

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **2.0 Introduction**

Chapter two reviews the literature which has significance in systemic linguistics. It begins by illustrating the early views on semantics and proceeds with an overview of the Hallidayan view of language. This chapter also highlights the contrasts and similarities of the approaches taken by those working within this framework both in the field of cohesion and system networks. It examines some of the challenges posed to the views of the theorists. Finally, this chapter gives examples of other kinds of research on scientific texts primarily in the field of English for Specific Purposes.

#### **2.1 Historical antecedents**

The interest in the study of semantics can be traced back to Ferdinand de Saussure, Malinowski and Firth's thinking.<sup>7</sup> Saussure expounded a number of theories in language relating to how meaning

is viewed. A significant concept introduced by Saussure is the dichotomy between a synchronic and diachronic study of language.

A synchronic study of language is the study of language at a particular point in time. For example the study of the language of Shakespeare or of present day English are synchronic manifestations of a study of language. However, Saussure pointed out that the changes in language over a period of time reflect a diachronic perspective. Thus, the differences in the features between Old English and Middle English are indeed diachronic studies of language. Following Saussure's concepts of synchronic and diachronic studies of language, we acknowledge that language evolves over time and the evolutions in a language would be associated with the meanings expressed in it. Therefore Saussure's theory of language is very much meaning oriented.

Subsequent to Saussure's view of language, Malinowski in 1923, identified the study of meaning in language within a context of culture. Malinowski argued for a study of semantics "in a context of situation within a context of culture" (Firth 1957 ; Butler 1985). Malinowski's ideas of a context of situation were developed first by Firth and later by Halliday. Firth through his association with Malinowski strongly declared that "the complete meaning of a word is always contextual and no study of meaning apart from a complete

context can be taken seriously" ( Firth 1957 : 7). To elaborate, a linguistic contribution to the study of meaning is of significant value only when the study of meaning involves a context. In the Firthian tradition, the meaning of a word becomes alive when in association with different contexts. To exemplify, consider the word "seventeen." It does not convey much meaning in itself but in contextualising it, it can refer to a person's age, or the age a person may obtain a driver's licence, or the number of a section of a suburb or even a magazine. In this study the lexical items studied are within the confines of the chapter which designates the context for this piece of discourse. Following the Hallidayan tradition, the terms field, mode and tenor are used to refer to the constituents of the "semiotic structure of situation." (Halliday & Hasan 1976 ; Halliday 1978 & 1985) The context of situation of this study is defined by the field of the text and it is chemistry. Its mode is written discourse and its tenor is expository. Firth's ideas of a contextual theory of meaning was developed by Halliday in his model of language which is realised in the concepts of system and structure to interpret syntagmatic and paradigmatic relations.

## 2.2 The Hallidayan view of language

In Hallidayan linguistics, syntagmatic and paradigmatic relations are two different dimensions through which linguistic elements are related. Linguistic elements which are structurally related or which form the constituents of syntax are designated to be in a syntagmatic dimension whereas linguistic elements which are in a relation with every other item which may be substituted for it are in a paradigmatic relation. An important concept in this holistic representation of language is that elements in a paradigmatic relation are not related through structural means. The syntagmatically related elements represent the structure of the language and the paradigmatically related elements represent the system of the language. This concept is strongly subscribed to and underlies the description of the lexis of chemistry in the present study.

In developing Firth's thinking, Halliday adopts a view of language in which the study of meaning is given prominence. In his description of language, semantics is one of the three strata of the linguistic system, the other two being lexicogrammar and phonology. In this view of language, text is conceived of as a semantic unit. A semantic unit is a unit of meaning. This view concerns itself with describing how one item in the text is related to another item in the text even though the two items are not related through any structural

means. The kind of relation formed between the two items is a semantic relation and not a structural one. It is the semantic relation between one part of the text and another that enables the text to attain a sense of semantic continuity. A text which displays this kind of semantic continuity is regarded as a unified whole. Closely related to the concept of semantics is the concept of cohesion. Lexical cohesion is the semantic relation between one lexical item and another in the text.

Halliday (1961) in his work on "Categories of the Theory of Grammar," draws attention to the fact that lexis, apart from grammar, has its own distribution pattern in a text and thereby he established the need for a theory of lexis to describe the distribution pattern. He notes that a theory of grammar cannot describe lexical patterning in a text. Therefore, a theory of lexis was needed to give such a linguistic description. In his paper on "Lexis as a Linguistic Level" (1966), he elaborates on the theory of lexis, arguing for a separate theory to account for the lexical content of texts.

Following this view, lexis has been analysed for several purposes. Some of the purposes are for identifying its distribution pattern (Hoey 1991), for compiling a profile of familiar registers (Cowan 1974 ; Roe 1977), for gathering intra-text word frequency counts (Salager 1983 ; Goodman & Bird 1984) and for exemplifying

the cohesive properties of a text (Hasan 1980 & 1984 ; Martin 1981, 1989 & 1992). Other frameworks can be taken into account in the study of lexis and these are given a detailed treatment in section 5.4 of chapter five of the thesis.

### 2.3 Halliday and Hasan's model of cohesion

Halliday and Hasan (1976) in their comprehensive study of cohesion in English explain how cohesion may be achieved through the levels of grammar and lexis. The framework underlying this model is the Hallidayan systemic-functional model which describes the semantic system as an interrelation between the ideational, the interpersonal and the textual components. (Halliday 1978 & 1985) The three functions of semantics are closely related to the three semiotic structures of situation introduced earlier. The field is related to the experiential function, the tenor is related to the interpersonal function and the mode is related to the textual function. The ideational metafunction relates to the content of what is said or written. It is related to the cognitive skills we use to construe meaning and how we conceptualise ideas. The interpersonal metafunction relates to our reactions and attitudes to what is said or written which also includes how we connote meaning. The textual metafunction expresses the resources language has for the creation of text.

Cohesion is what Halliday and Hasan (1976 : 293) term as “a linguistic means whereby texture is achieved.” Cohesion is one of the three components that provide texture to the text. The other two components are textual structure, which relates the language system to its environment and discourse structure which is considered unique in every genre. A cohesive relation is formed when the interpretation of one item cannot be done without recourse to another in the text and the recovery of the item must be entirely within the text or in Halliday and Hasan's terms “endophoric.”

Lexis is a unit of vocabulary generally referred to as a lexical item or lexeme which in Hallidayan linguistics belongs to the set of open class items. The set of open class items usually refers to content words with an indefinite membership as new words are continuously being invented as knowledge expands and develops. For example, the lexical items “inter-net” and “web-site” are recent inventions of the language system. A lexical item may be a morpheme, word, or group (Halliday 1961). Examples of these will be dealt with in greater detail in section 3.4 of chapter three of the thesis.

Halliday and Hasan (1976) in their initial inquiry into the concept of lexical cohesion propose the categories of reiteration which constitute the semantic aspect and collocation which constitutes the lexical aspect in the analysis of a text for its cohesive properties. The

category of reiteration involves repetitions, synonyms, near-synonyms, superordinates and general words. The category of collocation includes items which display a mutual inclination to appear in similar contexts. A cohesive force is exerted between two items in the text irrespective of whether or not overtly cohesive signals are present. This proposition primarily concerns the category of reiteration. Some examples of such overt signals are the determiner “the” and the demonstrative “this” positioned before a lexical item.

#### 2.4 Challenges to the 1976 model of cohesion

However, the model of cohesion proposed by Halliday and Hasan has not been without criticism. Doyle (1982), argues that Halliday and Hasan (1976) have not given the study of coherence its due importance and she questions the contribution of such a study to writing processes. In this respect, Bamberg (1983) shares a similar view that cohesive ties are in themselves an insufficient criteria to render a text coherent. Stotsky's (1983) dissatisfaction seems to be that “derivational items” should not be subsumed under the reiteration label and suggests a separate category. Myers (1991) points out how a specialist reader of scientific texts is able to see the implicit cohesive signals of the texts because of his or her knowledge of lexical relations even if signals signifying cohesion is not present in the texts. His

study suggests that the non-specialist reader needs overtly marked signals to find the texts coherent and may encounter interpretation difficulties even in the presence of such signals owing to the lack of domain knowledge to infer relations between lexical items.

Hoey (1991) in his analysis of patterns of lexis in texts makes frequent comparisons of the Hallidayan theoretical stance with his own position and asserts that Hasan's (1984) analysis of cohesive harmony, cohesive chains and chain interaction does not shed light on how sentences connect as wholes. He suggests that cohesive bonds alone are insufficient to demonstrate the connections between sentences. He proposes an alternative system of description that combines both the structural and non-structural features of the text. This suggestion appears in contradiction with the fundamental Hallidayan concept of cohesion and that is lexical relations between lexical items are of the semantic kind and not of the structural kind.

Brown and Yule (1983) maintain that the concept of coherence plays an important role in the interpretation of meaning especially in the absence of any cohesive signals signifying any link between one proposition and another and they cite several examples of texts which lack these signals but were successfully interpretable. The successful interpretation of the text may be attributed to the content schemata of the reader. Brown and Yule (1983 : 248) explain content schemata as

the “organised background knowledge which leads us to expect or predict aspects in our interpretation of discourse.”

Contrary to the claims made by other linguists that the concept of coherence has been subordinated by Halliday and Hasan in their model of cohesion, I find that the position of coherence is significantly valued in their acknowledgement that cohesion is not the only resource contributing to the text being considered as a semantic unit. While cohesion is one of the resources in the textual metafunction for the creation of text, coherence is associated with the other semantic functions of language. The operation of the ideational metafunction enables the reader in his involvement as an observer to find the text coherent and the operation of the interpersonal metafunction enables the reader in his involvement as intruder to find the text coherent. I find Halliday and Hasan clearly recognising the significant role of coherence in the interpretation of discourse when they argue that when we find the text coherent it does not necessarily mean that the text has used the resources of cohesion in its creation and when we find overtly explicit cohesive signals indicating cohesion, it does not also mean that we are able to find the text a coherent piece of discourse. The concepts of cohesion and coherence appear to be intricately intertwined in the whole system of language.

## 2.5 Subsequent studies on cohesion

Halliday and Hasan since their joint study on cohesion in English have modified their categories of cohesive devices. Halliday (1985) proposes the categories of repetition, synonymy and collocation whereas Hasan's (1984) proposes the categories of general and instantial. The following tables display the initial 1976 categories and Halliday (1985) and Hasan's (1980 & 1984) modifications.

Table 2.5.1

Halliday and Hasan's 1976 categories of lexical cohesion	
1. Reiteration	
a. repetition	
b. synonymy	
c. superordinate	
d. general word	
2. Collocation	

Table 2.5.2

Halliday's 1985 categories of lexical cohesion

1. Repetition
  - a. same morphological shape
  - b. inflexional variants
  - c. derivational variants
2. Synonymy
  - a. with identity of reference
    - i. general synonyms
    - ii. superordinates
  - b. without necessary identity of reference
    - i. synonymy
    - ii. hyponymy (including cohyponymy)
    - iii. meronymy (including comeronymy)
    - iv. antonymy
3. Collocation

Table 2.5.3

Hasan's 1980 & 1984 categories

1. General
  - a. repetition
  - b. synonymy
  - c. antonymy
  - d. hyponymy (including cohyponymy)
  - e. meronymy (including comeronymy)
2. Instantial
  - a. equivalence
  - b. naming
  - c. semblance

Halliday (1985) and Hasan's (1980 & 1984) independent study of cohesion since the 1976 model differ in the categorisation of lexical relations. Halliday's modified categories seem to be based on whether the lexical items shared a systematic semantic relation or whether they were related through a mutual expectation to co-occur in similar contextual environments. The category of reiteration of the

1976 model seems to have been subdivided into repetition and synonymy. Derivational variants and inflexional variants are considered repetitions of the same morpheme. Halliday defines a derivational variant as an instance of a repetition which has a different grammatical function and an inflexional variant as an instance of a repetition which usually has the same grammatical function. These differences are dealt with in greater detail in section 3.5 of chapter three of the thesis.

Hasan's basis for categorisation appears to be on whether the recovery of the lexical relation was solely contextually provided or was independent of contextual clues. She asserts that general lexical relations are not text bound as the lexical relations are a manifestation of their ideational meanings and they stand in the same relation to each other irrespective of whichever context they occurred in and as such were not dependent on contextual clues. Instantial lexical relations are those that are text bound as the interpretation of the lexical relations depended on the context in which the lexical items occurred. Such a pair of lexical items may be identified as having different relations in different contexts.

Hasan has excluded the category of collocation dismissing it as being "difficult to operationalise." (Hasan 1984 : 202) Though Firth (1957 :196) showed immense interest in collocation, he commented

that “meaning by collocation is an abstraction at the syntagmatic level and is not directly concerned with the conceptual or idea approach to the meaning of words.” Hasan (1984 : 195) on the other hand, has chosen to do away with the label collocation as she reflects on the shortcomings of relying on the notion of collocation which she says is an “intuitive reality.” She advises against using it in research because of “the problems of inter-subjective reliability.” Although Halliday, 1985, includes collocation in his analytical categories, he cautions us about clichés grouped under the collocation category which have very little cohesive effect.

## 2.6 The contributions of other neo-Firthian scholars

The study of lexis in text within a Hallidayan view of language has been undertaken by a number of linguists who have contributed immensely to the body of knowledge. The work of Sinclair(1966 & 1991), Jones and Sinclair(1971) and Martin (1981,1989 & 1992) will be reviewed in this section.

Sinclair (1966 & 1991) has been involved in the traditions of corpus based concordances and collocation studies. His main line of enquiry has been in making useful descriptions of collocationally related items in large samples of natural language. In his (1966 : 414) paper on “Beginning the Study of Lexis,” he defines the concept of

collocation as the “co-occurrence” of lexical items “in any sequence, with or without intervening material.” He gives examples of collocations which are more likely to occur than others and proposes a method to measure the collocational possibility of lexical items in the text.

Jones and Sinclair in their 1971 study, propose a methodology for describing the lexical organisation of the text in terms of the kinds of relations formed between the collocates. They further substantiate Halliday’s argumentation for a distinct linguistic analysis for lexis. However, Sinclair, in his 1991 study suggests that lexical items that are collocationally related and those that are semantically related need not be analysed separately as in previous analyses. He suggests that collocation and semantics may after all be intimately connected and they may merit a unified kind of description.

Martin’s (1981) study proposes that the categories of lexical cohesion be subsumed under two broad categories; a taxonomic analysis which is consistent with Halliday and Hasan’s (1976) semantic aspect and a collocation analysis which is consistent with Halliday and Hasan’s (1976) lexical or collocational aspect. Taxonomic analyses can be divided into superordination and meronymy relations. Martin’s analytical categories which are used as the theoretical construct of this research is given a more detailed

description in chapter three. While Hasan's (1984) study attempted to analyse the co-relation between the number of cohesive devices and the textual coherence of the text, Martin's (1989) study of a piece of expository text, has as one of the aims, relating lexical cohesion to grammatical cohesion of the conjunctive kind and providing an outline for the thematic structure of the text. Martin (1992) following Halliday's systemic-functional model, unlike Sinclair's, 1991 suggestion just decribed, proposes that a text be described from four different perspectives. These are in terms of the lexical items collocational potential, in terms of providing options used to extend hierarchically ordered features in system networks, in terms of the semantic bonds formed between lexical items and in terms of the semantic fields espoused. It is this view that I have subscribed to for the linguistic description of lexis in the texts. A lexical description that does not differentiate syntagmatic and paradigmatic contexts will not enable me to make systemic descriptions of more delicate lexical items. The concept of delicacy will be discussed in section 2.7 of this chapter.

Martin represents his taxonomic analyses as lexical strings and defines them as a group of semantically related lexical items each depending retrospectively and prospectively on the nearest lexical item for the recovery of its meaning. This manner of presentation is

adopted for the taxonomic analyses of chemistry texts and the research methodology will be outlined in great detail in chapter three.

## 2.7 System networks

The formalisation of paradigmatic relations in a description of natural language is the main thrust of a systemic-functional approach to languages (Martin 1987). Lexical items embodying a set of concepts may be captured in system networks and interpreted as “the organisation of alternatives” (Halliday and Martin 1981 : 13). (Section 1.4 of chapter one illustrates how a system network may be used to capture the lexical content of a text. )

To exemplify, the lexical item “image” maybe abstracted on a scale of delicacy following Halliday’s definition (1961 : 272), “the scale of differentiation, or depth in detail” to realise three contrasting features which are “sharp”, “clear”, and “feeble” which form a network of systemic options shown in Figure 2.7.1.

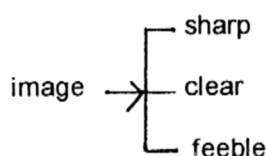


Fig. 2.7.1

Further examples of system networks illustrating possibilities for delicacy ordering, featuring both simultaneous and hierarchical ones, are given in chapter four of the thesis.

## 2.8 ESP research

One of the current interests in ESP research seems to be in the field of text and discourse analysis. A growing interest in analysing scientific texts began in the 1960s as there emerged an awareness that a general English curriculum would not sufficiently prepare learners for whom English is a Second Language. This is especially so when the learners have to contend with specialist subjects taught in English. A curriculum that is specifically catered to a learner's needs was needed to assist the learner in developing good reading and writing strategies as well as developing good listening and speaking skills. Ever since this realisation the field of ESP has been much enriched with pedagogically-oriented research. Early ESP research reflected register analysis and making explicit the grammatical features of the scientific texts while later research reflect a trend towards discourse analysis. Scientific texts have been linguistically described with different theoretical underpinnings, namely those using a Hallidayan construct and those independent of it.

Two early studies with the aims of outlining teaching materials for the ESP classroom are the ones by Cowan (1974) and Weissberg and Buker (1978). Cowan's interest was in identifying the kinds of vocabulary and structural patterns that would typically represent the genre of medical texts. Weissberg and Buker's (1978) concern were in identifying the rhetorical categories or functional divisions of agricultural reports.

Still on scientific texts, Wood's (1982) research on chemistry texts was to compare the discourse structure of original scientific articles with the simplified versions used in the subject specialist class. He discovered a shift of emphasis and a deviation from original meaning when the original texts were altered in terms of lexis and grammar. Another discovery was that the simplified versions did not comply with the rhetorical structures of the original texts and as such did not accurately represent the genre of its kind.

Coupland (1984) from her observations of learners' scientific and technical writings found cases of frequent overuse of the devices of repetition, omission of antecedents for pronouns and inconsistent use of registers. She suggests that the resources of cohesion following Halliday and Hasan's (1976) model be used to improve the reading and writing ability of these learners. Love (1991) sectioned a chapter of a geology textbook in terms of "process-

product” which she says reflects the fundamental taxonomic principles of geology. She also asserts that this framework provides a strategy for comprehending geology facts and concepts more readily.

## 2.9 Conclusion

Chapter two has given an overview of the concepts of semantics, lexis and cohesion in system-structure theory. It has also compared and contrasted Halliday (1985), Hasan (1980 & 1984) and Martin’s (1981, 1989 & 1992) analytical framework for analysing lexical cohesion. Finally it has reviewed the kinds of ESP research on scientific texts.