthiessen’s registerial cartography is a metaphorical term that explains how a semantic system is represented in longitude and latitude poles to communicate instantiation and stratification. Matthiessen and Teruya (2019) discussed register from the perspective of types and subtypes within a register. Using the tenor of activity, Matthiessen and Teruya (2019) noted that the semiotic process in language could seek to 1) Expound, 2) Recreate, 3) Explore,

4) Report, 5) Share, 6) Do, 7) Recommend and 8) Enable. Matthiessen and Teruya (2019) considered register variation within the types of semiotic process that is used to communicate meaning.

In Ghana, Frimpong (2020) also carried out a comparative analysis of the registers of newspaper editorials in Ghana and Britain. The author conveniently selected 144 texts from four newspaper organizations, namely *Daily Graphic* and the *Ghanaian Times (Ghana)* and *The Times* and *The Daily Telegram (Britain)*. Using Biber and Conrad's (2009) register model, Frimpong (2020) analyzed the sampled texts and discovered that despite the sociocultural differences, the register of the editorials of both newspapers was similar and consistent in the sentence types and their distribution in the editorial texts. Moreover, Frimpong (2010) discovered that notwithstanding the slight discrepancies in the distributing register, there appeared to be a vast similarity in the use of sentence types such as declarative and complex sentence types. The author concluded that the register of the editorial is consistent despite sociocultural differences.

The findings of Frimpong (2020) show how the register of a genre may defy sociocultural context to present similar sentence structures as well as sentence types. Hence, Frimpong (2020) provides clarity on how register occupies the position of a fabric that directs readers' minds regarding what to expect in any genre. For instance, the genre of textbooks, especially for students, is expected to have a register that includes exercises, activities, and familiar vocabulary, among others.

In another study, Borza (2013) explored the register of biology textbooks in Hungary to ascertain their linguistic complexity. The author

purposely selected 12 texts from the biology textbooks for 10th graders and secondary school textbooks and used an eight-aspect analytical tool to describe the linguistic features of the register of the biology textbooks in relation to general English textbooks. Bursa (2013) revealed that the biology textbook used simple tenses, conditional structures, prepositions, relative clauses, infinitives, nominal relative clauses, passive voice, and modals, which made the biology textbook less complex compared to the English language textbook.

The finding of Bursa (2013) is intriguing in that the English language textbook, which is supposed to be less dense in terms of register linguistically, is rather dense in comparison to the biology textbooks, which does not necessarily use technical register. While the analytical tool of Bursa (2013) was painstakingly done personally with close similarities to Biber's analytical framework, the possibility of the inherent weakness of the analytical tool as the reason that accounted for this result is possible. Nevertheless, the work of Borza (2013) echoes the assertion of Özyıldırım (2014, p. 1) that textbooks may be "notoriously text-heavy laden with linguistically and conceptually dense content." This observation does not exempt language textbooks like the English Language. Therefore, there is a need to examine the linguistic complexity and register of English textbooks.

In this section, the reviewed studies revealed contradictory evidence gaps. Findings of some studies discovered a minimal lexical density in the register of English textbooks in comparison to registers of science and religion textbooks. However, it is noteworthy that several other studies discovered that registers of English textbooks possess a higher level of lexical density when compared to Biology textbooks or Geography textbooks.

The review also demonstrated that fewer studies have adopted Matthiessen's (2015) categorization for the determination of linguistic complexity in the register of English textbooks. This is vital since it will provide a meaningful guide for the present study in the analysis segment.

A close reading of the previous studies and the objectives of the present study shows a relationship between them. The cline of instantiation provides a credible means of understanding variation in linguistic complexity across registers. The cline of instantiation forms the theoretical framework for the present study. The review revealed that several studies indicated that syntactical and lexical complexity are often influenced by clause complex relations across registers. Identification of the types of clause complex relations across registers forms one of the specific objectives of this study. Several previous studies adopted Matthiessen's (2015) categorizations for the determination of linguistic complexity across registers. This study adopted Matthiessen's (2015) categorization to ascertain linguistic complexity across registers in the various levels of SHS English textbooks.

The adoption of Matthiessen's (2015) categorization of semiotic processes is consistent with Piperski's (2014) graphs because both provide insight into objective assessment of linguistic complexity in textbooks. However, since this study is oriented towards ascertaining register variation in addition to linguistic complexity across English language textbooks, Matthiessen's registerial cartography provided insightful categorization of registers and how components of these semiotic processes varies from one textbook to another. Hence, while Piperski focuses on linguistic complexity in a textbook, Matthiessen categorize linguistic complexity based on the types and

sub-types in registers, thereby deepening insight on whether cline of instantiation is achieved in a textbook.

### **Conclusion**

The conceptual review revealed that there is a dichotomy of opinions regarding what constitutes linguistic complexity. While some linguists view it from the objective perspective, which revolves around reader-centered complexities, other linguists see it from the absolute perspective, which is text-centered. The review further demonstrated that there is a knowledge gap regarding accurate measures of linguistic complexity. It is, therefore, pertinent to examine the socio-semiotic processes of the SHS English language textbooks by employing Matthiessen registerial cartography to ascertain linguistic complexity. Hence, it is vital to investigate the type of registers employed in writing selected reading comprehension passages in the SHS English textbooks with a view to understanding whether a mix of registers was used or only one standard register was used.

## CHAPTER THREE

### METHODOLOGY

#### Introduction

This chapter describes methods adopted in the study, notably in the collection of data and analyzing the data to find answers to the research questions. The chapter presents the research design, data and data source, and data analysis procedure.

#### Research Design

This study adopted the qualitative research design. Findings of several Studies (Creswell & Hirose, 2023; Hyejin, 2017; Sauro, 2015) revealed that qualitative research facilitates researchers' effort at answering questions about the how, what, and where of current events, experiences as well as deepening insight into poorly understood phenomena. It also helps the researcher to gain deeper understanding of the research topic and reveal the implications of the research findings (Pyo et al., 2023; Yazid et al., 2014).

As one of the methodological concepts under qualitative research design, discourse analysis was employed. Discourse analysis is an explanatory method of analysing texts, and interpretations made based on both the material itself and on the contextual knowledge (Luo, 2023). Hence, its adoption provided me ample space to explore contexts and processes within which language is used, especially in discipline-specific applications (Fairclough & Wodak, 1997; Jankowicz, 2005; van Dijk, 2001). The selection of discourse analysis was predicated on its appropriateness for the study because it describes the linguistic forms of the passages as well as the purpose those forms are designed to serve. It allowed me to have a wider variety of interpretation of the

texts (Foucault & Wodak, 1997). Discourse analysis also fast tracked my capacity at ascertaining various forms of linguistic complexity and register variation of comprehension passages in the Senior High School English language textbooks used in Ghana.

### **Data and Data Source**

The source of data for this study was the Senior High Schools' English Language textbooks titled; 'English For Senior High Schools 1', 'English For Senior High Schools 2' and 'English For Senior High Schools 3'. The authors of the textbooks are John Anum Sackey, Prosper Kwesi Agordjor and Paul Akwasi Apogo. English textbooks occupy an important position for language teaching and coverage of the national curriculum in the three levels of Senior High Schools in Ghana. In-depth examination of English language textbooks in Senior High Schools is prudent, because it is considered a critical sector of education in Ghana with the potential of fast tracking development of middle-level manpower relevant to Ghana's national development (Adombilla, Kris, & Roger, 2019; Attafuah, Akussah, & Banji, 2020).

Additionally, unlike tertiary education, second cycle schools are largely accessible to every citizen to aid development of requisite skills in the labour market (Adombilla et al., 2019). It is therefore paramount to examine the English language textbooks, a critical resource and crucial pedagogic genre in every level of education. Outcome of such examination will augment knowledge on factors contributing to SHS students' academic performance in English as a core subject in WASSCE.

Textbooks from the three levels (i.e SHS1, SHS2 and SHS3), were selected as data sources for the study. The data used downsampling approach in

selecting the passages (see Baker et al., 2008). Down-sampling was introduced by Baker et al. (2008) to describe a systematic decrease in the sample size in a study for more detailed analysis. First, all the comprehension passages in the three textbooks, comprising Fifty-five (55) passages were used to examine registerial diversity in the textbooks. Each of the textbooks was treated as cases, in consonance with the principle of case study approach to research (Creswell & Hirose, 2023; Ellis & Rod, 2014; Priya, 2021; Yin, 2018).

Comprehension passages in the textbooks are distributed as follows: SHS1 contains 20 passages, SHS2 possesses 20 passages and SHS3 textbook has 15 passages. Out of the total of 55 passages, 19 were selected across different registers using disproportionate quota sampling for analysis of the variation in linguistic complexity across the registers. The disproportionate quota was selected so that only those meeting the criteria for the study are selected (Hirose & Creswell, 2023; Poth, 2019).

Criteria for selection entails comprehension passages in the three textbooks that cover varied subjects ranging from transportation, health, entertainment, education, cultural setting, morality, technology and religion. For instance, titles such as Sports in Ghana, Sanitation, Diseases: Ebola, Your Body, The Magic of Computers, Afadjato, The People's Pride, among others, were covered in the three textbooks.

It is noteworthy that selected textbooks must also have covered subjects or issues that were well developed, clear, and oriented towards meeting the three SHS levels. In the selected books, sentences varied according to grade levels. For example, SHS1 textbook has 1,092 sentences while SHS2 possesses 817 sentences. It is noted that SHS3 textbook has 507 sentences.



In line with Frost (2023), I used disproportionate sampling technique to select the registers so that I will have a manageable sample for analysing linguistic complexity. Disproportionate sampling approach is a form of sampling method that the sample sizes are not proportional to the sizes in the entire population.

The use of disproportionate sampling is predicated on the fact that I need to capture key categories and sub-categories of the registers, especially in connection with textbooks that the categories are underrepresented. Hence, in harmony with Hayes, James, and Beer (2024), I decided to select a sample that best represent the content of the three textbooks to encompass the underrepresented categories.

As a result, the samples are divided as follows: 1) Five passages were selected from each of the registers that recorded higher numbers such as Exploring (28), Recreating (10), and Reporting (7), two Registers – sharing (2) and recommending (2) – that are too few instances were excluded from the linguistic complexity analysis. Though expounding register recorded 6 passages, 2 belong to the categorizing sub-category while four passages belonged to the explaining sub-category. Therefore, the four passages recorded under the same sub-category (explaining), were selected for this register.

In all, I got a total of nineteen (19) passages selected from the dominating processes across the three textbooks. Table 3.1 underscores the distribution of registers (or socio-semiotic processes) across the 55 passages of the selected textbooks. A close study of the table revealed that while Exploring scored the highest frequency (28), Recommending (2) and Sharing

**Table 3.1: Registers represented in all the passages in the English language textbooks for the three levels of the SHS**

Socio- semiotic process	Number of passages
Exploring	28
Expounding	6
Reporting	7
Recommending	2
Recreating	10
Enabling	0
Sharing	2
Doing	0
<b>Total</b>	<b>55</b>

Source: Field Survey (2024)

(2) had the least scores. It is also noteworthy that both Doing and Enabling were not found in the three textbooks.

**Table 3.2: Texts in Registers of the Selected SHS English language**

**Textbooks**

Socio-Semiotic Process/ Register	Code	Text
<b>Exploring; [Reviewing]</b>	B1U9	Sports in Ghana
	B3U5	Diseases: Ebola
	B3U13	Survival
	B2U4	Sanitation
	B2U6	World Heritage Sites: The Castles of Ghana
<b>Recreating: [Narrating]</b>	B3U6	Diseases and Myths
	B1U1	Being Honest
	B1U3	The Leopard and the Squirrel
	B2U1	The Supreme Sacrifice I.
	B1U6	Being Honest II
<b>Reporting [Surveying]</b>	B2U9	Transportation; Air
	B2U14	Transportation by Sea
	B1U15	Afadjato: A People's Pride
	B1U11	Effects of Deforestation
	B2U16	Water Pollution in Ghana
<b>Expounding [Explaining]</b>	B1U16	The Magic of a Computer
	B1U2	Your Body
	B1U19	Malaria
	B3U12	Politics and Government: Elections

Source: Field Survey (2024)

In-depth analysis of Table 3.2 revealed that 19 comprehension passages in the textbooks were selected for the linguistic complexity analysis. Codes used for SHS1 textbook was B1, SHS2 B2 and SHS3 B3. U represent the passages, hence U1 depicts the first passage selected, irrespective of the the level. For example, B1U19 mean the nineteenth passage, selected from SHS1 English Language textbook, while B2U16 represents the sixteenth passage from SHS2 English Language textbook. The topics or headings of each of the passages are shown under the “text” segment of Table 3.2.

### **Data Analysis Procedure**

In order to answer the first research question, it is paramount to ascertain which of the properties of the eight registers (or socio-semiotic processes) are represented in the selected comprehension passages of each of the three textbooks.

I read all the passages of the three textbooks and with the understanding of registers as explicated by Matthiessen (2015). I identified each passage with the appropriate register, considering the attributes each passage presented. Six registers were identified in the passages: expounding, exploring, recreating, reporting, recommending, and sharing. No passage was identified with features of the Enabling and Doing registers. The data taken on each passage under each register included: the level of the textbook, the title, the unit, the subject matter of the passage, and the register of the passage. This was presented in an Excel document where passages with common attributes were grouped under the right registers as shown in Table 3.3.

Depicted in Table 3.3 are the various registers alongside relevant attributes within the context of the three textbooks. The first segment contains

each of the book for the code for SHS 1 textbook is “1”, SHS 2 textbook is “2”, and SHS 3 textbook is “3”. The second compartment underscore the paragraph containing the title of the article and the code is the numeric value of the paragraph. For example, the sixteenth paragraph is represented by “16”.

Under the subject-matter compartment are the key points in the article. The main category of the semiotic process is shown in the fifth compartment while the last compartment comprise the sub-category of the main category. For example, as the main category “Expounding” semiotic process has “Explaining” as its sub-category. The second research question deals with the difference that exists in the clause complex relations across the socio- semiotic processes represented in the passages in the textbooks. According to Halliday and Matthiessen (2004), one key form that determines the manner in which clauses are related to each other is the taxis. This study analyzed the selected texts based on the parataxis and hypotaxis distinction, the two main ways of combining clauses in English. This dimension of relationship is known as ‘inter-dependency’ (de Oliveira, 2015). Hypotaxis means “the relation between a dependent element and its dominant” and parataxis is “the relation between two like elements of equal status, one initiating and the other continuing”.

In the present study, I first analyzed each passage into clausal structures by labeling the clauses numerically as indicated below:

**Table 3.3: Registers identified in the passages across the three levels**

Book	Title	Unit	Subject matter	Semiotic process	Sub-category
1	2	Your Body	Organs of the human body and their functions	Expounding	Explaining
1	7	Habits and Customs Relating to Food	The beliefs people have about the food they eat	Expounding	Categorising
1	16	The Magic of the Computer	The significance of the computer in our world of today	Expounding	Explaining
1	19	Malaria	It explains the cause and effects of malaria	Expounding	Explaining
1	14	The Thing Called Power	The use of power by leaders	Exploring	reviewing
1	18	Taking care of our Natural Resources	The value of natural resources to mankind	Exploring	reviewing
1	20	The Story of Gold	Gold mining in Ghana	Exploring	reviewing
2	4	Sanitation	Poor sanitary conditions at the entrance of the market	Exploring	reviewing
2	5	The Sanitation Problem	Citizens' role in keeping a healthy environment	Exploring	reviewing
2	6	World Heritage Sites; The Castles of Ghana	The castles in Ghana and their uses	Exploring	reviewing
2	11	Honesty	The story of two children and their relationship with their father	Recreating	Narrating
2	15	The Returned Native	The attitude of Kobina on his returned from the foreign country	Recreating	Narrating
3	1	Unearthing One's Talent	A youngman who got employed years after completing the university	Recreating	Narrating
3	6	Diseases and Myths	A beautiful lady, who is admired by most young men in the village, fell sick	Recreating	Narrating

Source: Field Survey (2024)

*[0] Being Honest I [Recreating: Narrating], Book 1, Unit 1*

*[1] There were these two young people [[who loved to spend their holidays with their grandparents in a little village]].*

*[2.1] It was comfortable there*

*[2.2] and Grandpa and Grandma were very warm and friendly*

*[2.3] even though a little patronising.*

*[3.1] There was a lot of space*

*[3.2] to run around,*

*[3.3] trees*

*[3.4] to climb*

*[3.5] and even a little stream*

*[3.6] to splash about in.*

*[3.7] Let's call them Kofi and Ama.*

*[4] One day, Grandpa went into the forest up the mountains with his bow and arrows.*

*[5.1] Before he did,*

*[5.2] he checked to see*

*[5.3] if the bowstring was flexible*

*[5.4] and the arrows were sharp.*

Secondly, the clauses were presented on the Excel document for further analysis into Paratactic and Hypotactic clauses as shown in Table 3.4.. The analysis of clause-combining strategies of these passages would indicate some distinct features. In Table 3.4, I summarized relevant information concerning some clauses with their appropriate clause complex relations.

**Table 3.4: Paratactic and Hypotactic Clause Complexes**

Parataxis	Hypotaxis
1. [6.6] He drew from his bag a guinea fowl [6.7] and threw it onto the ground.	1.[5.2] he checked to see [5.3] if the bowstring was flexible.
2. [7.1] 'Bring it to the kitchen [7.2] Grandma said to Kofi.	2. [1.1] Nobody told Grandpa or Grandma [1.2] when they returned.
3. [18.1] The computer itself is called the hardware. [18.2] and there are many different kinds of hardware.	3. [6.1] In the beginning, people placed logs on water [6.2] which they directed with their hands.

*Source: Field Survey (2024)*

The study also ascertained another way by which one clause can be linked to another in a clause complex thus, the logico-semantic relation. This relationship has two main types: Expansion and Projection. By expansion, clauses realize meaning through the use of conjunctions. With this relation, the primary clause is expanded by the secondary clause through elaboration, enhancement and extension. The elaboration relation is attained using examples in order to provide more information to a previously stated idea. For instance, in a paratactic elaborating clause complex, the first clause is restated and illustrated by another clause. The semi colon or colon is usually used in between the clauses.

[7.1] The great warriors of the land had gathered;

[7.2] they were prepared for war.

In the hypotactic elaborating relation, the subordinate clause gives an elaborate description.

[2] It is caused by a parasite [**which is normally carried and injected into bodies by a mosquito.**]

Enhancement is realized in meanings which express place, time, cause, condition, concession and manner and can also be expressed as circumstances within the clause.

Time as hypotactic enhancement:

[11.1] Occasionally when someone climbs a tree after him, ||

[11.2] he'll start backing down.

Enhancing relations are commonly identified with clause complex relations which are hypotactic. Extension relations add alternative meaning or information to the clause. These relations often link parataxis through the use of conjunctions such as *and*, *but*, *or*, and *nor*.

[25.1] Nana raised his hand ||

[25.2] and the young man stopped speaking in mid-sentence.

In extension relations, the subjects can be ellipsed: (e.g)

[9.1] Elections have been going on for a long time ||

[9.2] and generally follow certain processes.

Projection concerns speeches or thoughts which are direct or indirect. In this relation, a parataxis occurs when a clause quotes another as in direct speech or thought but a hypotaxis is realized when a clause is reporting another clause as in indirect speech or thought. This is exemplified in Table 3.5. Under “Parataxis”, a projection is “LOCUTION” when the metaphenomena is projected by a verbal clause (the use of saying verbs such as ‘said’, ‘asked’, ‘promised’, etc) while it is idea when the metaphenomena is projected by a mental clause (using mental verbs such as think, know, learn, believe etc).

**Table 3.5: Clause Complex Projection**

Parataxis	Hypotaxis
LOCUTION	



[7.1] 'Bring it to the kitchen'	Grandma asked Kofi
[7.2] Grandma said to Kofi.	to send it to the kitchen
IDEA	
[14.5] "Nana wants to know	[14.6] if we have consulted.

**Source: Field Survey (2024)**

The third research question is concerned with lexical density of the selected registers. Lexical density of texts is recognized as an important factor of complexity of written language (Halliday, 1989). This study is analyzed by applying the formula proposed by Halliday, which suggests that the number of lexical items per ranking clauses should be considered. The formula for Halliday's lexical density (LD) calculation is as follows (Castello, 2008, p. 97):

$$LD = \frac{\text{Total number lexical words}}{\text{Total number of ranking clauses}}$$

For this study, I first of all manually counted the number of lexical items (content words) and ranking clauses of the selected passages with assistance from a grammar class of MPhil English Language students of the University of Cape Coast. This enabled me to calculate the lexical density. The selected passages were equally processed in Microsoft word to generate the total number of words in the passages as a way to confirm the manual counting of the researcher.

According to Halliday (1985b), it is sometimes difficult to draw the line between lexical items and grammatical items; but he cautioned that items should be consistent throughout the analysis. Following prior recommendation by Halliday and Matthiessen (2004), the present study considered all nouns, lexical verbs, all adjectives, all adverbs as lexical items; while all pronouns, all determiners, all finite and modal verbs, all conjunctions and all prepositions as grammatical items.

With the ranking clauses, the researcher considered parataxis (independent clauses) and hypotaxis (dependent clauses) as ranking clauses but the following groups of clauses (e.g. nominal clauses and restrictive relative clauses) were excluded in the analysis. The lexical density scores were interpreted according to Halliday's interpretation of the scores that formal written texts have an average lexical density of 4 or 5. Lexical densities of 5 or higher can be considered high and make a text highly dense. For example, for a passage with 241 lexical items and 30 ranking clauses, its lexical density is calculated as  $\frac{241}{30}$ , which is equal to 8.0 lexical density. This suggest that the passage has a high lexical density.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### Introduction

In the previous chapter, procedures adopted for the retrieval of relevant data and their analysis were presented. This chapter presents and discusses the results of the analysis of registers represented in reading comprehension passages, differences in clause complex relations across registers and variations in lexical density across registers. The chapter is segmented into four sections. The first section covers the identification of registers, while the second section focuses on clause complex relations. The third section examines variations in lexical density, while the fourth section entails a succinct summary of the entire chapter.

#### **Research Question 1: Socio-Semiotic Processes and Value Features in the Selected Passages**

This section addresses research question one:

*What socio-semiotic processes are represented in reading comprehension passages in the SHS English Language textbooks in Ghana?*

For this study and in consonance with Matthiessen (2015) and Matthiessen and Teruya (2019), the socio-semiotic process refers to the registers in comprehension passages that authors use to communicate meaning in various ways. This section discusses the type of registers identified in the passages and the nature of content represented in individual registers as well as the kind of value features available in each of the registers. Depicted in Table 4.1 is the distribution of socio-semiotic processes discovered within the data.

For clarity, I used the following codes for the textbooks: Book 1=R1, Book 2 =R2 and Book 3=R3.

### Socio-Semiotic Processes Identified in the Passages

Table 4.1 reveals that six types of socio-semiotic processes, which can be found in the textbooks, are: 1) Exploring, 2) Expounding, 3) Reporting, 4) Recommending, 5) Recreating, and 6) Sharing.

**Table 4.1: Distribution of Socio-Semiotic Processes across the Textbooks**

Socio-Semiotic Process	R1		R2		R3		Total	
	n	%	n	%	n	%	n	%
Exploring	7	12.7	11	20	10	18.2	28	51
Expounding	4	7.3	1	1.8	1	1.8	6	10.9
Recreating	3	5.5	5	9.1	2	3.6	10	18.2
Recommending	0	0		0	2	3.6	2	3.6
Reporting	4	7.3	3	5.5		0	7	12.7
Sharing	2	3.6	0	0	0	0	2	3.6
<b>Grand Total</b>	<b>20</b>	<b>36.4</b>	<b>20</b>	<b>36.4</b>	<b>15</b>	<b>27.2</b>	<b>55</b>	<b>100</b>

**Source: Field Survey (2024)**

**n=Frequency; Book 1=R1; Book 2 =R2, Book 3=R3.**

The table 4.1 shows that these registers are distributed differently, and their frequency varies from several perspectives. Exploring ranks first among the dominant registers with 28 (51%) frequency. This is followed by Recreating 10 (18.2%). Recommending and Sharing each had 2 (3.6%) instances, indicating they were the least used registers in the data.

Table 4.2 reveals additional details regarding the identified (6) registers in the data.

**Table 4.2: Type and sub-types of Socio-Semiotic processes**

Socio-Semiotic Process	Sub-types	R1		R2		R3		Total	
		n	(%)	N	(%)	n	(%)	n	(%)
Exploring	Reviewing	5	9.1	9	16.4	10	18.2	24	43.6
	Arguing	3	5.5	1	1.8	0	0	4	7.3
	Recommending	0	0	0	0	2	2	2	3.6
Reporting	Chronicling	2	3.6	0	0	0	0	2	3.6
	Surveying	2	3.6	3	5.5	0	0	5	9.1
	Explaining	3	5.5	0	0	1	1.8	4	7.3
Expounding	Categorising	2	3.6	0	0	0	0	2	3.6
Recreating	Narrating	3	5.5	5	9.1	2	3.6	10	18.2
Sharing	Experience	2	3.6	0	0	0	0	2	3.6
<b>Grand Total</b>		<b>22</b>	<b>40.0</b>	<b>18</b>	<b>32.7</b>	<b>15</b>	<b>27.3</b>	<b>55</b>	<b>100</b>

**Source: Field Survey (2024)**

**n=Frequency; Book 1=R1; Book 2 =R2, Book 3=R3.**

The table 4.2 shows the sub-categories or sub-types of the six registers. Only exploring and expounding registers have both sub-types. However, reporting, recreating, and sharing do not have subtypes. This means inventorying for reporting was not available, and the subtype of recreating – dramatizing, was also not available. Sharing values, a subtype of sharing, was not available. Additionally, promoting, a subtype of recommending, was also not available. Findings revealed that sharing, recreating, recommending and reporting have value features that facilitated their realization and fostered students' understanding and comprehension. These various forms of subtypes are substantiated in subsequent paragraphs.

It is noteworthy that reviewing is the dominant subtype, with 24 (43.6%), followed by narrating 10 (18.2%). Four subtypes were sparingly used in the data, with all four (advising, chronicling, categorising, and experience) scoring 2 (3.6%), respectively. I found that among the three books, SHS 1 book (R1=40.0%) contains more registerial diversity than SHS 2 (R2=32.7%) and

SHS 3 books (R3=27.3%). In effect, the SHS 3 book had the least use of registerial subtypes.

The findings in this section corroborate the results of studies by To (2018) and Mahboob (2019) that the complexity of textbooks and the choice of registers become more complex from one level to another. Table 4.2 shows that registerial diversity in textbooks gradually reduced from 40% of subtypes in SHS 1 to 32.7% in SHS 2 and later drastically dropped to 27.3% in SHS 3. This shows a 7.3% drop between SHS 1 and 2, alongside a notable drop of 5.4% between SHS 2 and 3, thus corroborating To (2018) and Mahboob (2019).

It is worth noting that the finding in this section is consistent with the outcome of studies by Mohamed and Negm (1997) and Jacobs (2019), that the individual personal experience often influences selection of cultural resources by a writer. Findings of studies by Martin and Rose (2008), Matthiessen (2015), and Matthiessen and Teruya (2019) within the context of culture and situation showed that there are several other registers authors could have used to buttress important points and increase students' registerial repertoire. Consider reporting and sharing, which were not used in R2 and R3, are invaluable in second cycle schools (English language as a subject) in view of their relevance to sustaining readers' interest in a given event or review as well as impact valuable information to students irrespective of their academic levels (Matthiessen, 2015; Rezeki & Sagala, 2021). As a result, this finding is inconsistent with the focus of cline of instantiation, which requires authors to be adequately familiar with several registers so as to use socio-semiotic processes that best meet the specific contexts of SHS

2 and SHS 3 levels so as to fast-track students' knowledge, comprehension and increase their registerial repertoire.

The dominance of the exploring register is consistent with the overall objective and focus of the SHS English textbook, which is to foster the processes of teaching and learning of English at the second cycle school. Also, according to Gyasi and Slippe (2019), English textbooks are reference resources in connection with the communicative and practical uses of English. Hence, exploring register, which functions within the semantic space of communal or public values and positions, will be dominant since the register is frequently used in reviewing and arguing several ideas, positions and societal values.

### **Nature of Socio-Semiotic Processes**

This subsection considers the content of registers in terms of their value features and how authors used them. In line with Bache (2013) and Halliday and Matthiessen (1999, 2004), value feature refers to components or features in interrelated systems that facilitate the writer's capacity to instantiate the meaning potential of texts. It also helps in the realization of each of the eight registers in Matthiessen's (2015) registerial cartography. For example, reviewing and arguing are valuable features of exploring, while dramatizing and promoting are the valuable features of recreating and recommending, respectively.

This section of the study, therefore, provides information regarding value features of individual registers and what it means when an author adopts the register in the textbook. For example, how does an author explore, recreate, or expound, and what implication does it have on second language learning in second-cycle schools in Ghana?

Though there are variations in authors' use of the exploring register (Foll, 2021; Kabellow et al., 2021; Nordquist, 2019), it is evident that all the authors used it more frequently (R1=7; R2=11; R3=10) in each of the three books and it appeared with its subtypes in all the textbooks. The following excerpts highlight the value features of exploring alongside the important role of exploring within the context of the teaching and learning of the English language:

*Throughout the history of humankind, we have fought to be free of many things. One of the conditions that we have always tried to fight is disease.....(1)*

[R3: Diseases – Ebola]

*The World health Organization has determined that there is a link between good sanitation and good health. If we are going to live healthy lives, we must live in sanitary environments. Citizens often expect governments to ensure good sanitation in the nation; but then, the actions and inactions of citizens often contribute to the insanitary conditions in which people live..... (2)*

[R2: Sanitation]

*There are people who play sport for a living. These are called professionals. Others who are in a sport not for the money but for their entertainment and physical well-being are amateurs.....(3)*

[R1: Sports in Ghana]

Excerpts 1 to 3 illustrate the two value features associated with exploring and how the author explored or used the value features for enhancing students' knowledge and registerial repertoire. The two features are consistent with Matthiessen's (2015) topology of registerial cartography for exploring register, which comprises 1) reviewing and 2) arguing. Relevant segments of the excerpts are analysed to underscore how individual authors employ exploring



registers for the purpose of fostering students' knowledge of the English language within the context of communal, public or societal values and ideas.

In (1), the author employed the prepositional phrase "*Throughout the review history of humankind*" as well as an adverbial phrase "*conditions we...always tried to fight is disease*". The choice of the preposition "*throughout*" with the uncountable noun "*humankind*" and the adverb "*always*" demonstrates the author's interest in providing a retrospective view of humanity's historical trajectory in relation to diseases. In effect, the author used the exploring register to carry out an in-depth review and offer a personal opinion on issues involving humankind's history within the context of diseases and the efforts that have been made to eradicate them alongside their negative impact on human society.

Similarly, in R1, the author also reviewed relevant societal and cultural values in connection with sports. The author looked closely into issues concerning the public perception of those participating in sports within the Ghanaian context and provided his opinion. The author wrote, "*...people who play sport for a living...are called professionals. Others who are in a sport ...for... entertainment and physical well-being are amateurs*".

For SHS students, the authors' insight into the identification of individual participants in sports within Ghanaian contexts coincides with the cultural resources of education and the English language (subsystem) since it enhanced students' level of awareness of the peculiar 'terms' associated with the semantic space of sports in Ghana. This aligns with the theoretical framework of Cline of Instantiation because through effective use of the cultural resources of education, the author skilfully employed the rules within the

context of the subsystem (English language as a subject), using relevant topic (subtypes) to foster students' knowledge on what constitute professionals and amateurs among those participating in sports in Ghana.

The exploring register made it possible to situate and contextualise sports to aid students' understanding. Through the chosen register, the author lends credence to Halliday (2013) and Matthiessen's (2015, 2022) studies by localising the issue to suit the cultural settings of students in harmony with the cline of instantiation.

However, unlike the authors in R3 and R1, the author in R2 adopted a different subtype of exploring register – arguing. I substantiated this as follows: the author used the conditional clause “*If we are going to live healthy lives*” as a premise for the argument. This was followed by deductive reasoning or hypothetical syllogisms: “*we must live in sanitary conditions. Citizens often expect governments to ensure good sanitation in the nation; but then, the actions and inactions of citizens often contribute to the insanitary conditions in which people live*”.

In (2), it is clear that the author employed arguing to legitimize the claim of WHO that good sanitary condition is not the sole responsibility of the government; every citizen, irrespective of age, is included. The conditional clause and argument lend credence to the claim that the citizens, public or community, as a whole, should be aware that good health is dependent on the individual contributions of every citizen towards good sanitary conditions at home, workplace or any other location in the country. Thus, the choice of exploring register is very fitting and adequately contextualises the issue for students' understanding and comprehension.

As shown above, out of the 55 (100%) usages of registers, exploring accounts for more than half (28, 51%). This signifies that most of the authors employed the semantic space of public or communal values in underscoring relevant issues within human society, thereby deepening students' knowledge of such issues within the Ghanaian context. This is aimed at enhancing their communicative and practical use of English in relation to societal, public and communal matters.

By exploring, findings revealed that the author employs expressions or phrases involving public, communal or social values. These issues are critically examined and reviewed within the semantic space. This often affords the author the opportunity to proffer personal opinion of the issue reviewed. The textbook also explored through arguing, which often encompasses the provision of substantive argument so as to concretize or legitimize a point or fact for public or social consumption. Several examples were given in the data to underscore its relevance to teaching and learning. In effect, the dominance of exploring in the present study was a result of its function in tracing and reviewing the historical trajectory of several social issues and communal values for the purpose of enhancing students' communicative skills and fostering their capacity regarding registerial repertoire.

Following exploring is recreating register with 10 (18.2%) frequency in Table 4.1. However, in Table 4.2, it was shown that only narrating was used for the realization of recreating. Recreating, according to Martin and Rose (2008) and Matthiessen (2015), involves the use of narration or dramatization to underscore and vividly portray specific human imaginary events with the intention of creating aesthetic effect. There is an interception between the field

of activities and tenor in this regard. In effect, the author creates an imaginary world that has a direct relationship or tenuous connection with our day-to-day activities via narration or dramatization. The following excerpts are representative of the cases of recreating registers in the data.

*He was the leader of the brekete cult. Even some of the chiefs in the village and some other villages around were known to come to him to be fortified. He got everything that he wanted and no one got in his way. He could kill, literally, by snapping his fingers.....(4)*

[R 3: Diseases and Myths]

*Long ago, all animals lived together in a vast forest. Their king was the lion .One day, King Lion decided to organise a grand banquet. It was to mark the 18<sup>th</sup> birthday of his twin children, a son and a daughter. There was going to be a dancing competition and the best dancers were to win prizes; the hand of Princess Tata in marriage for the best male dancer and Prince Foofou for the best female dancer.....(5)*

[R 1: The Leopard and the Squirrel]

*He was away for just a couple of hours and then he returned. The excited children ran to meet him as he emerged from the footpath that led into the forest....The next day, Grandpa and Grandma had to attend a funeral in the next village. The two children were thus left to their own devices.....(6)*

[R2: Being Honest]

Excerpts (4), (5) and (6) illustrate that the authors employed narration as the value feature in the recreating register. For example, in (4), the allegorical statements: “...were known to come to him to be fortified”, “no one got in his way and “He could kill...by snapping his fingers” demonstrated how the author used effective narration to vividly portray specific human imaginary events with the intention of creating aesthetic effect.

In the passage, people go to the man “*to be fortified*” and he can kill just “*by snapping his fingers*”, which shows that the authors created the aesthetic feelings of the leader being an imaginary wall built to defend or serve as a bulwark or rampart to his people. The author boosted confidence in the imaginary figure by using a verbal phrase in making an allegorical statement: “*He can kill...by snapping his hand*”. He reemphasized the leader’s ability through another allegory: “no one got in his way”. This implies that he is greatly feared, and people are scared of confronting him.

The author thus creates an interception between the imaginary world of someone standing tall as a wall, fortification or bulwark and our day-to-day experience with pragmatic and resourceful political leaders, who often go to great lengths to fulfil their political mandate, defend their people against misery and foster growth and prosperity. The finding is consistent with the perspective of Martin and Rose (2008) and Matthiessen (2015) regarding how an author employs recreating register in deepening understanding and improving students’ knowledge through narration.

Similarly, in (5) and (6), the narration was also used as a value feature for recreating register. In (5), it was clear that the author used allegory in teaching important lessons through narration of the imaginary world of the animal kingdom to underscore what often transpires in the human kingdom and how individual members of the kingdom could either make or mar the prosperity of the kingdom. However, it is worth noting that, in (6), while narrating, the author created an aesthetic effect through the use of the phrase “*meet him as he emerged from the footpath*” since it is not possible in practical terms for the man to come out of the footpath.

Hence, the impression created was that of the excited children celebrating the arrival of their hero (Grandpa). The author further used the idiomatic expression that Grandpa and Granma left the two children “to their own devices”. Devices mentioned in (6) can only be in the imaginary world since there are no mechanical devices; rather, the idiomatic expression connotes that the children were unguided, allowed to suit themselves and follow their wishes or preferences.

As shown above in excerpts (4), (5) and (6), the author created an interception between reality and the imaginary world through narration using a recreating register. This harmonizes with the cline of instantiation by Halliday and Matthiessen (1999), Halliday (2013) and Matthiessen (2015), who postulated that the dimension of meaning is contained in a subsystem within a larger encompassing system. The authors in the above instances (4-6) used the cultural resources of a subsystem, which comprises registers and subtypes, to meet the context and peculiar settings of SHS students so that they can fathom the text and increase their knowledge and proficiency in the English language. In (4), (5) and (6), the author employed recreating register through narration as the subtype, in line with the cultural resources of the English language (subsystem) within the larger educational system of second cycle school, to convey valuable information relevant to deepening knowledge and enhancing students’ communicative skills in the English language.

A close study of Table 4.1 revealed that reporting was used more frequently (7, 12.7%) than expounding (6, 10.9%), recommending (2, 3.6%) and Sharing (2, 3.6%). Table 4.2 shows that the value features of reporting were Chronicling 2 (2, 3.6) and Surveying (5, 9.1%). This finding is notable because

both chronicling and surveying were only used in SHS 1 English textbook; they were non-existent in SHS 2 and SHS 3 textbooks.

This corroborates Özyıldırım's (2014) statement that authors are influenced by the target user space so that they can write with appropriate register to meet this space and clearly communicate meaningful information to their target audience, knowing they can comprehend the text. By inference, unlike authors of R2 and R3, the author of R1 employed a reporting register because he felt it was appropriate for SHS 1 students and they would benefit from detailed information regarding an issue, event or a certain location. On the other hand, by deductive reasoning, authors of R2 and R3 could have viewed reporting register (chronicling and surveying) as less instrumental or below the semantic space of SHS 2 and SHS 3 students.

The use of the two value features (chronicling and surveying) facilitated the efforts of the author to underscore his or her experience on a particular issue, phenomenon or event. As a result, chronicling enables the author to recount historical events or itemise news reports for the purpose of increasing awareness of an event or phenomenon. Surveying, on the other hand, entails critical evaluation, examination and/or description of a place, issue or event. The following excerpts are representative of how surveying and chronicling were used as reporting registers in the R1 English textbook:

*Since then, aircraft frames have become lighter and aircraft engines have become more efficient. But the most significant and lasting improvement has taken place in the use of the computer in powering and maneuvering the aircraft. Satellite communications have radically changed the cockpits of airliners while powerful computers help pilots in navigating and viewing the terrain much more accurately even at night and with low visibility.....(7)*

[R1: Transportation by Air]

*Ebenezer Ampa Sarpong, Director in charge of Programming, Planning, Monitoring and Evaluation at the Environmental Protection Agency, on Tuesday, noted that water pollution causes approximately 14,000 deaths daily in developing countries.....(8)*

[R1: Water Pollution in Ghana]

*Ngwane had a herd of goats and cattle. There were initially, 350 goats, but the numbers kept dwindling, especially during the dry season when the wilted grass had laid his farm bare. Then hyenas could approach his farm, attack, kill and feast on his goats.....(9)*

[R1: The Farmer, the Hawk and the Hyena]

*Mass education in Ghana dates back to the colonial era when missionaries taught their converts to read and write. During that period, however, there was no systematic effort to make the entire population literate. Only some of the people who had become Christians learnt to read and write....The Gold Coast government joined in the adult literacy efforts in the 1940s, yet the larger proportion of the population remained illiterate. ....(10)*

[R1: Mass Literacy]

Excerpts (7) to (10) illustrate the several cases of surveying and chronicling adopted by the author of R1 to enhance the communicative skills and learning experience of SHS 1 students. For example, in (7), the author deepened insight and attractively enhanced students' knowledge of the enviable position of computers in the aircraft industry through the following expressions: "...significant and lasting improvement has taken place" in the use of the computer "... in powering and maneuvering the aircraft", "have radically changed the cockpits of airliners".

The author sustained students' interest through the use of adjectives (*significant; lasting*), uncountable noun (*improvement*), gerunds (*powering and maneuvering*) and an adverb (*radically*). These words are familiar to students



and readily available in the cultural resources of second-cycle educational institutions in Ghana.

Going by the author's choice of words, it is clear that surveying in the reporting register was adopted. This coincides with Matthiessen's (2015) statement that a writer is using a reporting register (surveying) when he or she writes expressions that help readers keep up with the flow of information on the story or review of a human-related event, especially involving historical detail of a scientific discovery, equipment or technology.

The author's choice of words whets students' appetite/interest to learn and creates suspense because they were well chosen and within the context of their institutional subculture (or subsystem) and context of situation (meet sociocultural context). This coincides with the underpinning principle of SFL 'cline of instantiation' (Matthiessen, 2015; Matthiessen & Teruya, 2019; Rezeki & Sagala, 2021) that a resourceful and effective author or writer often selects relevant cultural resources in the register to suit the context of potential readers, so as to increase their registerial repertoire, augment knowledge and improve the learning experience.

The author, in (9), however, adopted chronicling in the use of a reporting register, as shown by the following expressions: "*Ngwane had a herd of goats and cattle, initially 350 goats...kept dwindling...during the dry season....Then hyenas...approach his farm, attack, kill and feast on his goat.*" A close reading of the highlighted excerpt demonstrated how the author chronicled vital information in the story about the farmer, the farm and predators (the hyenas). The author divided the short story (3 paragraphs) into a series of seven discrete parts, namely: (1) the identity of the farmer, (2) the size and condition of his

farm, (3) the inception of disaster, (4) time/period disaster often strike, (5) (6) factors promoting disaster, and (7) the culprit.

It is clear from the author's approach that he effectively chronicled the story so that it meets the context of culture and the context of situation of the students. As newcomers in the SHS academic setting, dividing the story into seven intervening parts with words that are readily available in their cultural resources and their sociocultural setting makes it very easy for the students to read and comprehend, with a positive impact on their communicative skills.

An in-depth analysis of Table 4.1 revealed that both sharing and recommending occur sparingly, with both occurring only 2 (3.6%) times. This means that the two socio-semiotic processes were the least used. It is also noteworthy that while recommending was used by the author for R2, sharing was used by the author for R1. In effect, both recommending and sharing were used in only one, though separate textbooks (R1=Sharing; R2: Recommending).

Table 4.2 reveals that while explaining is the major value feature of expounding, experience is the only value feature for sharing. The following excerpts underscored how the authors used sharing and recommending registers in their textbooks:

*My brother promptly sent me five hundred Ghana cedis. I spun round and round until my sides almost split with joy and my head reeled with dizziness. In a matter of seconds, I had spilt the good news in a hurried jumble of gaps, giggles and words. My sister, Ama, quickly grew tired of my excited babbling.....(11)*

[R1: The New Dress]

*What do you do with the old cabinet? Would you give it away? Would you throw it away? Perhaps your garden fence is also coming apart because termites have eaten away a portion. You can decide to*

*invite a carpenter to take the cabinet apart, saw up the hard wood into the appropriate dimensions and use it to mend your fence. You are reusing what you had earlier used as a cabinet for something else. That is the idea of recycling.....(12)*

[R3: Environmental Issues: Recycling]

Excerpts (11) and (12) deepen insight into the various ways the authors used sharing (experience) and recommending (advising) to promote SHS 1 and SHS 3 students' learning experience and registerial repertoire. For instance, in (11), *My brother promptly sent me..... I spun round...until my sides almost split with joy...my head reeled with dizziness... I had spilt the good news....My sister, Ama,... grew tired of my excited babbling*" the author made several attributive sentences such as (1) "*my brother promptly sent me...*", (2) "*I spun round...until my sides almost split with joy*", (3) "*I had split the good news*" and (4) "*my sister, Ama,...grew tired*".

The attributive adjectives in the highlighted sentences (1-4) of the excerpt (11) underscored how the author used words such as "I" and "my", which underscores the authors' interest in highlighting personal experience (of the speaker). The possessives ("I" and "my") epitomise the personal feeling or experience of the speaker (Nordquist, 2019). As a result, the finding in this section revealed that through the use of the value feature (personal experience), the author adopts a sharing register to buttress vital points.

The personal experience of the speaker was well presented and vivid that students can readily remember important aspects of the comprehension passage, thereby enhancing their capacity to improve their academic achievement in the subsystem or English language as a subject.

The use of the following expression: “...*You can decide to invite a carpenter to take the cabinet apart, saw up the hardwood into the appropriate dimensions and use it to mend your fence*” clearly showed that the writer is “advising” an important value feature of recommending. As shown in (12), subsequent to the authors’ questions on how a member of his audience may want to use an old cabinet and the likelihood that the audience may be interested in knowing the best way to approach the issue, he initiated an “advising” session wherein he provided meaningful recommendations on the best way to use an old cabinet.

The finding is consistent with Christie and Derewianka (2008), Matthiessen (2009) and Matthiessen (2015) that as one of the major value features of sharing register, advising entails recommendation of a line of thought or action to an addressee as the beneficiary. In (12), any addressee in doubt regarding the best way to use an old cabinet will greatly benefit from reading the literary work.

Moreover, in future, the need may arise for other addressees on how to use an old cabinet, and at that time, they will also become beneficiaries of the authors’ ‘advice. When considered within the context of SHS 3 students, Christie and Derewianka (2008) and Matthiessen (2009) demonstrated that the author adopted the recommending register to progressively expand students’ registerial repertoires regarding old cabinets and their usage. Hence, students’ academic pathways within the subsystem (English as a subject) are broadened and enhanced.

In a nutshell, the finding of the study showed that six socio-semiotic processes were identified in the data. These were: 1) Exploring, 2) Expounding,

3) Recreating, 4) Recommending, 5) Reporting, and 6) Sharing. Ranking first among these registers is exploring, with 28 (51%) as its frequency. This was followed by recreating 10 (18.2%), while both recommending 2 (3.6%) and sharing 2 (3.6%) were the least used among the registers.

Results of the study further showed that the authors of the three books exhausted the value features relevant to their realization in the data and harmony with Matthiessen's topology of registerial cartography. Reviewing was ranked first among the subtypes, with 24 (43.6%) in frequency. Findings also revealed that among the three books, SHS 1 book ( $R1=40.0\%$ ) contains more value features than SHS 2 ( $R2=32.7\%$ ) and SHS 3 books ( $R3=27.3\%$ ). In effect, the SHS 3 book had the lowest registerial diversity.

Findings revealed that the dominance of the exploring register is consistent with the overall objective and focus of the SHS English textbook; it functions as a reference resource in connection with the communicative and practical uses of English. Hence, exploring register, which functions within the semantic space of communal or public values and positions, is often used in reviewing and arguing ideas, positions and societal values.

## **Research Question 2: Clause Complex Relations across Socio-Semiotic Processes**

The primary focus of this section is to critically examine the data with a view to responding to the research question two:

*What differences exist in the clause complex relations across socio-semiotic processes in the reading comprehension passages in the SHS English language textbooks of Ghana?*

In this segment of the study, I analyzed the type of relationship existing between clauses and how they are distributed across registers. Essentially, this section proffered answers to questions such as how clauses are distributed among the taxis and logico-semantic relation types across the registers in the data. More importantly, what are the possible implications of clause complex relations to the overall focus of the present study?

Under this section, I arranged the clauses structurally by numbering them numerically as they occur in the passages. This was followed by an analysis of taxis and logico-semantic across data alongside their implications for the present study.

In this section, I outlined the clausal structures in each of the passages in the three textbooks (R1, R2, and R3). Table 4.3 encapsulates the clausal structures of the three textbooks.

Close reading of the table revealed that the clauses were structured based on the four dominant registers (Exploring, Expounding, Recreating and Reporting). Each of the books varied in their results within the context of taxis (simplex, hypotaxis and parataxis). I selected only four socio-semiotic processes because in-depth analysis of the data revealed that these four had enough passages suitable for adequate and in-depth analysis in comparison to other socio-semiotic processes such as sharing and recommending. For example, after examining the data, I discovered that exploring, recreating, and reporting have more than five passages.

**Table 4.3: Tactic relations in the SHS English Language Textbooks in Ghana**

Register	Taxis											
	R1				R2				R3			
	Sentence	Simplex	Hypotaxis	Parataxis	Sentence	Simplex	Hypotaxis	Parataxis	Sentence	Simplex	Hypotaxis	Parataxis
	n	n	n	n	n	n	n	n	n	n	n	n
Exploring	47	18	17	12	88	35	39	16	75	16	45	20
Expounding	130	56	55	19	1	0	0	1	40	10	28	3
Recreating	199	58	53	107	72	13	23	39	54	12	14	31
Reporting	88	17	42	18	78	26	42	10	0	0	0	0
Total	464	149	167	156	239	74	104	66	169	38	87	54

**Source: Field Survey (2024)****n=Frequency; Book 1=R1; Book 2 =R2, Book 3=R3.**

Though the expounding register has four passages, only four belong to the same sub-category(explaining) The rest of the socio-semiotic processes were less than three passages. Hence, it was prudent to select the four socio-semiotic processes to deepen knowledge and promote well-validated research findings.

Table 4.3 reveals that while R1 has 464 sentences, there is a corresponding decrease in the number of sentences in R2 (239) and R3 (169). This means there is a drop of 225 (32%) in sentences between R1 and R2 and also a drop of 70 (17%) between R2 and R3. In effect, the author of R1, when compared to R2 and R3, employed several sentences. The usage of more sentences influenced the clausal structure in each of the books alongside notable implications for the present study. For example, a close study of the simplex in each of the books showed that R1 dominates other books in terms of simple clause relation. Computation in Table 4.3 showed that while simplex was used more frequently in R1 (32.1%), its use was limited in R2 (30.9) and acutely limited in R3 (22.5%).

However, Table 4.3 reveals that R3 dominates R1 and R2 in the use of hypotaxis. The data showed that the author of R3 frequently (51.4%) use hypotaxis, while authors of R2 (43.5%) and R1 (35.9%). In effect, the author of R3 used hypotaxis extensively, while the writer of R1 used it sparingly.

Also, R1 dominates the use of parataxis in comparison to the other books (R2 used it only 27.6%). This means that while R1 contains more parataxis in comparison to R3, it was sparingly used in R2 and R3). For instance, while R1 used parataxis with a frequency of 33.6%, which was close to how the author of R3 used it (31.9%), the writer of R2 used 27.6%.



The following excerpts illustrate the statistical computation in Table 4.3. The three excerpts provided ample clues to how clause combination influences linguistic complexity and the extent to which readers can comprehend the content of an English textbook.

*Random felling of trees has, however, destroyed large portions of forest.....(13)*

[R1: Effect of Deforestation, Reporting]

*The occasional bear or panther will put up with a fistful of quills for a taste of porcupine meat, and wolves have been found to have quills bristling thick in their throats, but the only animal [[which can take the porcupine regularly and without getting hurt]] is the fisher, a big, fast member of the weasel family, that gets his paw under the porcupine's unprotected stomach and flipms him over .....(14)*

[R3: World Heritage Sites: The Castles of Ghana, Exploring]

*"I think this is intolerable. Nana himself is here and for half the day we've been waiting for the Okomfo.....(15)*

[R2: The Supreme Sacrifice 1, Recreating]

Excerpt (13), under the reporting register in SHS 1 (R1), with the sentence: "*Random felling of trees has, however, destroyed large portions of forest*", it is evident that the sentence is a "Simplex", an important category, as shown in Table 4.3, under taxis. Simplex is a simple sentence comprising one independent clause. The sentence in (13) does not contain subordinate or dependent clauses. Relevant information such as process (*random felling of trees*) and circumstance (*destroyed large portions of forest*) were provided, which was sufficient to convey accurate meaning to listeners or readers.

However, in (14), under exploring register in SHS 3 (R2) textbook, the sentence comprises six clauses with various forms of taxis. For example, the two clauses “*the occasional bear or panther will put up with fistful of quills...and wolves have been found to have quills bristling thick in their throats*” is “Parataxis” in their relationship because it comprised two independent clauses with similar elements (a) “bear or panther...with fistful of quills” and (b) “wolves...found to have quills bristling in their throats” while (a) was initiating, (b) was continuing with a view to providing readers with accurate and complete information. The clauses in (14) are independent without the need for a subordinate clause. Similarly, in the three clauses highlighted as follows: (a) *but the only animal* (b) *[[which can take the porcupine regularly and without getting hurt]] is the fisher, a big, fast member of the weasel family,*”. I divided the sentence into two clauses labelled (a), and (b). Each of these sentences is independent, although one initiated the statement (“but the only animal”) while the remaining are continuing”.

In Excerpt (15) “*for almost half the day we’ve been waiting for the Okomfo*” can be classified as “Hypotaxis” because the subordinate or dependent clause is tied to the dominant clause for accurate transmission of meaning. In (3a), the use of the conjunction “and” and circumstance or time “...almost half a day” demonstrated that (a) would have no meaning if “*we’ve been waiting for the Otumfo*” was not included.

The result of the study in this section coincides with the insightful study of Berendez and Vajjala (2017) where the level of linguistic complexity fluctuated across Grades VII, VIII, and IX. This is similar to SHS 1, SHS 2 and SHS 3 English textbooks, as highlighted above, simple sentences were

dominant in R1, followed by R2, and in R3, it was sparingly used. Similarly, complex clausal structure was frequent in R3 (51.4%), less frequent in R2 (43.5%) and sparingly used in R1 (35.9).

Hence, contrary to the findings of Gamson, Lu and Eckert (2013) and Hiebert and Mesmer (2013), who supported the model of grammatical intricacy which claimed that the complexity of text decreases as the level progressed, this study has shown that complexity increases due to the nature of clausal structure for every grade level.

Notwithstanding, the finding in this section is inconsistent with the outcome of an investigation by Verdiansyah et al. (2020) that, based on descriptive and inferential statistics, there was no statistically significant difference between grades 10 and 12 of English language textbooks. This lends credence to the result of a comprehensive study by Amendum, Conradi and Hiebert (2017) that linguists are divided in relation to whether complexity progresses from one level to the other. For instance, while some conceptualized a gradual progression of complexity, others felt that complexity should be reduced so as to facilitate a deeper level of comprehension among students.

Viewing this dichotomy of opinion from the perspective of Matthiessen (2015) and within the context of the cline of instantiation, it is evident that textbooks are instrumental to enhancing students' registerial repertoire. Hence, comprehension passages in English textbooks should be written in such a way that students can readily comprehend and make appropriate inferences based on a deeper knowledge of the passage.

The finding above corroborated Mulyanti and Soeharto's (2019) recommendation that text should be written to meet the varying stages of

students' intellectual development. This means, according to the cline of instantiation by Matthiessen (2015), textbook authors or writers should write to increase the concrete level of meaning embedded in each subsystem and subtype with a view to employing cultural resources and relevant socio-semiotic processes that meet the specific context and level of SHS students.

It is noteworthy that when Table 4.3 is considered from the perspective of the four semiotic processes (Exploring, Expounding, Recreating and Reporting), it is clear that there is a notable progression in the three textbooks. For example, consider the use of the exploring register in each of the textbooks. A notable progression was visible because while R1 employed hypotaxis less frequently (36.2%), R3 adopted it more frequently (60%). However, fluctuation was observed in relation to the use of simplex because while the author of R1 used simplex 38.3% in the selected passages, its usage increased in R2 (39.8%) and later dropped in R3 (21.3%). Similarly, parataxis was used 25.5% in R1; the writer of R2 used it sparingly (18.2%) while the author of R3 adopted it 26.7%.

Findings in this section provide insight into the controversy surrounding complexity or variation in clause complexity in comprehension passages. The result has demonstrated that while exploring, simplex and parataxis were fluctuating across the three books, hypotaxis was consistently progressive in relation to how the three authors used it. Conversely, the data showed that parataxis was consistently progressive within the context of the recreating register because it was used 53.8% in R1, 54.2% in R2 and 57.4% in R3. However, both hypotaxis and simplex were fluctuating. The data revealed that

simplex was used 29.1% in R1, 18.1% in R2 and 22.2% in R3. On the other hand, hypotaxis was employed at 26.7% in R1, 31.9% in R2 and 25.9% in R3.

The finding regarding parataxis is consistent with To's (2018) and Mahboob's (2019) studies that there is a gradual and notable progression from one level or grade of education to another. Both To and Mahboob provide ample support for the outcome of Franz et al. (2015) and the focus of the present study. Franz et al. (2015) discovered that it is not necessarily grade or level of education that influences variation in linguistic complexity. They indicated that the syntactical features of a text often contribute to linguistic complexity. The finding in Table 4.3 lends credence to Franz et al. (2015) result because variation in complexity was related to syntactical complexity at the clausal level, as shown in the clausal structure (computed in Table 4.3).

The next sub-section of this section critically examined and analysed retrieved data in relation to logic-semantic relations as well as logico-semantic sub-categories with a view to underscore their implications for the present study. This is an important aspect of the analysis because there are controversies on how linguistic complexity is conceptualized, and more importantly, as Amendum et al. (2017) and Mulyanti and Soeharto (2019) indicated, it is prudent to conduct a specific investigation in connection with individual textbooks because empirical literature on complexity has yielded varied results. More importantly, the findings in those studies cannot be generalized due to the adopted methodology. Hence, the following section examines clause complex relations and their implication for the present study.

## Clause Complex Relations

This section is primarily oriented towards analysis of the clause complex relations in the data with a view to making appropriate inferences in connection with the implications of findings regarding how authors' choices of clausal combination and students' level of comprehension, increment of registerial repertoire and academic progress in the English language.

In their study, Halliday and Matthiessen (2004) indicated that the determination of clausal complexity in a sentence is inextricably linked to gaining insight into the level of syntactical complexity in a literary piece such as a textbook. However, findings of several studies showed that clausal complexity does not necessarily mean difficulty in reading or comprehending a passage in a comprehension textbook, several other factors should be examined to determine the effect on readers. Hence, in consonance with Amendum et al. (2017) and Mulyanti and Soeharto (2019), I have examined relevant passages in the three comprehension textbooks, and the results have been summarized in Table 4.4.

Table 4.4 shows that the hypotactic relationship is dominant in the data when compared to the use of parataxis by the three authors. The table showed that, in aggregate, hypotactic relationships between clauses had a frequency of 140, while paratactic relationships were 124. It is noteworthy that among the four logico-semantic categories, extension was used more frequently than elaboration, enhancing, and projection. The data in Table 4.4 showed that most of the authors used extension 105 (40%), followed by projection 73 (27%). On the other hand, elaboration had 63 (24%), while enhancing was the least frequent with 23 (9%) usage.

**Table 4.4: Clause Complex Relation**

Register	Paratactic Relation					Hypotactic Relation				
	Elaborating	Enhancing	Extension	Projection	Total	Elaborating	Enhancing	Extension	Projection	Total
Exploring	8	4	7	2	21	14	2	14	10	40
Expounding	4	0	4	3	11	11	1	21	2	35
Reporting	6	2	6	2	16	3	6	19	8	36
Recreating	15	5	21	35	76	2	3	13	11	29
Grand Total	33	11	38	42	124	30	12	67	31	140

**Source: Field Survey (2024)****n=Frequency; Book 1=R1; Book 2 =R2, Book 3=R3.**

It is worth mentioning that among the four semiotic processes, the recreating register has the highest level of paratactic relations because the three authors used it frequently 76 (61.2%). Within the context of hypotactic relation, exploring ranked first because it was used 40 (29%). The frequency of clause complex within paratactic and hypotactic relation in Table 4.4 reveals that the recreating register was dominant. The use of the four categories of logico semantic was widespread in the recreating register in comparison to the remaining three registers. For instance, while recreating has a frequency of 105 (40%), exploring had 61 (23%), reporting recorded 52 (20%), and expounding scored 46 (17%).

The finding in this section showed that extension was the largest sub-category of expansion. This is inconsistent with the findings of Eggins (2004) that enhancement is the largest sub-category of expansion. The dominance of extension can be attributed to the desire of the authors to add new information, offer an alternative explanation or underscore an exception, which Noviadari (2019) and Nordquist (2020) indicated can contribute to a deepening of readers' knowledge as well as engendering lasting impression on readers' mind. Nordquist indicated that the use of extension often changes the sentence from simple to complex or compound sentence.

However, Wray and Janan (2013) and Sibanda (2020) asserted that complex or compound sentences often contain several clauses that make greater demands on readers' memory. In view of the dichotomy of opinion regarding the type of sentences that will foster comprehension, this section analysed some of the sentences selected in the three books (R1, R2 and R3). The excerpt below is illustrative of the dominant types of sentences used in the passages.



*It was comfortable there and Grandpa and Grandma were very warm and friendly even though a little patronising.....(16)*

[R1: Being Honest 1]

*The bowstrings were tested for their flexibility and bows for their tautness.....(17)*

[R2: The Supreme Sacrifice 1]

*Unfortunately for Nana Tingan there were about a half dozen men with him at the time, and he had boasted to them earlier that he was about to take a younger wife.....(18)*

[R3: Diseases and Myths]

*Ami had the disease again and her mother was very worried. Ami was Seventeen.....(19)*

[R3: Diseases and Myths]

Excerpt (13) reveals that the logico-semantic category the author used was extension and its logico-semantic sub-category was “addition” (+). I divided the sentence into three clauses:

<sup>1</sup>*It was comfortable there [[<sup>+2</sup>and Grandpa and Grandma were very warm and friendly [[ even though a little patronising*

From the excerpt above, it is clear that the logico semantic relation between the first clause and second clause, “and Grandpa and Grandma were very warm and friendly” was an extension which was realized using the sub-category “addition” as indicated in the excerpt. The use of extension here contributed to a clearer understanding because it added something new. Readers do not know why the participants felt the location was comfortable. However, with the “addition”, readers deciphered that Grandpa and Grandma were friendly.

It can be inferred, therefore, that the use of extension provided detail and depth to the first clause, which had a paratactic relation with the second clause

since the two were independent and of equal status. In a similar vein, the second clause has a hypotactic relation with the third clause because the two have unequal status and the third clause “even though a little patronizing” is dependent on the second clause.

Similarly, excerpt 14, “*The bowstrings were tested for their flexibility and bows for their tautness*”, underscores another crucial function of extension as a logico-semantic category. The sentence in excerpt 14 can be divided into 2 clauses, as shown below: *The bowstrings were tested for their flexibility* [<sup>+</sup>*and bows for their tautness*”].

The logico-semantic sub-category “addition” is used to realize the main logico-semantic category “extension”. The use of a conjunction to link the two clauses in <sup>+</sup>*and bows for their tautness*” brought to bear an alternative to bowstrings, which is one of the main functions of extension. Essentially, the sentence conveys the thought that bowstrings could be tested for “*flexibility*” and the bow tested for “*tautness*”.

Another interesting aspect of the two clauses is that they are related paratactically. The two clauses were independent and possessed complete meaning. However, while the first: “*The bowstrings were tested for their flexibility*” initiated the sentences or story, the second continued the line of thought: <sup>+</sup>*and bows for their tautness*. As a result, the author was able to provide readers with accurate, relevant information as well as other alternatives that make the story come alive in the mind of readers.

Excerpt (17): “*Ami had the disease again and her mother was very worried*” reveals another aspect of how extension as a logico-semantic category

influences the nature of a sentence and readers' level of comprehension. The sentence can be divided into two clauses, as shown below:

*<sup>1</sup>"Ami had the disease again [[ +and her mother was very worried"*

Extension occupies an essential position in terms of deepening the knowledge of readers concerning the sentence. In this instance, extension was realized using "addition" with a view to provide the reader with new information "her mother was very worried". Essentially, without the use of logico-semantic relation, I mean, if it was a simplex, vital information regarding the mother's state of mind would be missing. With the use of compound sentences, the author was able to convey ample information with depth, thereby extending readers' understanding regarding Ami and the mother. This has contributed to the progression of knowledge on the part of readers or listeners.

Other examples underscoring the dominance of extension in the data are provided below:

*Nana raised his hand // .....(18)*

[R2: The Supreme Sacrifice 1]

*and the young man stopped speaking in mid-sentence.....(19)*

[R2: The Supreme Sacrifice 1]

In both (18) and (19) above, it is clear that extension was used to provide relevant information to the clause. It is worth mentioning that the sentence is paratactically related since both are independent and contain complete meaning. The use of parataxis and extension (logico-semantic made it possible to decipher that the man speaking stopped mid-sentence. If, for the sake of writing a simple sentence, the additional information was chopped, readers would not have gained insight into the sentence. Hence, in this instance, the

compound sentence provided ample information to deepen listeners' or readers' knowledge. In certain instances, the logico-semantic category of extension can be ellipted or elliptical, consider the following excerpt in the data: "Elections have been going on for a long time ||" "and generally follow certain processes".

The findings in this section of the study demonstrated significant implications in connection with the overall focus of the study. For example, the finding provided useful information concerning bridging the conundrum regarding various conceptualizations on the type of sentence that will foster students' understanding. In consonance with Noviadari (2019) and Nordquist (2020), the finding in this segment has shown that compound sentences can deepen readers' knowledge as well as engendering lasting impressions on readers' minds. Relevant information that would have been chopped off for the sake of writing simple sentences was provided, and it broadens readers' knowledge concerning the issue at hand.

The result contradicts the findings of studies by Wray and Janan (2013) and Sibanda (2013, 2020) that long sentences make greater demands on the readers' memory and because such sentences often contain clause complexes comprising subordinate and dependent clauses, it usually reduces comprehensibility.

The findings in this section of the study lend credence to Graves and Graves' (2003) observation that the use of compound or long sentences could be beneficial and contribute to comprehensibility if it is used to buttress or enhance readers' knowledge or outlook on certain issues. Graves and Graves indicated that such sentences could include examples, illustrations and logico-semantic categories to foster comprehensibility. The excerpts analysed above

revealed that majority of the sentences contributed to enhancing readers' comprehensibility.

Analysis in this section is consistent with the framework of Matthiessen's (2015) cline of instantiation. Though simplex or simple sentences were used, all the authors employed long sentences to buttress vital information. This means their choice of the clausal structure was commensurate with students' level of comprehensibility because they employed compound sentences comprising paratactic and hypotactic relations to promote students' understanding. In effect, relevant cultural resources in the sub-system were adopted by authors to ensure that students' registerial repertoire is enhanced and broadened, which harmonizes with an underlying principle of Matthiessen's (2015) Cline of Instantiation.

In summary, the result of the study in this section has shown that as the grade level progresses, the level of complexity also progresses. The study showed that simple sentences were dominant in R1, followed by R2, and in R3, it was sparingly used. Similarly, complex clausal structure was frequent in R3 (51.4%), less frequent in R2 (43.5%) and sparingly used in R1 (35.9%). Results also showed that R3 dominates R1 and R2 in the use of hypotaxis. It was shown that the authors of R3 frequently (51.4%) use hypotaxis in comparison to R2 (43.5%) and R1 (35.9%). In effect, the author of R3 used hypotaxis extensively while the writer of R1 used it sparingly.

In connection with logico-semantic relation, it was shown that most of the authors used extension 105 (40%), followed by projection 73 (27%). On the other hand, elaboration had 63 (24%) while enhancing was the least frequent with 23 (9%) usage.

Findings showed that recreating register has the highest level 76 (61.2%) of paratactic relations. Within the context of hypotactic relation, exploring ranked first because it was used 40 (29%). It was also shown that recreating register was dominant in its usage among the socio-semiotic processes. The use of the four categories of logico semantic was frequent in the recreating register in comparison to the remaining three registers. For instance, while recreating has a frequency of 105 (40%), exploring had 61 (23%), reporting recorded 52 (20%), and expounding scored 46 (17%). There is a gradual progression in the level of complexity based on change.

The study also discovered that extension was dominant because all the authors adopted it to provide new or alternate information, deepen knowledge on a certain issue or provide additional information concerning a clause. By implication, most of the authors employed relevant cultural resources of the sub-system/subtype (English language) to increase SHS student registerial repertoire.

Notwithstanding, it was discovered that most of the authors used more hypothetical sentences in the passages, implies that the majority of the texts are either compound sentences or compound-complex sentences. Ample insight into the data revealed that the use of these compound sentences that were paratactically or hypotactically related were oriented towards enhancing comprehensibility and increasing their registerial repertoire.

### **Research Question 3: Lexical Density and Socio-Semiotic Processes in Selected Passages**

This section answers research question three:

*What variations exist in the lexical density across socio-semiotic processes in the reading comprehension passages of SHS English Language textbooks in Ghana?*

In a bid to understand the variation in lexical density across registers and its implication for the study, the following are relevant: What are the lexical densities of the passages? Are there any notable differences in lexical density across passages, and what are the implications of such differences (if any) in relation to teaching and learning?

Table 4.5 shows that all the registers have recorded higher mean lexical density. The exploring register had the highest mean lexical density of 13, while expounding register scored the least lexical density of 9.3. Following exploring register is reporting with 11 as its mean lexical density. The recreating register also had a mean lexical density of 10.

A close examination of the results showed that the exploring register, which mainly comprises passages in the SHS3 textbooks, has the highest mean lexical density of 13. However, it is noteworthy that though the recreating register has one passage in the SHS 3 textbook and several passages in SHS1 textbooks, it recorded a mean lexical density of 10. Halliday (2008) shows that formal written texts have an average lexical density of 4 or 5. The study posits that lexical densities of 5 are considered high and make a text highly dense. Hence, the results of the present study suggest that all the registers have very high lexical density. Whereas the least mean lexical density was 9.3, the highest lexical density was 13. Though the registers are not equally populated with the same year group, passages, their lexical densities are above 5. The findings in

this section demonstrated that there are no exceptions to the level of lexical density from one textbook to another.

A close examination of one of the passages in the recreating register (The Supreme Sacrifice I in the SHS1 textbook) revealed that the lexical density was 23. This is the passage with the highest lexical density in the entire data. This implies that there are occasions when certain passages in a textbook may not reflect the overall lexical density of a given register. This implies that authors of SHS1 should make a concerted effort at writing to meet the academic status of the students to enhance their capacity at comprehending and improving their registerial repertoire.

Table 4.5 shows that the recreating register has more words in comparison to the remaining registers. The findings showed that recreating has 2598 words, followed by exploring with 2540. However, while expounding has 1494, reporting was the least with 1377. This computation revealed that recreating has more words while reporting has fewer words in comparison to other registers. This is noteworthy because expounding has only 4 passages, and yet it has more words than reporting, which comprises five (5) passages.



**Table 4.5: Lexical Density and Socio-Semiotic Process in Selected Passages**

Semiotic Process	Code for passages	Title of Passages	Words	Content Words	Ranking Clauses	Lexical Density	Mean of Lexical Density
<b>Exploring; [Reviewing]</b>	<b>B1U9</b>	<b>Sports in Ghana</b>	<b>466</b>	<b>324</b>	<b>29</b>	<b>11.2</b>	
	B3U5	Diseases: Ebola	309	213	20	10.7	<b>13.0</b>
	B3U13	Survival	409	279	16	17.4	
	B2U4	Sanitation	896	482	35	13.8	
	B2U6	World Heritage Sites: Castles of Ghana	460	295	25	11.8	
<b>Recreating; [Narrating]</b>	<b>B3U6</b>	<b>Diseases and Myths</b>	<b>324</b>	<b>215</b>	<b>29</b>	<b>7.4</b>	
	B1U1	Being Honest I	376	241	30	8.0	<b>10.4</b>
	B1U3	The Leopard and the Squirrel	453	320	43	7.4	
	B2U1	The Supreme Sacrifice I.	992	666	29	23.0	
	B1U6	Being Honest II	453	215	34	6.3	
<b>Reporting [Surveying]</b>	<b>B2U9</b>	<b>Transportation; Air</b>	<b>262</b>	<b>176</b>	<b>16</b>	<b>11.0</b>	
	B2U14	Transportation by Sea	269	185	21	8.8	<b>11.0</b>
	B1U15	Afadjato: A People's Pride	388	243	21	11.6	
	B1U11	Effects of Deforestation	299	201	22	9.1	
	B2U16	Water Pollution in Ghana	159	103	7	14.7	
<b>Expounding [Explaining]</b>	<b>B1U16</b>	<b>The Magic of a Computer</b>	<b>382</b>	<b>254</b>	<b>24</b>	<b>10.6</b>	
	B1U2	Your Body	423	283	42	6.7	<b>9.3</b>
	B1U19	Malaria	339	218	23	9.5	
	B3U12	Politics and Government: Elections	350	217	21	10.3	

In terms of content words, recreating has 1657, exploring has 1593, and expounding contains 972. Again, in connection with content words, reporting has the lowest score of 908. This means that while recreating retains its dominance in content words, reporting had the lowest content words in comparison to other registers.

Table 4.5 reveals a similar trend with words and content words in the table. For example, while recreating retains its dominance with 165 ranking clauses, exploring had only 125, followed by expounding with 110. The table showed that the reporting register has the least ranking clauses with 87. Critical evaluation of this section of the statistical computation shows clearly that recreating maintains its dominance in relation to ranking clauses while reporting remains the least register in this regard.

Findings in this segment of the analysis have several implications within the context of this study, especially in relation to teaching and learning the English language in senior high schools in Ghana. These implications are enumerated below alongside relevant literature corroborating them and deepening insight regarding lexical density and socio-semiotic processes.

Results of the study in connection with the registers imply that they are linguistically complex and are not relevant to enhancing students' registerial repertoire. Students will have challenges with comprehending such texts in the textbooks since they are difficult and do not enhance students' learning experience.

Again, the result of the study in connection with all the registers lends credence to the assertion of Ozyildirim (2014) that registers with high lexical densities are: "notoriously text-heavy laden with linguistically and conceptually

dense content”, which, according to Analyse My Word (AMW, 2023), is counterproductive in the teaching and learning of comprehension passages in English.

Findings showed that recreating register possesses the highest number of words, content words and ranking clauses. This suggests that the writers of the three books are very conversant with vocabulary related to creative writing concerning various events occurrences with a view to maximising students’ learning experience. This underscores an important implication for SHS teachers because, in consonance with Douglas and Nancy’s (2014) statement, students’ familiarity with many words and content words enhances their capacity to comprehend more complex text. This, in turn, will facilitate students’ capacity to write or compose more sophisticated documents.

As a result, English language teachers should “support the development of vocabulary in the content areas...intentionally select words worth of instruction, model their own words” through collaborative and highly engaging classroom discussions” (Douglas and Nancy, 2014, p. 55).

Lending credence to the findings of Elleman and Oslund (2019), teachers in second-language classrooms should make a concerted effort to foster students’ capacity to identify or analyse content words in their readings through appropriate strategies that make sense of the text under consideration. Hence, these students must be exposed to more words and content words through collaborative discussions and assignments to promote active academic engagement during classroom discussion.

However, in-depth analysis of selected registers, such as reporting and expounding, revealed that authors were limited in their use of words and content

words. This corroborates Halliday's (1978), Lewandowski's (2010), and Nordquist's (2019) findings that several factors influence the choice of registers an author uses within the cultural resources. Nordquist indicated that various factors, including context, settings, audience and social connotation of comprehension passage, could influence register selection. For instance, several words (2,540) and content words (1,593) were used for exploring, requiring digging deep into pertinent public ideas, values and issues through reviewing and arguing. On the other hand, recreating had 2598 words and 1657 content words that aided authors to elicit and create impressive and thought-provoking comprehension passages oriented towards sustaining students' interest.

On the other hand, in line with Matthiessen (2015), reporting and expounding are oriented towards chronicling or providing explanations of issues involving scientific principles, which often requires fewer words and content words. This lends credence to the use of 1494 words and 972 content words for expounding, while 1377 words and 908 content words were used for reporting.

The study showed that expounding had the least lexical density of 9.3. In Matthiessen's (2015) cline of instantiation and registerial cartography, expounding often involved semiotic resources of explaining and categorising scientifically related principles, with a view to enhancing readers' comprehension. Contrary to this study, the authors employed high dense content words which does not foster students' understanding in order to improve their registerial repertoire within the subsystem (English language).

The finding in this section is also in consonance with Frimpong's (2020) recommendation that textbooks for students should employ registers that meet

students' expectations to aid comprehension. Such registers will contain words and content words that are less dense or with lower lexical density since Schuster and Erickson (2014), Alvarez-Canizo et al. (2015), and Sibanda (2020) indicated that word difficulty and constraints with comprehension of a passage often stem from the ratio of the number of lexical words and total number of ranking clauses. This is contrary to the level of lexical density of all the registers under study.

In brief, the finding in this segment of the study has shown that recreating has a higher number of words (2598) and content words (1657), while the reporting register comprises fewer words (1377) and content words (908). Recreating register also has the highest number of ranking clauses, with 165, while reporting has the lowest ranking clauses, with 87.

In view of the words, content words and ranking clauses used in the study, lexical densities for all the registers are inappropriate for SHS 1, SHS 2 and SHS 3 students because they were higher than 5. By implication, authors of these books should re-examine their selection of cultural resources to ensure that they enhance the student's learning experience and improve their registerial repertoire.

### **Summary of Chapter**

The analysis and discussion reveals that as grade level progresses, the level of complexity also progresses. The study showed that simple sentences were dominant in R1, followed by R2 and in R3, they were sparingly used. Similarly, complex clausal structure was frequent in R3 (51.4%), less frequent in R2 (43.5%) and sparingly used in R1 (35.9). The results also show that R3 dominates R1 and R2 in the use of hypotaxis. It was shown that the author of

R3 frequently (51.4%) used hypotaxis in comparison to R2 (43.5%) and R1 (35.9%). In effect, the author of R3 used hypotaxis extensively, while the writer of R1 used it sparingly. Lastly, the study discovered that all semiotic processes possess very high mean lexical density. Exploring, the dominant register, recorded the highest mean lexical density of 13 while Expounding 9.3, recorded the least. Reporting, had 11 and Recreating had 10 as their mean lexical densities. This means, to the extreme the three textbooks were conceptually high dense, and the texts were too heavy-laden linguistically. It was shown that while the highest lexical density for the textbook was 13, the least was 9.3, which demonstrates that, on, the three textbooks are inappropriate and do not meet the cultural and semiotic resources of the subsystem (English language). This contradicts the underlying principle of the cline of instantiation and is irrelevant to boosting SHS students' registerial repertoire.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### Introduction

This chapter is oriented towards providing a succinct conclusion to this study. Hence, it provided ample information regarding the summary, findings, conclusion and recommendations. The chapter also touched on the suggestions for future study. Under this chapter, implications of the findings within in connection with the implications of the findings for ESL classroom was also captured.

#### Summary of the Study

This study was primarily concerned with ascertaining and augmenting knowledge regarding the complexity of semiotic processes in the English Language textbooks for Senior High Schools in Ghana. It examines the texts on the basis of clausal structure, lexical density and syntactical complexity. This research, therefore, sought to examine the English Language textbooks for senior high schools in Ghana through Matthiessen's (2015) cline of instantiation, which is a key concept in the SFL model for the determination of complexity resource materials.

The study was guided by three research objectives, 1) To identify the socio-semiotic processes represented in reading comprehension passages in the SHS English Language textbooks of Ghana, 2) To examine the differences that exist in the clause complex relations across socio-semiotic processes in the reading comprehension passages in the SHS English Language textbooks of Ghana, and 3) To investigate the variations that exist in the lexical density

across socio-semiotic processes in the reading comprehension passages of the SHS English Language textbooks of Ghana.

For the purpose of achieving the highlighted objectives, the following research questions were formulated: 1) What socio-semiotic processes are represented in reading comprehension passages in the SHS English Language textbooks in Ghana? 2) What differences exist in clause complex relations across the socio-semiotic processes represented in reading comprehension passages of the SHS English Language textbooks in Ghana? 3) What variations exist in the lexical density across socio-semiotic processes in the reading comprehension passages of SHS English Language textbooks in Ghana?

This study was structured within the framework of a qualitative design. For clarity and accuracy, I used some quantitative techniques in the form of descriptive statistics. The study population was made up of passages used in the English Language textbooks across the three levels (i.e. Form 1, 2 and 3).

The multi-stage sampling technique was used to select various types of passages for the study. A census was conducted on English Language textbooks 1 to 3 used in Senior High Schools in Ghana, and 55 passages in all were enumerated. Adopting a disproportionate stratified sampling technique, the passages were categorised into six Semiotic Processes, according to Matthiessen's Registerial Cartography (2015): Expounding, Recreating, Exploring, Reporting, Sharing, and Recommending.

The adopted methodology facilitated the elicitation of relevant information concerning socio-semiotic processes in each of the three books and, more importantly, provided a meaningful basis for making appropriate inferences on the data.



## **Findings**

### **Socio-Semiotic Processes Represented in Selected Reading**

#### **Comprehension Passages**

Results of the study in this section showed that six socio-semiotic processes were identified in the data: 1) Exploring, 2) Expounding, 3) Recreating, 4) Recommending, 5) Reporting, and 6) Sharing. Ranking first among these registers is exploring, with 28 (51%) as its frequency. This was followed by recreating 10 (18.2%), while both recommending 2 (3.6%) and sharing 2 (3.6%) were the least used among the registers.

Results of the study further showed that the authors of the three books exhausted the value features relevant to their realisation in the data. Reviewing was ranked first among the subtypes, with 24 (43.6%) in frequency. Findings also revealed that among the three books, SHS 1 book ( $R1=40.0\%$ ) contains more value features than SHS 2 ( $R2=32.7\%$ ) and SHS 3 books ( $R3=27.3\%$ ). In effect, the SHS 3 book was the least in terms of frequent use of subtypes.

The findings reveal that the dominance of the exploring register is consistent with the overall objective and focus of the SHS English textbook, that it functions as a reference resources in connection with the communicative and practical uses of English. Hence, exploring register, which functions within the semantic space of communal or public values and positions, is often used in reviewing and arguing ideas, positions and societal values.

#### **Differences in Clause Complex Relations across Socio-Semiotic Processes**

The findings of the study in this section revealed that as the grade level progresses, the level of complexity also progresses. The study showed that simple sentences were dominant in R1, followed by R2, and in R3, it was

sparingly used. Similarly, complex clausal structure was frequent in R3 (51.4%), less frequent in R2 (43.5%) and sparingly used in R1 (35.9). Results also showed that R3 dominates R1 and R2 in the use of hypotaxis. It was shown that the authors of R3 frequently (51.4%) use hypotaxis in comparison to R2 (43.5%) and R1 (35.9%). In effect, the author of R3 used hypotaxis extensively, while the writer of R1 used it sparingly.

In connection with logico-semantic relation, it was shown that most of the authors used extension 105 (40%), followed by projection 73 (27%). On the other hand, elaboration had 63 (24%), while enhancing was the least frequent, with 23 (9%) usage. Findings showed that the recreating register has the highest level of paratactic relations because the three authors used it frequently 76 (61.2%). Within the context of hypotactic relation, exploring ranked first because it was used 40 (29%). It was also shown that recreating register was dominant in its usage among the socio-semiotic processes. The use of the four categories of logico semantic was widespread in the recreating register in comparison to the remaining three registers. For instance, while recreating has a frequency of 105 (40%), exploring had 61 (23%), reporting recorded 52 (20%), and expounding scored 46 (17%). There is a graduate progression in the level of complexity based on change.

The study also discovered that extension was dominant because all the authors adopted it to provide new or alternate information, deepen knowledge on a certain issue or provide additional information concerning a clause. By implication, most of the authors employed relevant cultural resources of the sub-system/subtype (English language) to increase SHS student registerial repertoire.

Notwithstanding, it was discovered that most of the authors used more hypotactical sentences in the passages, which implies that the majority of the texts are either compound sentences or compound-complex sentences. Ample insight into the data revealed that the use of these compound sentences that were paratactically or hypotactically related was oriented towards enhancing comprehensibility and increasing their registerial repertoire.

### **Variations in the Lexical Density of Text across Socio-Semiotic Processes**

Findings in this segment of the study have shown that recreating has a higher number of words (2598) and content words (1657) while reporting register comprises fewer words (1377) and content words (908). Recreating register also has the highest number of ranking clauses, with 165, while reporting has the lowest ranking clauses, with 87.

In view of the words, content words and ranking clauses used in the study, lexical densities for all the textbooks were extremely high for SHS 1, SHS 2 and SHS 3 students because they are all far above 5. Exploring had 13 with Expounding, 9.3 as the least. The remaining two registers (Reporting, 11 and Recreating, 10) also had higher mean lexical densities.

## Conclusion

In view of the findings enumerated above, this study arrived at the following conclusions:

Six socio-semiotic processes or registers were identified, and these included exploring, expounding, recreating, recommending, reporting and sharing. Though the authors used these registers, exploring was used more frequently, while both sharing and recommending were used sparingly.

Clause complex relations increased as the grade level progressed. Recreating register has the highest level of paratactic and hypotactic relations in comparison to the remaining three registers. Notably, extension was the dominant logico-semantic sub-category in comparison to other sub-categories.

The three textbooks possess an extremely level of lexical density since all the registers had mean lexical densities above 5. That is Expounding, 9.3, Recreating 10, Reporting, 11 and Exploring 13. English teachers should, therefore, provide students with multiple-choice questions on comprehension tests and facilitate students' development of relevant strategies for identifying lexical and grammatical function words in order to understand the texts in the textbooks.

## Implications for Second Language Learning

It was discovered that while simplex dominates R1, it became acutely limited in R2 and R3. This implies that complex clausal relation increases as students' transition from one level to the other. This implies that each of the English textbooks was useful in enhancing students' linguistic repertoire.

An important implication of this study is that the use of compound sentences and complex clausal relations can deepen students' understanding

instead of dominating a textbook with simplex, especially in the upper classes. The study has implications for authors of English textbooks. It demonstrated the need for authors to balance the use of registers to reflect the rich cultural resources of every subsystem. Teachers of English should make a concerted effort to enhance students' registerial repertoire by providing multiple choice questions on comprehension tests to aid students' capacity at building syntactical knowledge and identifying lexical function words.

The study has implications for teaching practice. It demonstrated that English teachers in second-cycle schools possess extremely complex tool in the form of highly dense textbooks which are linguistically complex to deepen students' registerial repertoire. Hence, English teachers should be very familiar with the content and function words and adopt appropriate teaching strategies to facilitate students understanding.

Findings shows that the three textbooks are not suitable in enhancing students' knowledge and, improving students' registerial repertoire contrary to the cline of instantiation and the primary focus of this study. Another implication for the study is that it demonstrated that the authors might not familiar with the cultural and semiotic resources of the subsystem so as to employ appropriate lexical items to promote students' cline of instantiation and foster high-level learning experience. This section thus has severe implications for English teachers.

The authors did not use appropriate ration of content words and grammatical function words. Teachers are therefore encouraged to structure their teaching to foster students' exposure to a lot of words and grammatical function words and facilitate students' capacity to develop result-oriented

strategies for identifying and analysing these words through multiple choice questions reflecting the cultural resources of the sub-system. This will promote a notable increase in students' registerial repertoire as well as requisite skills of writing and understanding complex sentences as to progress from one grade to the other.

Implicatively, all the registers across the three textbooks are not suitable in enhancing students' knowledge as well as improving students' registerial repertoire as the focus of the cline of instantiation and the primary emphasis of this study. Another implication of the study is that it demonstrated that all the authors were not very familiar with the cultural and semiotic resources of the subsystem so as to use appropriate lexical items to promote students' cline of instantiation and foster high-level learning experience.

This section thus has implications for teachers of English Language. Since, all the authors have used ration of content words and grammatical function words, not appropriate for the senior high school, which makes the passages linguistically complex, teachers must structure their teaching to foster students' exposure to a lot of words and grammatical function words.

Teachers must facilitate students' capacity to develop result-oriented strategies in identifying and analysing several words through multiple choice questions, reflecting the cultural resources of the sub-system (English language). This will promote a notable increase in students' registerial repertoire as well as requisite skills of writing and understanding complex sentences, a requisite to improving academic performance and progression from one grade to the other.

## **Recommendations**

Based on the conclusion of the study, the following recommendations are appropriate:

Though the three authors adopted six semiotic processes in writing the selected comprehension passages, several were scantily used. It is therefore recommended that writers of textbooks should balance the use of registers as well as include other semiotic processes that were missing, such as doing and enabling, which can also promote students' registerial repertoire.

It was shown that all the textbooks have a higher number of hypotactic and paratactic clausal relations than simplex. Though there is controversy over whether simplex is the best logico-semantic relation for high-level comprehension, it is recommended that more simplex clausal relations should be used because there is a growing number of researchers claiming that simplex or simple sentences are the most appropriate for students learning English as a second language in the senior high school.

Lexical densities in the three books were highly dense and inappropriate for the level of the second-cycle school learner and irrelevant to the cultural and semiotic resources of the students. However, since teachers play a major role as facilitators of knowledge in the classroom, it is therefore recommended that English teachers should employ appropriate cultural resources to design or set tasks for students on comprehension passages enhance students' understanding as well as broaden their knowledge and registerial repertoire.

## **Recommendations for Further Studies**

This study adopted an English textbook in SHS as the data source for the study. In view of the critical role of basic education as a building block for

second cycle and tertiary education, future studies could consider English textbooks in JSS1 to JSS3 in Ghana.

The study used Halliday's (1985) formula for calculating lexical density – the ratio of lexical items and the total number of ranking clauses. It is therefore recommended that future studies consider using the Ure (1971) formula for calculating lexical density, which uses the type-token ratio (the ratio of total number of lexical items and total number of words in a register multiplied by 100).

This study conducted an in-depth investigation into the level of lexical density in the registers of English textbooks at second-cycle schools. Future studies could consider conducting comparative studies on lexical density and lexical diversity of English textbooks in SHS3, being a critical level for preparing students for WASSCE.

This study was limited to the linguistic content of an educational textbook. It is therefore recommended that a corpus-based study be conducted on lexical diversity and density with the aid of AntConc as a corpus tool.

### **Contributions of the study**

The present study has contributed to the knowledge on linguistic complexity in the Senior High School textbooks. It is a probe into the linguistic complexity and register variation of English language textbooks in Ghana. The findings would inform teachers to be in the right position to adopt more appropriate teaching strategies in the teaching of comprehension passages in the textbooks.

The study has provided areas of evidence of complexity in English language textbooks. Based on this evidence, authors could address those



complexities to make textbooks easy to read and understand in their future writing.

Furthermore, this research has contributed to existing research in linguistic complexity as well as register studies founded on the SFL approach. Existing literature on English language textbooks has skewed towards the readability assessment of the textbooks as an effective yardstick for determining complexity. This study yielded qualitative results which would provide a complete picture of the complexities that exist in English language textbooks.

The study again explored linguistic complexity from the discourse and SFL perspective. Such addition to readability studies, and for that matter, the linguistic complexity, will help provide a holistic picture of how textbooks should be produced in terms of their content features to meet the demands and abilities of students who use such textbooks. This will provide insight into the role of textbooks in the performance of students and how that role is mediated by linguistic complexity.

Finally, this research has equally contributed to knowledge on register variation in English language textbooks for second-cycle schools in Ghana. It deepens knowledge on how to expand SHS students' registerial repertoire. The findings reveal the kind and nature of registers that authors of the textbooks employed in writing the comprehension passages of Senior High School English language textbooks. This will be useful to researchers, student researchers and educators.

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