CHAPTER II

LITERATURE REVIEW

II.1. Schemata

II.1.1. Definition of Schemata

The notion of schema has lead to many interesting discussions among the linguists and it was followed by several researches to explore it. The term **schema** originated with Kant, in 1781, who found it necessary to devise a mediating representation between abstract thought and sensory experience. However, Bartlett introduced this term into Psychology in 1932. He believed that the human memory system involved the information of abstract cognitive structure or schema (Sternglass 1989:76).

Rumelhart (1980:34) defined schema as a data structure for representing the generic concepts stored in memory. He said that a schema theory is basically a theory about knowledge. It is a theory about how knowledge is represented and about how that representation facilitates the use of knowledge in particular ways.

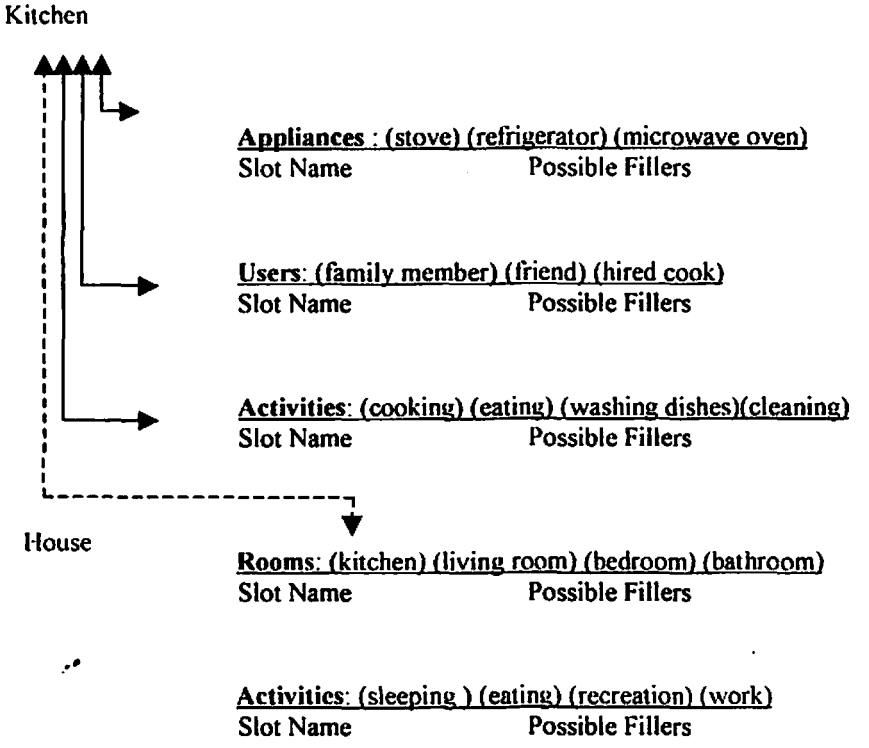
According to Van Dijk as cited in Brown and Yule (1983:247) schemata are said to be 'higher-level complex" knowledge structures' which function as "ideational scaffolding" in the organization and interpretation of experience.

Bartlett; Minsky and Schunk as cited in Just and Carpenter (1988:11) stated that a schema is the organizational aspect of knowledge which is captured in a

knowledge representation. Furthermore, a schema is a framework containing a set of slots, with each slot labeled to indicate what type of information it can contain.

A simple example is represented by the schema of KITCHEN in a house, which have slots for the major categories of information about kitchen, such as its appliances, furniture, lay out, and users, as depicted in the following figure. Here, each slot has possible fillers that can serve as a default value. For example, appliances have the possible fillers stove, refrigerator, microwave oven, and so on. Here, the schema may be connected to other schemata such as the schema for HOUSE.

Figure 2.1. A schema for a concept of kitchen



Source: Just and Carpenter; *The Psychology of Reading;* 1988

II.1.2. Types of Schemata

Schemata can be differentiated into three areas: linguistic, content and formal schemata (Mark.O.James as cited in Davine 1988:178). Linguistic schemata deal with the reader's knowledge about linguistic aspects which are found in a text. Linguistic schemata are needed to convert visual information processed in sensory store into linguistic forms that can be divided into short term memory.

Content schemata refer to the knowledge of the content area of the text which deals with reader's prior knowledge and experience of the topic discussed. Here, content schemata are needed to convert linguistic forms processed in short term memory into larger, proportional structures that can be stored permanently in long term memory (LTM).

Formal schemata refer to the rhetorical organization or rhetorical organizational structures of different types of texts. Formal schemata are needed to guide the eyes where to move precisely in order to search for and to pick up information required to be processed in sensory store.

II.1.3. Characteristics of Schemata

Rumelhart and Otorny in Rumelhart (1977:40) listed several characteristics of schemata as mentioned as follows:

1. Schemata have variables

   Schemata have variables just as theories have parameters, plays have roles and procedures have arguments.

2. Schemata can embed one within another.

The embedding characteristic of schemata can be illustrated by the analogy between schemata and procedures. Schemata consist of sub schemata as procedures consist of sub procedures.

3 . Schemata represent knowledge at all levels of abstraction.

Schemata can represent knowledge at all levels, from knowledge abut the meaning of word to knowledge about ideology. We have schemata to represent all levels of our experience, at all levels of abstraction

1. Schemata arepresent knowledge rather than definitions.
2. Schemata are active process
3. Schemata are recognition devices whose processing is aimed at the evaluation of their goodness of fit to the data being processed.

II.1.4. Functions of Schemata

There are three major functions of schemata (Rumelhart 1977:45-47) dealing with cognitive and psychological aspects:

1. The function of schemata in perceiving.

   Perception is an interactive process in which information comes in from our sense organs and then the perceptions need appropriate schemata to interpret the sense data.

2. The function of schemata in understanding discourse.

   The process of understanding discourse is the process of finding a configuration of schemata that offer an adequate account of the message. Smith in Just and

Carpenter (1987:10) said that comprehension is better if the reader has some forehand knowledge about the topic.

3. The function of schemata in remembering.

Besides playing an important role in comprehension and perception, schemata are also assumed to be the significant factor in remembering. Essentially, the process of perceiving and remembering is similar, but in remembering the data source is no longer sensorial but memorial.

II.2. Reading Comprehension

II.2.1. Conception of Reading Comprehension

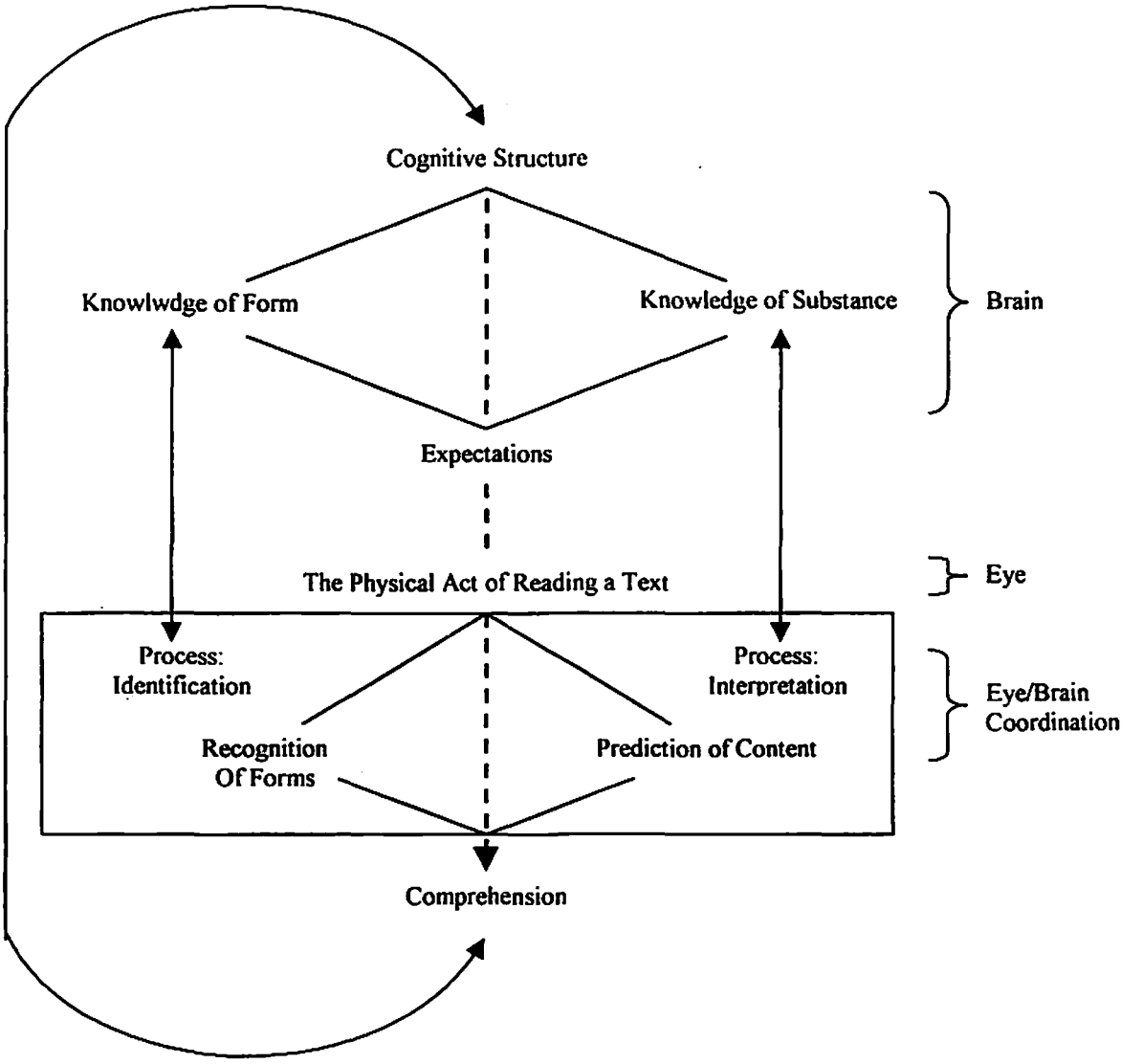
Reading comprehension is an extremely complex process whose different views result in different types of reading model. The existing reading models, however, can be classified into three categories according to the three general principles of how reading is assumed to be processed. They are top down, bottom up and interactive processing (Harris and Sipay 1984:6).

The primary characteristic of top down models is that the "top" of the information processing system, which is the part that is constructing the meaning of the passage, controls the information flow at all levels. According to Rayner and Pollastek (1989:467), in this model the reader uses their general world knowledge and contextual information from the passage being read to make hypotheses about what will come next during reading.

On the other hand, the basic idea of bottom up models is that visual information is initially sampled from the printed page and the information is transformed through a series of stages with little influence from general world knowledge, contextual information or higher order processing strategies. The processing of comprehension in this model is very fast and that information flows through the processing system in a series of stages.

Another model of reading which has a great deal in cognitive psychology is interactive models. In this models, readers are usually assumed to be drawing upon both top-down and bottom up information before eventually settling upon an interpretation of the text (Rayner and Pollatsek 1989:467). In his book, *Teaching Second Language Reading for Academic Purposes*, Eskey (1986:15) displayed a rough diagram of the interactive model of the reading process. He conceived reading as a particular type of cognitive behaviour which based on certain kinds of knowledge which is form a part of the reader's cognitive structure. The diagram is presented as follows:

Figure 2.2 Reading as Cognitive Behaviour: An Interactive Model



Source: Rayner and Pollastek; *Teaching Second Language Reading For Academic Purposes*;1983

It begins with cognitive structure in the brain, that is, what the reader knows and a stored schemata in his long term memory. Here, he must know the language

well enough in each written form and know enough about the subject matter of the text. These are to ensure that the text will be comprehensible to him. Yet, his knowledge of form will provide him with certain expectation about the language of the text. Given these expectation, during the physical act of reading, he can make an accurate identification of form, and if his reading skills are well developed, he will be able to do this quickly and automatically. Simultaneously, his knowledge of substance will provide him with certain expectations about the larger conceptual structure of the text. Given this expectation he can make accurate predictions in interpreting of the text. In achieving comprehension, a personal reconstruction of the meaning of the text, will be determined by the reader's knowledge and reasoning power. Here, the word "interactive" refers to both the interaction of the reader's several kinds of knowledge and the interaction of the reader and the text. But as the arrow from comprehension back to cognitive structure suggests, these two kinds of interaction blend into one as, in the normal process of reading, the reader makes the text apart of what he knows.

II.2.2. Schema Theory on Reading Comprehension

In schema theory terms, a reader comprehends a message when he is able to bring to mind a schema that gives a good account of the objects and events described in the message (Anderson 1985:372). In line with that statement, many experts agree that schemata play an important role in reading comprehension. Anderson and Pichert in Anderson (1985:376-377) proposed a brief explanation of the functions of schemata in reading comprehension:

1. A schema provides ideational scaffolding for assimilating text information.

   Here, the idea is that a schema provides a slot for certain information. Also see the theory proposed by Bartlett; Minsky and Schunk in page 12 for further information about this.

2. A schema enables inferential elaboration.

   Since there is no text that is completely explicit, a reader's schema provides the basis for making inferences to understand the information literally stated in a text.

3. A schema allows orderly searches of memory.

   A schema can provide the reader with a guide to the type of information that need to be recalled. Then, the knowledge stored in the reader's memory will help the reader to gain access to particular information learned when the text was read.

4. A schema facilitates selective allocation of attention.

   Or in other words, a schema provides part of the basis for determining the important aspects of a text.

5. A schema facilitates editing and summarizing.

   In this case, schema contains its own criteria and it enables the reader to make summaries about the important point in the text and omit the less one.

6. A schema permits inferential reconstruction

   It means when there are gaps in memory, a rememberer's schema, along with the specific text information that can be recalled, helps generate about the missing information.

Furthermore, Rumelhart (1977:48) tried to explain the reasons implicit in schema theory when a reader fails to correctly understand a passage, they are:

1. The reader may not have the appropriate schemata in the case he cannot understand the concept being communicated.
2. The reader may have the appropriate schemata, but the clues provided by the author may be insufficient to suggest them.
3. The reader may find a consistent interpretation of the text but may not find the one intended by the author. In this case, the reader will "understand" the text but misunderstand the author.

II.2.3. Reading Comprehension in Foreign Language

Since reading is a process that involves our perception and metacognition and no one can explain exactly how the process operates, it is impossible for us to discuss reading in foreign or second language without any comprehensive understanding about reading process in the first language. Therefore, reading comprehension in the second and in the first language can not be separated.

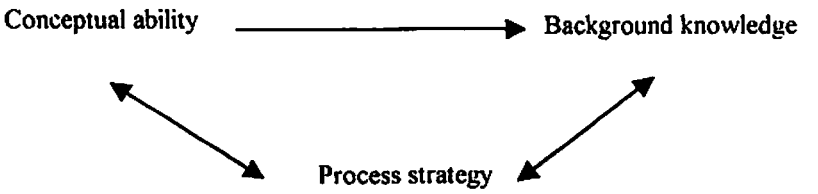
Ulijn (1987:71) proposed that in reading comprehension, knowledge is the basic element for comprehension. Therefore readers with low performance of syntactic knowledge will not face any difficulties in comprehending scientific text of certain knowledge which with they are really familiar.

Alderson (1992:1-12) stated that poorer reading performance is .caused especially by interpretation of words and syntactic structure. Poor reading of second language caused by poor ability in the first language and un adequate knowledge of

foreign language. In other word, the competence of relevant knowledges language is not enough in comprehending second language scientific text, and readers should also know the rule of syntax of both the foreign language and the first language.

In the last decade, the theory of reading in second language and foreign language, especially English language (EFL/ESL) has been influenced by Goodman's psycholinguistics model of reading. Goodman as cited in Hamied (1993:92) described reading as "Psycholinguistic guessing game" . In this model, a reader does not need to understand all of the textual meaning. The better reader's ability in making a right presupposition, the fewer the confirmation needed through the text.

Figure 2.3. The Coady model of reading in ESL text



A simple ESL model of reading proposed by Coady as cited Hamied (1993: 93) explains about fundamental psycholinguistic model of reading. He suggested a model at which background knowledge of ESL or EFL's reader interacts with conceptual ability and process strategy in comprehending a text. What is meant by conceptual ability is the general intelectual capacity, while process strategy deals with various sub component of reading ability, including language processing such as syntactic information, lexical meaning, and contextual meaning. Related with

background knowledge , Coady said; "background knowledge becomes an important variable when we notice, as many have, that students with a western background of some kind learn English faster, on the average, than those without such background". Furthermore, Coady explained that background knowledge may be able to compensate the syntactic weakness'.

> "The subject of reading materials should be of high interest and relate well to the background of the reader, since strong semantic input can help compensate when syntactic control is weak. The interest and background knowledge will enable the student to comprehend at a reasonable rate and keep him involve in the material in spite of its syntactic difficulty".

II.3. Previous Related Studies.

Schema theory has been interested many researchers to conduct many studies on this subject. The extent to which one type of schemata facilitates reading comprehension can be tested by manipulating one type of factor influencing reading comprehension (either language, content, or form of the text), holding two other factors constant, and having comparable groups of subjects processing the manipulated factor.

A single study conducted by Steffensen, Joag-dev, and Anderson as cited in Carrel (1987:462) is a good example of the type of cross culture research on content schema. In that study, two groups of subjects with different cultural heritage were investigated, one was a group of Asian Indians living in the United states and the other was a group of Americans. Each subject was asked to read and recall two personal letters, both constructed with similar rhetorical organization. The cultural

content of the two letters differed; one described the traditional Indian wedding, the other American wedding. It was assumed that all adult members of society would have a well developed-system of background knowledge about the marriage customs of their own culture and a relative lack of knowledge about the marriage customs of more distance culture. Results showed that the Indian and American group read the material dealing with their own cultural background faster and recalled more of the content. In short, the study exposed the clear and profound influence of cultural content schemata on reading comprehension.

In line with the study above, another research conducted by Carrel (1987: 461-477) attempted to know the simultaneous effects on English as Second language (ESL) reading comprehension of both culture-specific content and formal schemata, as well as any potential interaction between them. This study was conducted with two groups of high intermediate level ESL students who were of Catholic or Moslem religion. For the purpose of the study, religion was considered the defining characteristic of each cultural group. They read, recalled, and answered the questions about each of two texts. For each of two groups of readers, one text had culturally familiar content, the other culturally unfamiliar content. And also within each group, one half of the subjects read the texts in a familiar well organized-rhetorical format, the other read the texts in an unfamiliar altered rhetorical format. And the result showed that content schemata affected reading comprehension to a greater extent than formal schemata.

CHAPTER III

PRESENTATION AND ANALYSIS OF THE DATA