CHAPTER II

LITERATURE REVIEW

II.1. Memory

Myers (1986) views memory as a dynamic information–processing system. This system must **encode** or translate information into some form that enables the system to process it; **store** or retain information over–time; **retrieve** or locate and get out information when needed.

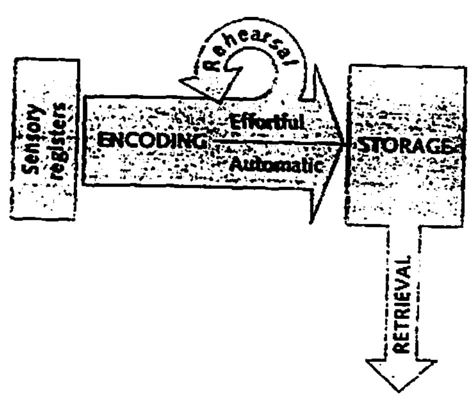

Figure II. 1

A simplified information-processing model of memory (Myers, 1986:257)

Atkinson and Shiffrin in 1968 (in Baron, 1995) suggest three distinct kinds of memory systems. One of these, known as Sensory Memory, provides temporary storage of information brought by one's senses. A second type of memory is known as Short-Term Memory (STM). Short-term memory holds relatively small amounts of information for brief periods of time usually thirty seconds or less. Third memory system, Long-Term Memory (LTM), allows one to retain vast amounts of information for very long periods of time.

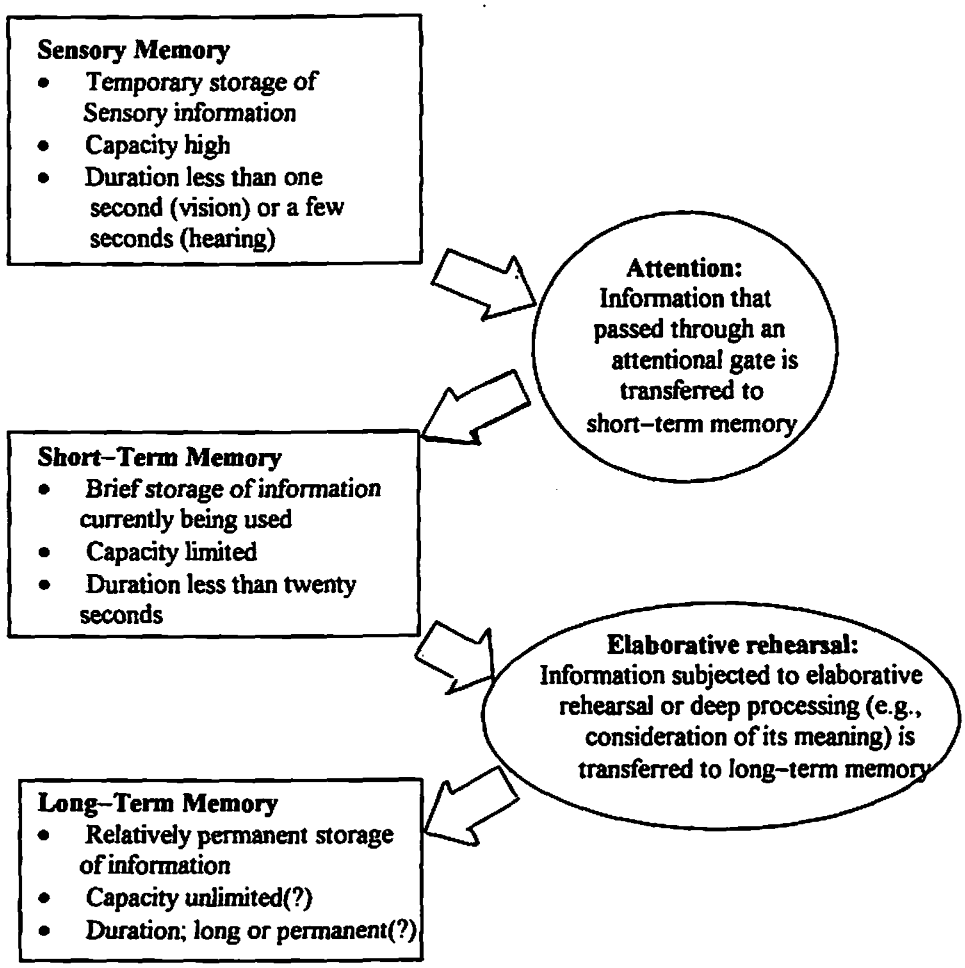

Figure II.2.

One widely accepted model of memory (Atkinson and Shiffrin in Baron, 1995: 219)

II.2. Long-Term Memory

According to Solso (1995), in general, LTM is thought as the repository of all things in memory that are not currently being used but are potentially retrievable. Its most distinguishing feature is its diversity of codes, abstraction of information, structure, capacity, and permanence. In LTM, information is clearly coded acoustically, visually, and semantically. Solso (1995:164) illustrates the multidimensional coding of information in LTM as follows:

> A black–and–white bird sometimes perches outside my window. I know it's a western birds–feathered creatures, wildlife, and so on. Magpie when it makes a sound like one, or when I see it, or when I read about a western magpie and I associate that information with other semantic information about birds–feathered creatures, wildlife, and so on.

Atkinson and Shiffrin model (in Baron, 1995) suggests that information is processed in memory in the step-by-step manner as shown by Figure II.2. Information enters STM from Sensory Memory through Attention. On the other hand, information enters LTM from STM through Elaborative Rehearsal. It is rehearsal requiring significant cognitive effort; it can include thinking about the meaning of the new information and attempting to relate it to information already in memory.

Meanwhile, Craik and Lockhard in 1972 (in Baron, 1995) introduce two levels of processing view: *shallow processing* through more effortful and lasting *deep processing*. Shallow processing might consist repeating a word or making a simple sensory judgment about it while a deeper level of processing might involve somewhat more complex comparison.

According to Johnson and Hasher (in Gerow, 1992), the information we have stored away in LTM can be retrieved in many different forms. It may be that different subsystems or types of LTM process information in our LTM. Different kinds of information may be stored in different places by different processes.

Endel Tulving (in Gerow, 1992), determined the information stored in LTM in three different types: *Procedural memory* in which stimulus–response associations and skilled patterns of responses are stored; *Semantic memory* in which vocabulary, facts, simple concepts rules and the like are stored; and *Episodic memory* in which live events and experiences are stored. It is time–related memory, and in a sense, it is autobiographical.

> Procedural memory is the lowest level of LTM that enables organism to retain learned connections between stimuli and responses, including those involving complex stimulus patterns and response chains, and to respond adaptively to the environment. Basic procedures or techniques, such as those required to ride a bicycle, are stored in procedural memory. The meanings and correct spellings of words are stored in semantic memory. Life experiences, mundane, and dramatic are stored in episodic memory (Tulving in Gerow, 1992:259-260).

Likewise, the process of getting information out of LTM storage or retrieval depends on retrieval cues. As defined by Baron (1995), retrieval cues are stimuli, which are associated with information stored in memory that can help bring to mind at times when it cannot be recalled spontaneously. Such cues can be aspects of the external environment- a place, sights or sounds, even smells.

In addition, according to Myers (1986), the retrieval might involve the interference of each other. He differentiates two kinds of interference: *proactive interference* refers to the disruptive effect of previous learning on the recall of new information and *retroactive interference* refers to the disruptive effect of new information on the recall of previous information.

II.3. Semantic Network Structure

The fanciful representation of LTM, according to Solso (1988), suggests that within it, items are linked in a way similar to that of an intricate telephone network, which is capable of calling up other related information until the desired information is contacted. The way we recall the desired information through the network of interrelated and associated information suggests that LTM is organized. Hence, knowledge stored in our memory is organized information.

Taylor and Taylor (1990) explain that each word stored in our memory carries various types of information: letters, letter cluster, prefixes, suffixes, global word shapes, first letters, semantic features, associates, syntactic relations, phonetic patterns, and other less describable features. Each type of information is not uniquely associated with a single word rather each type of information is shared with other words. When one word is presented, many other words sharing some types of information are inevitably activated. Words and all kinds of semantic information are stored in semantic memory. The organization of semantic information in this memory relates to how people respond to words and their information.

Psychologists have used several techniques to study the organization of information in semantic memory. One technique is to construct semantic network structure as proposed by Collins and Quillian in 1969 (in Gerow, 1992:262-263). In semantic network structure, semantic memories are organized in hierarchies of information.

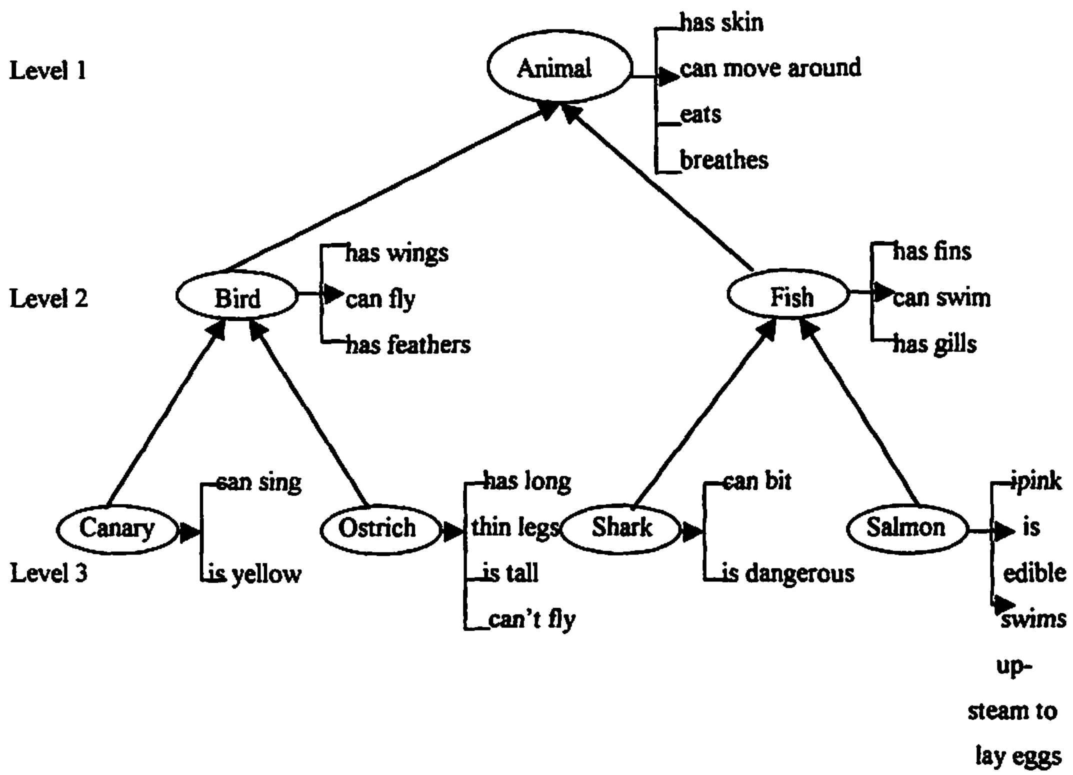

Figure II.3.

An Illustration of how information may be organized in semantic memory

Figure II.3. presents a very small segment of a possible network or hierarchy. Members of a category are organized in a hierarchy. The information to be retrieved must be located within the hierarchy to be recalled. At the top of the chart of semantic organization is the term *animal*. Associated with it are some of its defining characteristics, “has skin,” “can breathe,” “moves around.” Below *animal* are found (among others) two concepts, *bird* and *fish*, each with its defining characteristics. Below this level are more specific examples, including canary, robin, shark, and salmon, each with its defining characteristics. It is possible, of course, to go even farther.

Further, Reed. (1992:212) explains that a semantic network structure shows how concepts are related to each other. Networks are typically represented by diagrams in which the concepts are called *nodes* and the lines showing the relationship between two concepts are called *links*.

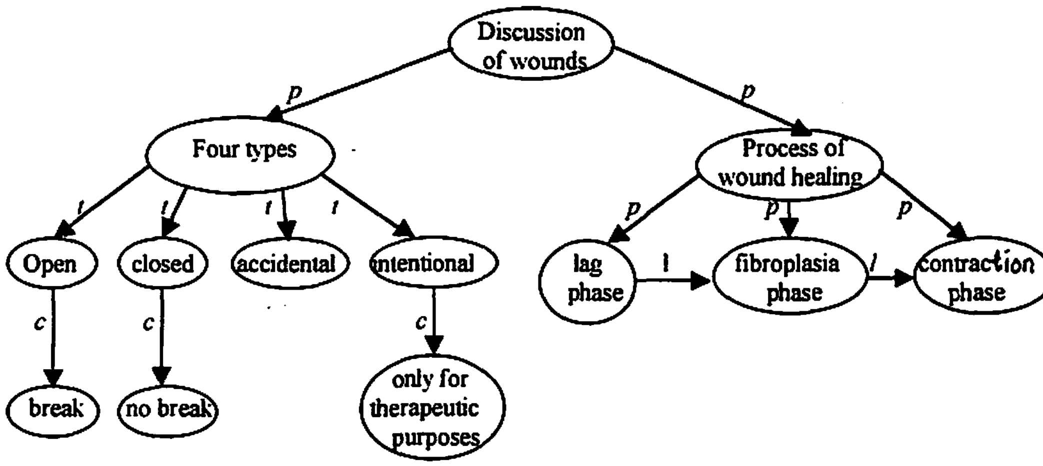

Figure II.4.
Part of a semantic network that represents information in a nursing text

Figure II.4. shows how information is stored in the three-level hierarchical network structure. Each concept in the network is stored with pointers (arrows) showing how it is related to other concept in the network. There are several different kinds of relations among concepts. There are two kinds of hierarchical relations, *part* (indicated by a *p*) and *type* (indicated by a *t*). *Part* indicates that a concept in a lower node is part of a concept in a higher node. The discussion of wounds is divided into two parts: the types of wounds and the process of healing. *Type* indicates that a concept in a lower node is an example of a category in a higher node. Open and closed wounds are examples of different types of wounds. In addition, the information on wounds contains two nonhierarchical relations: characteristics (indicated by a *c*) and *leads to* (represented by an *l*).

Characteristics are the features or properties of a concept. A characteristic of an open wound is that there is a break on the skin. The relation *leads to* specifies that one concept leads to or causes another concept. This relation is particularly useful for describing sequential processes, such as the three phases of healing. In addition, John-Laird in 1983 (in German, 1990: 391) suggests that the meaning of a word in a semantic network is set up in terms of a network of 'is' relationships.

Stanley Milgram (1992) has proposed the application of 'Graph Theory' to semantic network structure. Based on Graph Theory, a simple graph or diagram varies in the number of points it contains (the size of the graph), and the number of connections each point has (the valency of the points). It will be fairly obvious that both size and valency directly affect a third parameter; the distance, which has to be traveled between any two randomly, selected points (the diameter of the graph). The obvious parallel between semantic network structure and formal graph is that this parallel allows us to talk about large-scale mathematical properties of vocabularies. The techniques of formal graph theory might be a useful way of approaching vocabulary structure. In semantic network structure points are represented by words or concepts. The valency of the points is the number of connections each word or concept has. While the diameter of the graph is the distance which has to be traveled between stimulus–target word

> The beauty of the semantic network structure is not only concerned with the associations or the relationships among concepts themselves, it is not only can be used to reveal the organization of information in one's semantic long-term memory; but it also has an important role in the study of the first and second language vocabulary storage. The total vocabulary size is not a major factor in the task. Rather the semantic network structure provides a tool to compare and measure the links which are necessary to get from one concept to another in semantic network structures produced by between L1 and L2 speakers (Meara, 1992).

II.4. Semantic Theory

II.4.1. The meaning of word

According to Lyons (1977:317), the description of the meaning of words and phrases rests upon the thesis that the sense of every word can be analyzed in terms of a set of more general sense–components (or semantic features), some or all of which will be common to several different words in the vocabulary. The sense–components may be thought of as atomic, and the senses of particular words as molecular, concepts. For example, the sense of 'man' might be held to combine in the molecular concept "man", and the atomic concepts "male", "adult", and "human".

'Semantic features' and 'meaning components' are two terms that are often used together. 'Semantic features' strictly means features that have been proposed within semantics used as the representation of meaning in the mental lexicon, whereas 'meaning components' may be thought of as those entities which semantic features are set up to elucidate (German, 1990:388).

A further notational convention introduces a feature technically in Linguistics, as the use of a plus–sign or a minus–sign to distinguish between the positive and the negative values of component (Lyons, 1977:323).

Meanwhile, the definition of semantic properties and relations in semantic theory can be thought of as formal explications of our ordinary notions about semantic concepts. For example, our ordinary notions of semantic similarity, ambiguity, meaningfulness, and synonymy are, roughly, that semantically similar expressions are ones whose senses share a feature, that an ambiguous expression is one that has more than one sense, that a meaningful expression is one that has a sense, and that two expressions are synonymous in case they have a common sense (Kats, 1972).

In addition, Fromkin and Rodman (1988) say that words have general properties such as "human" or "patent", as well as more specific properties that give the word its particular meaning.

II.4.2. Paradigmatic or Sense Relations of Palmer

In responding to stimulus words, adults tend to produce 'paradigmatic' responses. Two words in a paradigmatic relation belong to the same grammatical class, share most semantic features, and therefore can substitute for one another in a sentence, for example: This pillow is *soft* or *hard*. Sensitivity to paradigmatic relations can develop only through experiencing words in varied context, experience that comes with age (Taylor and Taylor, 1990:171).

Semantic association, which exists between two words, can be analyzed through paradigmatic relations. Palmer (1981) recognizes several types of paradigmatic relations and treats them in term of 'sense' relations. These include:

- *Hyponymy* refers to *inclusion*, the hierarchical relationship between the meanings of words, in which the meaning of one word is included in (under) the meaning of another word. Thus words refer to the class itself. Example: *rose* and *tulip* are the hyponyms of *flower*.

- *Synonymy* refers to the relationship of sameness of meaning between words, in which the meaning of one word is synonymous to the meaning of another word.

  Example: *buy–purchase*

- *Antonymy* refers to the relationship of oppositeness of meaning between words. There are two kinds of antonym:

  Gradable refers to the relationship of oppositeness of meaning, in which words do not refer to absolute qualities, but may be the subject to comparison or qualification.

  Example: *tall–short*

  Complementary refers to the relationship of oppositeness of meaning, in which the denial of one word of the pair implies the assertion of the other word.

  Example: *alive–dead*

- *Relational Opposites* refers to the reversal of a relational ship between pairs of words.

  Example: *buy–sell*

- *Temporal Relationship* refers to the relationship of pairs of words in which one word expect the occurrence of other word.

  Example: *ask–reply*

- *Polysemy* refers to the relationship of meaning of a word, in which one word has a set of different meanings.

  Example: *flight → passing through air; power of flying*

- *Homonymy* refers to the relationship between words, in which some words have the same meaning.

  Example: *mail–post*

- *Homography* refers to the relationship between words, in which words are spelt in the same way, but pronounced differently.

  Example: *lead* (*metal*) – *lead* (*dog's lead*)

- *Homophony* refers to the relationship between words, in which words are spelt differently, but pronounced in the same way.

  Example: *site–sight*

- *Metaphor* refers to a word that appears to have both 'literal' and one or more 'transferred' meanings.

  Example: *foot* (*part of the body*)–*the foot of the mountain*

- *Components* refer to the analysis of the total meaning of a word being seen in terms of a number of distinct elements or components of meaning.

  Example: *child* → (*+human*) (*–adult*)

  Boy → (*+human*) (*–adult*) (*+male*)

II.5. Related studies

The followings are two studies, which had been done in the past, but have given many ideas in doing this study. The alternative way of studying the organization of information as proposed by Collins and Quillian (1969) has interested the writer to use this technique to study the organization of information of bilinguals, Indonesian-English speakers. On the other hand, the outcome of the work of Paul Meara (1992) in paralleling network structure and Milgram's graph theory has raised the writer's curiosity to conduct the same study but different context to investigate the vocabulary storage of bilinguals, Indonesian-English speakers.

II.5.1. Network models of Collins and Quillian (in Gerow, 1992)

The best known of the early network models was proposed by Allen Collins and Ross Quillian (1969). They studied the conceptualizations of semantic memory that are organized in hierarchies of information such as shown in Figure II.3. The organization schemes describe the relationship among meaningful units stored in semantic memory. The model depicts each word in a configuration of other words in memory, the meaning of any word being represented in relationship to other words. The evidence that memories are stored in this fashion was shown by asking people to respond to the following questions with *yes* or *no*.

1. Can canaries sing?
2. Do canaries have feathers?
3. Do canaries have skin?

None of these questions gave the people a hard time, but Collins and Quillians found out that the first was answered more quickly, the second took longer, and the third, longer yet. Each question required the people to search a higher and higher level of memory to find the answer. An assumption of this model is that concepts can be clearly and neatly defined and then organized.

II.5.2. Network Structures and Vocabulary Acquisition in a Foreign Language of Paul Meara (1992)

Beginning from the assumption that L1 vocabulary is bigger than L2 vocabulary and to test the hypothesis that the valency of L2 vocabulary items is much smaller than that of L1 items, Paul Meara set up an experiment. In this experiment, Paul Meara tested ten advanced non-native speakers of Spanish who spoke English as L1. The subjects were asked to construct chains of associations between 13 pairs of random words. There were two test versions: English and Spanish. The interval between both versions was about two weeks. The result of this study, however, showed something of an embarrassment. The data is quite different from the logic of the earlier argument and requires a conclusion that valencies in an L2 are actually higher than valencies in an L1. A more likely explanation is that the psychological cost of moving round a semantic network is higher in an L2 than in an L1, and this encourages L2 speakers to produce short chains.

CHAPTER III

PRESENTATION OF THE DATA