CHAPTER II
LITERATURE REVIEW

II.1 Reading Comprehension

Reading is an activity in which for some people is very interesting to be done. In line with this, the purpose of reading vary in many ways such as reading for pleasure, information, improving writing ability, increasing vocabulary, enriching lives, etc. Reading for pleasure, here, is, for the readers, to entertain themselves. They often do it as their hobbies. Some of them would like to choose light themes as their reading references whereas the others likely to choose the heavy ones. For instances, one would rather reading novel than scientific books such as a technical book or an encyclopaedia. Meanwhile, another purpose of reading, reading for information usually begins when readers need to get some information through this activity. By reading, they would catch its significant contents which they truly need, though in fact, consciously or not, reading for pleasure is also a process to get new information. Thus, reading for pleasure is usually included in the kind of extensive reading. Extensive reading, here, is reading longer texts. It is a fluency activity and mainly involves global understanding. In contrast, reading for information is a kind of intensive reading which is customarily used to extract specific information (Grellet, 1981).

Moreover, it is quite hard to define what reading is. According to Levine and Calvalino (cited in Arbib, Caplan and Marshall, 1982), reading is an activity which involves responding in a conventionally acceptable manner to a set of visual stimuli. This definition is too broad and too narrow. It is too broad because

when we are greeting a friend and seeing her, it is not a reading activity, though a verbal response to a visual stimulus is involved. Whereas, it is too narrow because although reading usually involves visual stimuli, we would probably accept appropriate responses to tactile stimuli (like Braille) within the family of reading activities. Just and Carpenter (1987) mentioned that reading is a part of language skill. It is a complex cognitive skill. Reading consists of a collection of psychological processes that together produce an understanding of a text. The process, here, refers to a set of operations that accomplish some goal. Moreover, the process has a beginning state, an end state and some intervening transformations. In reading, the beginning state includes the printed words on the page, the reader's initial knowledge of the topic and the reader's knowledge of the language. The end state includes the new knowledge that the reader has gotten from the text. The intervening transformations are all of the processes and stuctures that make up reading. In line with this definition of reading, Harris (cited in Olson and Dillner, 1982) defined reading as visual perception of word forms and their meaning. Caroll (cited in Olson & Dillner, 1982) mentioned that reading is a perception and comprehension of written messages in a manner paralleling that of the corresponding spoken message. Goodman (cited in Olson and Dillner, 1982) described reading as a psycholinguistic process which interrelates the thought and language. In fact, thought and language, here, is not the same. Furthermore, reading is information processing. The reader interacts with the graphic input as he or she seeks to reconstruct a message encoded by the writer. The reader focuses his/her total prior experience and learning on the task, drawing

on his/her experiences and the concepts that he/she has attained as well as on the language competence that he/she has achieved. Smith also cited in Olson and Dillner (1982) states that reading is both a visual and a nonvisual activity which involve two types of information. The first type is the printed page, the second is the brain. Nonvisual information is what the reader already knows about reading, language and the world in general.

Moreover, comprehension is a process that requires the translation of written language into a form that is usable by the reader's cognitive system (Samuels & Eisenberg cited in Pirozzolo, 1981). They also stated that the ease and extent of comprehension is related to the degree to which there is a match between the incoming information from the text and information stored in the mind of the readers. Success in comprehension according to Goodman (cited in Olson and Dillner, 1982) is based on the extent to which the reader's reconstructed message agrees with the writer's intended message.

The term reading comprehension is used to identify the skills (decoding ability knowledge of the vocabulary, concept of familiarity and cognitive development) needed to understand and apply information contained within written material (Olson and Dillner, 1982). As stated by Turner in Alexander (1988), reading comprehension involves taking meaning to a text in order to obtain meaning from that text. He, furthermore, mentioned that an individual may be said to comprehend a text fully when he can:

1. recognize the words and sentences of the text and know what these words and sentences mean.

2. associate meaning, both denotative and connotative, from personal experiences with the printed text.
3. recognize how all these meanings and/or his perception of them fit together contextually.
4. make value judgements about, and based on, the reading experience.

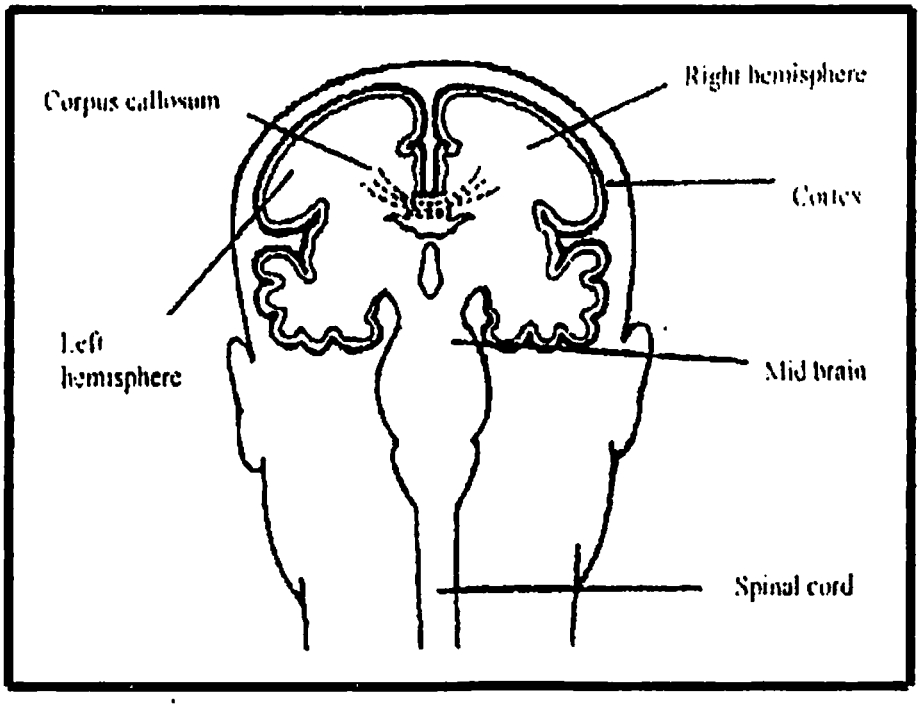
Comprehension, then, involves more than an author's syntactically correct, semantically plausible sentence or passage. The generation of literal or inferential meanings for written language involves the reader's organized knowledge and memories of experience. In brief, to comprehend written language, it is more than read and constructs a meaning for it. Furthermore, we must derive the reconstructed or reconstructed meaning or meanings from the syntactic and semantic characteristics of the written language that we read. Thus, reading with comprehension is the disciplined generation of meaning for written language (Wittrock cited in Pirozzolo, 1981).

II.2 Brain Lateralization

It is quite clear that brain is the most important organ of the body. It is an important part of the nervous system and is found in all animals. Definitely, the human brain is the most complex and highly developed of all brains. It commands hundreds of different muscles of the body so that we can run, talk and hold things. The brain also commands the thousands of glands that produce vital substances, for instance: sweat, tears and saliva are all under the brain control.

Brain has roles to control and communicate all of the organs within the body and it also communicates the body and its surroundings. Indeed, the brain has cerebrum as the largest part of the brain. It has a peculiar surface which is twisted, wrinkled and knotted. This surface is known as the cerebral cortex. Furthermore, cerebrum which is also called the forebrain, consists of two hemispheres. They are left hemisphere and right hemisphere. The left hemisphere is also called major hemisphere, whereas the right, minor hemisphere. These two hemispheres are separated and connected by a bridge called corpus callosum. Frequently, the division of the two hemispheres is considered like twins. They are exactly the same. In fact, they are asymmetries both in structure and function. Structurally, the left hemisphere is almost always larger than the right hemisphere. The right also contains a lot of long neural fibers, whereas the left contains shorter fibers. The different quantity of the left and right hemisphere itself brings them into differences in each of their functions. Functionally, the left is frequently associated with the superiority of language abilities such as in reading, writing and speech. It also has higher abilities in arithmetic, logical and analytical thinking. The right hemisphere, on the other hand, has better roles in musical and artistic abilities, in imagery and dreaming and in the perception of complex geometric patterns (Atkinson, 1987:49). The representation of the two hemispheres are presented below:

Figure II.1
Right and Left Hemisphere



Thus, the specialization of function of the two hemispheres is called brain lateralization. As stated by O'Grady, et al (1989:254) that lateralization is the process of localizing a particular function in one hemisphere, right hemisphere or left hemisphere. He, furthermore, gave a brief description of this hemisphere dominance as follow:

Table II.1
Hemisphere Dominance

Left Hemisphere	Right Hemisphere
Language	Perception of non-linguistic sound
Analytic reasoning	Music
Temporal ordering	Visual and spatial skills

Reading and writing	Holistic reasoning
Arithmetical	Pattern recognition

Source : O'Grady et al . , 1989

In connection with this, Kagan and Havemann (1980:54) maintained that the right hemisphere excels in processing many kinds of visualizing information, especially of form and space, and music and other sounds not related to language. Dogde (cited in Davidoff, 1980) also revealed that although the right hemisphere generally subordinate in the use of language, it exceeds the left hemisphere in recognizing faces, important for social responsiveness, in assembling objects, such as blocks and puzzles and in drawing three dimensional objects. This is also strengthened by Kimura (cited in Hall, 1983). He stated that people with right hemisphere damage may find it difficult to draw. Gerow (1992:89) confirmed that putting together a jigshaw puzzle, uses the right hemisphere more than the left. Whereas, skill in the visual arts, such as painting and drawing, is associated with the right hemisphere more than the left.

Furthermore, imagination cannot be separated from the process of drawings and imagination itself is mediated by the cognitive activities of the right cerebral hemisphere. As stated by Jackson (cited in Sheikh, 1983) that the posterior lobe of the right side (of the brain) is the chief seat of the revival of images. Moreover, construction apraxia, a difficulty in drawing, copying or building models and design, is disability most commonly associated with right hemisphere damage (Helaen cited in Sheikh, 1983). Newcombe, Weisenburg and McBride (cited in Sheikh, 1983) mentioned that right hemisphere lesion is often

followed by the impairment in drawing, object assembling, block design, and form boards and mazes. As said by Lange (Ley cited in Sheikh, 1983) that European neurologists, who were examining the right hemisphere's role in visual-spatial functions, also revealed the involvement of right hemisphere in visual and constructional imagination. The same argument is also commented by Bogen, Levy et al and Nebes (Forisha cited in Sheikh, 1983) that the left hemisphere has been termed analytical and the right, global. The left has a facility with words and numbers and the right, with images. Freud (Forisha cited in Sheikh, 1983) also stated that the right hemisphere is the origin of fantasies and dreams.

Furthermore, Ehrenwald (www.macalstr.edu) has classified important differences between hemispheres as follows :

Table II.2
General Left-Right Brain Attributes

Hemisphere	Left	Right
Thinking	Abstract, linear, analytic	Concrete, holistic
Cognitive style	Rational, logical	Intuitive, artistic
Specialized functions	Reading, writing, arithmetic sensorymotor skills	Rich dream imagery, good face & gestalt recognition
Spatial recognition	Relatively poor	Superior, also for shapes, wire figures

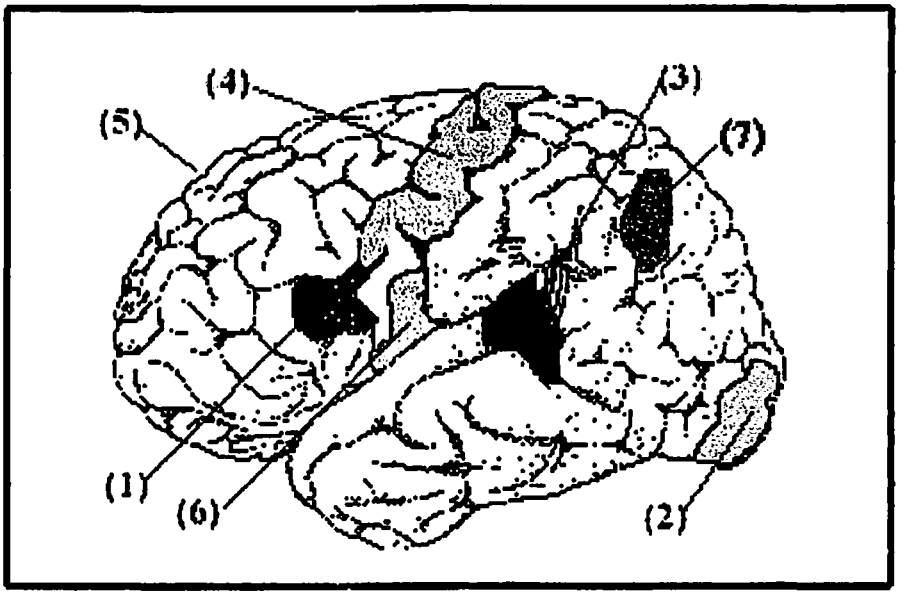
Reading is a part of language skill. As it is considered to be one of language skill, then it is clear that the process of reading involves the activity of the left hemisphere. This is due to the research to monolingual Japanese aphasics who show selective impairment in the reading of Kanji (logographic symbols borrowed from Chinese characters), as opposed to the Kana syllabary. It was explained thoroughly by Hung & Tzeng and Iwata (cited in Bright, 1992). They stated that reading a syllabary or alphabetic script requires analytic skills. It is the speciality of the left hemisphere. However, reading logographs requires only a general configurational match, presumably right hemisphere specialty. It is because reading logographs needs more complex spatial layout which implies that reading them should be handled by the right hemisphere as it is specialized in visual or spatial processing.

Based on this theory, the language abilities are dominantly influenced by the left hemisphere in which reading is included. Below is the process of reading in the left hemisphere:

- Right eye → Left visual cortex → Broca's & Wernicke's areas & Angular gyrus
- Left eye → Right visual cortex → Corpus Callosum → Left hemisphere → Broca's & Wernicke's areas & Angular gyrus

To know further about the division of the left hemisphere, the picture is depicted in figure II.2:

Figure II.2
Left Hemisphere



- Parts and the respective functions of the left hemisphere :

1. Broca's area : produces speech
2. Visual cortex : processes visual information
3. Wernicke area : comprehends verbal material
4. Motor cortex : executes motor activities
5. Cerebral cortex : responsible in complex mental activities
6. Auditory cortex : processes visual information
7. Angular Gyrus : integrates visual and phonetic information

Actually, the term "hemispheric specialization" is quite interesting to be discussed. It has been created a number of argumentations during the years. Thus, there are several researchers who seemingly agree and disagree with the theory of brain lateralization. Some of them reveal that the work of the two hemispheres do

not separate each other, but work in integrity. As noted by Levy (cited in Atkinson, 1987) that:

> These differences are seen in the contrasting contributions each hemisphere makes to all cognitive activities. When a person reads a story, the right hemisphere may play a special role in decoding visual information, maintaining an integrated story structure, appreciating humor and emotional content, deriving meaning from past associations and understanding metaphor. At the same time, the left hemisphere plays a special role in understanding syntax, translating written words into their phonetic representations and deriving meaning from complex relations among words concepts and syntax. But there is no activity in which only one hemisphere is involved or to which only one hemisphere makes a contribution.

Thus, the two hemispheres, right and left do not work independently, but they integrate all their activities at all times.

II. 3 Related Studies

In connection with the study about the lateralization of the brain, precisely, hemispheric specialization, there were some researches which had been done in the past. The first is the study done by Paul Broca in 1861(Fromkin & Rodman, 1988), in which there was a patient who had lesion in his left hemisphere, precisely, in the anterior part. The patient, then, lost his speech, whereas damage to the right hemisphere did not. His speech was not fluent, slow, laboured, hesitant, often one syllable at a time, with great difficulty in articulation and disturbed suprasegmental features. And then, in 1873, Carl Wernicke (Fromkin & Rodman, 1988) discovered patients who could speak fluently with good intonation and pronounciation, but with a lot of errors (word substitutions) and often with phonological errors. The patients also had difficulty in comprehending

speech. Wernicke's patients had lesions in the posterior or back portion of the left temporal lobe. Both of these brain damages are well known as Broca's aphasia and Wernicke's aphasia. Thus, aphasia, here, is a neurological term used to refer to any language disorder that follows a localized brain lesion caused by a stroke, a tumor, a gunshot wound or an infection. These researches covered that the left hemisphere has specialized functions. This was shown with the damage of the left hemisphere which destroyed the language abilities of the patients. And these were not found to the damage of the right hemisphere.

Another study of brain lateralization is what so-called split-brain technique. This term customarily connected to a person suffering from serious epilepsy which had to make his corpus callosum being cut. This "freeway" between the two brain halves consists of two million fibers which connect the cells of the left and right hemispheres. When this pathway is split there is no communication between the two brains. As stated by Gazzaniga (cited in Fromkin and Rodman, 1988):

> With (the corpus callosum) intact, the two halves of the body have no secrets from one another. With it sectioned, the two halves become two different conscious mental spheres, each with its own experience base and control system for behavioral operations...

The famous hemispheric specialist in this technique is Roger Sperry. In 1968, Sperry with his colleagues, Milner and Taylor at the California Institute of Technology, began extensive studies on a number of epileptic patients whose corpus callosum had been severed (Atkinson, 1987). This operation had been administered in order to confine a seizure to one half of the brain, so that the other half could carry on functioning normally. In the research, they began to uncover

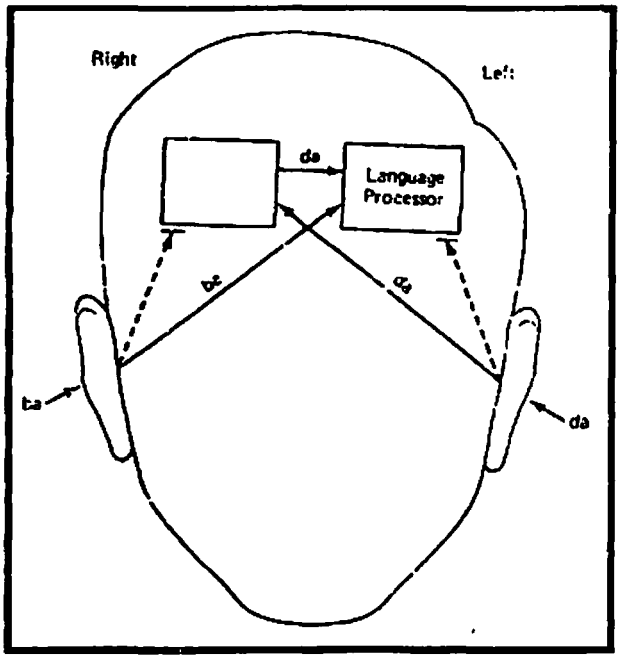
some interesting anomalies. If a patient was given something to hold in his right hand, he could say what he was holding, since the information was going to the left (verbal) side of the brain. But if the object was in his left hand, he could not describe it, though he could later point to the object again with his left hand. It was done intuitively since the right-brain had both recognized and remembered the object. Furthermore, the crossover in the visual system is slightly more complex than in the rest of the body. The eyes themselves are not directly crossed, as the left side of the retina of each eye connects to the left side of the brain, and the right side of the retina of each eye connects to the right side of the brain. Thus, since the retina image is inverted, the left side of the visual field connects to the right side of the brain and the right side of the visual field connects to the left side. When questioned, the split-brain subject seems unaware to what his left hand is doing. Since the sensory input from the left hand goes to the right hemisphere, the left hemisphere receives no information about what the left hand is feeling or doing.

The research of Sperry and his colleagues was treated to seven spilt-brain subjects In relation with this, Sparks and Geshwind (cited in Foss & Hakes, 1978) in 1968 also did the same research, but solely to one spilt-brain subject. Both of their outcomes were quite consistent. In both studies, subjects performed quite well when stimuli were presented to one ear at that time.

In 1961, Kimura (cited in Foss and Hakes, 1978:361) firstly demonstrated the behavioral techniques which could be used to demonstrate lateral differences in language processing capabilities in normal individuals. Kimura presented

subjects with three pairs of spoken digits, arranged so that the two digits of each pair were presented simultaneously, one to each ear. The presentation of different auditory signals to the left and right ears is referred to as dichotic listening. Her subjects were able to repeat more of the digits presented to the right ear than those presented to the left (See Figure II.3).

Figure II.3
Kimura Dichotic Listening Test



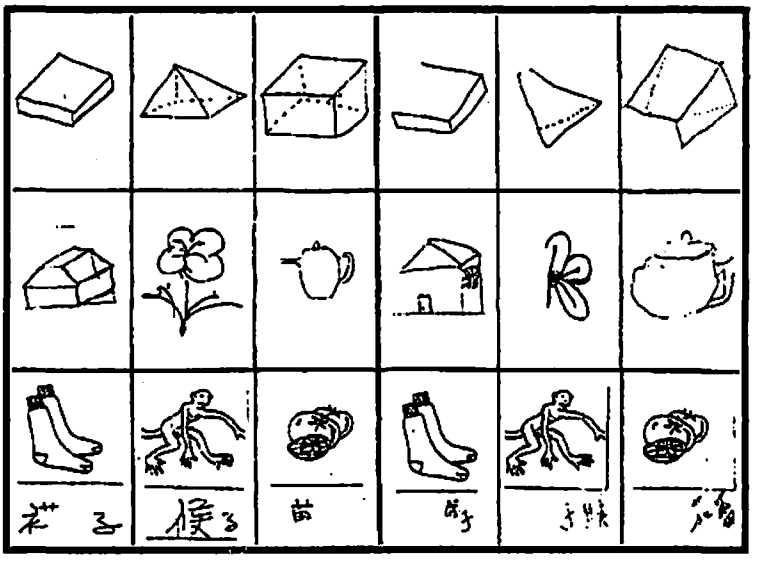
The neural connections between ears and cerebral hemispheres, showing that when sounds are presented to the two ears simultaneously (dichotically), the signal presented to each ear is transmitted to the hemisphere on the opposite side. The localization of the hyphotesized language processing center in the left hemisphere is also shown.

Another crucial studies were done by Tzeng et al (Bright, 1992). He concerned much about the reading of Chinese characters. He demonstrated the

subjects (a right hemisphere damage) to draw geometric figures and familiar objects and to describe their living room furniture from memory. They, afterwards, never missed any subcomponent when writing Chinese logographs. In contrast, left hemisphere- damaged patients showed perfect performance in another tasks, but did poorly in writing logographs with numerous errors of omission and commission.

Figure II.4
Sample Drawing & Writing Protocols by Patients with Right-Left Hemisphere-Damage

LH-damaged patients RH-damaged patients



LH : Left Hemisphere
RH : Right Hemisphere

In the top row are samples of copied geometric figures. LH patients showed perfect performance, while RH patients showed typical left visual field neglect. In the middle row are samples of spontaneous drawings of familiar objects. Here, LH patients showed perfect performance and RH patients showed

left visual field neglect. In the bottom row are samples of logographs written by the patients. In contrast with previous findings, LH patients showed omission and commission errors, while RH patients showed perfect performance.

Similar researches were also done by Hung & Tzeng and Iwata (Bright, 1992). They found that monolingual Japanese aphasics show selective impairment in the reading of Kanji (logographic symbols- borrowed from Chinese characters) as opposed to the Kana syllabary. In reading Kana syllabary (alphabetic script) requires analytic skills which is the speciality of the left hemisphere. Whereas, reading logographs (Kanji) needs a general configurational match, presumably a right hemisphere speciality. Basically, there are two reasons why logographs thought to be processed by the right hemisphere. First, they lack grapheme/phoneme correspondence and thus reading them does not require use of so-called GPC (Grapheme, Phoneme and Conversion) rules. The second reason is that logographs is a complex spatial layout and this make them to be handled by the right hemisphere since it is specialized in visual/spatial processing.

CHAPTER III

PRESENTATION AND ANALYSIS OF THE DATA