CHAPTER III
CHAPTER THREE

SCHEMA THEORY AND READING COMPREHENSION

3.1 Schema Theory: A Short History

Reading is not simply the ability to decode words but the ability to construct meaning from the text. The constructivist tradition in reading research initiated by Bartlett in the early twentieth century has cognitively revolutionized reading comprehension. Constructivism, which provides a coherent framework for studying the process of reading, not only views the reader as an active participant in the meaning-making process, but also makes him a part of 'cognitive revolution' in which he builds a mental representation from textual cues by organizing, selecting, and connecting context. The major accomplishment of the cognitive revolution, according to Gardner (1985), has been to demonstrate in clear terms "...the validity of positing a mental representation: a set of constructs that can be invoked for the explanation of cognitive phenomena, ranging from visual perception to story comprehension. Where forty years ago, at the height of the behaviorist era, few

scientists dared to speak of schemas, images, rules, transformations, and other mental structures and operations, these representational assumptions are now taken for granted and permeate the cognitive sciences." The cognitive revolution in the process of reading in the broad framework of the constructivist tradition has received support from interdisciplinary researches involving disciplines like psychology, linguistics, artificial intelligence and education.

The term schema dates itself to Kant (1787) who first developed the idea of general schemata as experiences of people collected together in the form of common elements in memory. Further, since these common elements identify categories of experiences, they also allow the synthesis of abstract knowledge that represents the category. Adopting Kantian's view of schemata, Head (1920), a neurologist, stated that anything entering consciousness is "charged with its relation to something that has gone before." Even Woodworth's (1938) observation that the process of

3. Ibid, p. 25
remembering involves the "revival of one's own experiences" runs on the similar lines.

Although as an explanatory concept the term schema has been in use in psychology for well over fifty years, the different branches of psychology gave different meanings to the schema concept. For example, for Gestalt psychologists, the concept of abstract schemata proved useful in describing memory for perceptual information.

The Gestalt movement, which was a reaction against the Zeitgeist movement which believed that emotion, perception, and thought could be resolved into elemental sensations, laid emphasis on the holistic approach. The insight of the Gestalt psychologists was that the properties of a whole experience can not be inferred from its parts. They stressed the mental organization as a 'dynamic' process where organization could be externally unaided.

Applying the gestalt ideas to visual perception, Wulf (1922/1938) experimented on the memory of geometric

4. Thorndyke and Yekovich op cit 1980: 25
designs on his subjects. An interval of a day and a week produced changes in the recall in his subjects which he labelled as 'leveling' and 'sharpening'. The former meant smoothening an irregularity, while the latter meant emphasizing or exaggerating a salient feature. His results, explained in the following terms, make an explicit reference to schema: "In addition to, or even instead of, purely visual data there were also general types or schemata in terms of which the subject constructed his responses... The schema itself becomes with time ever more dominant; visual imagery of the original disappears...details contained in the original are forgotten and incorrectly reproduced, yet even the last reproduction will usually show a steady progress towards representation of the type or schema originally conceived."  

The developmental psychologists like Piaget (1926), particularly in his early works, used schemata to describe the creation and developmental change in cognitive structures. Bartlett is usually acknowledged as the first one to use schemata for describing story recall. In his classic book REMEMBERING he proposed the notion of schema to

signify a hypothetical cognitive structure that was "...an active organization of past reactions or experiences, which must always be supposed to be operating in a well organized organic response. That is, whenever there is an order or regularity to behaviour, a particular response is possible because it is related to similar responses, which have been serially organized, yet which operate not as individual members coming one after another but as a unitary mass."\(^8\)

His study in the recall of "The War of the Ghosts," a North American Indian folk tale, is significant. He studied his subject's written recall of this text for deviations from the original materials and observed significant changes in the form of modifications, regroupings, and simplifications. This study of written recall is not something new. Earlier researchers (Binet and Henri 1884; Henderson 1903; Philippe 1897)\(^9\) have also used similar methods, but it was Bartlett who must be credited for giving a constructivist explanation for the transformation that occurred in a recall. Although Bartlett makes explicit reference to schema in his REMEMBERING, he remains vague when it comes to describing

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9. Ibid p.170
how schemata works. Going by his confession, Bartlett has indeed admitted that "I wish I know exactly how it was done."10

Bartlett's use of such phrases like "active organization", "mental set", "past experiences", etc. in the context of remembering and concomitantly reproduction of memory, explicitly or implicitly, bear a close resemblance with Ausubel, although Ausubel has himself emphatically denied such intellectual debts.11 David P. Ausubel, a major figure in the history of education and psychology, has made a direct influence on the thinking of the current generation of educational research workers. According to him, in meaningful learning, already known general ideas (or "past reactions or experiences" of Bartlett) will "subsume" or "anchor" the new particular propositions found in texts only when they are stable, clear, and discernible from other ideas. In the absence of these conditions or if the reader's grasp of the required knowledge is shaky, an "advance organizer" may be introduced which is simply "a statement written in abstract, inclusive terms deliberately introduced before a text and intended to provide a conceptual bridge


between what the reader already knows and the propositions in the text. Although Ausubel has not called his theory a schema theory, it clearly is.

Advances in the areas of cognitive science and artificial intelligence revolutionized our conception of how human process information and, thus, added encouraged to a full-fledged development of schema theory as a model for representing how knowledge is stored in human memory.

3.2 Definition of Schema

Specialists in artificial intelligence, cognitive psychologists, and linguists began emphasizing upon the constructivist theory for studying the process of reading. A new set of formalism for analyzing language comprehension emerged, which held the notion that meaning does not lie in the text and that linguistic inputs merely provide cues that readers use along with their knowledge of the world, background experiences, percepts, artifacts, etc. to construct meaning. Efforts to understand the previously existing knowledge structure led to a renewed interest in the definition and expansion of 'schema theory' and related ideas.

Schemata (the singular is schema) are theorized to be abstract knowledge structures or data structures for representing generic concepts stored in memory that have been abstracted by induction from experience. It is abstract in the sense that "it summarizes what is known about a variety of cases that differ in many particulars" and it is structured in the sense that "it represents the relationships among its component parts." Hierarchical in nature, a schema has consistent variables that become slots to fill, or instantiate in learning.

Several terms have been used to designate abstract knowledge and memory structures. Inspired by the work of Bartlett, researchers have extended and formalized his ideas by modelling the knowledge structures underlying memory for story information. Thus the term schemata have been called as "building blocks of cognition" and "the fundamental elements upon which all information processing depends" by Rumelhart (1980) or "macrostructures" by Kinstch and van

Dijk (1978) because of their significant roles in discourse comprehension and memory. Schemata as theoretical constructs have been designated by Minsky (1975), Schank and Abelson (1977), Tannen (1978), Warren, Nicholas and Trabasso (1979), and Schank (1980) as "frames", "scripts, plans and goals", "expectations", "event chains", and "memory organization packets", respectively, to represent knowledge of complex situations, events, and concepts which are operative in the area of artificial intelligence.


3.3 Types of Schema

Schema theory has formalized the role of background knowledge in language comprehension. Comprehension consists of an interaction between the resources of the reader and the characteristics of the text and efficient comprehension is said to take place if there is a match between the two. To quote Anderson et al.: "Every act of comprehension involves one's knowledge of the world as well." Interaction between the reader and the text shifts along a continuum from reader-based (characteristics of the reader that influence performance) to text-based (structural features of the text that affect reading performance) processing. When the text is familiar, the emphasis shifts towards reader-based processing. This results in greater recall of meaning, partly because prior knowledge structures assimilate information embedded in the text. The unfamiliar text, on the other hand, makes processing become text-based. This renders less efficiency in the recall of meaning, partly because the reader has to create knowledge structures for assimilating information by using different strategies like the use of analogues,

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metaphors, inferences and summarization rules, concept formation processes, metacognitive processes, etc.

Emanating from this range of continuum are the two broad types of schema, namely content schema and formal schema. Although these types of schema have been well differentiated by the various scholars, there are some studies which have apparently confounded the two schemata and have failed to distinguish between them.²³

3.3.1 A content schema is defined by "the reader's world knowledge"²⁴ or "knowledge relative to the content domain of the text."²⁵ Use of content schema in the processing and selection of important information from a given text has been investigated in four major lines of research²⁶, namely:

23. For more extensive discussion on the problems of confounding one may look up P.L. Carrell 1983 "Some issues in studying the role of schemata or background knowledge, in second language comprehension," READING IN A FOREIGN LANGUAGE, 1


(a) studies using difficult or ambiguous passages to show that interpretation of content is dependent upon prior knowledge;

(b) studies using culture-sensitive passages which demonstrate the importance of one's cultural background (or "cultural schemata") in the interpretation of a text;

(c) studies involving experts and novices to show that both the amount and the structures of prior knowledge influence passage interpretation and task performance; and

(d) studies in Artificial Intelligence which support the importance of domain-specific knowledge in learning and reasoning tasks.

3.3.2 A formal schema is defined as "knowledge relative to the formal, rhetorical organizational structures of different types of texts". This knowledge of organizational structures of text has also been referred to as "text structure schema" which includes "the reader's knowledge of how authors structure their ideas— as a narrative or as one of several types of exposition (namely) comparison, problem/solution, description or causation." (Thus text structure

27. Carrell, op cit 1987: 461
28. Ohlhausen and Roller op cit 1988: 72
schema may encompass both the "author's schema" and the "story schema" or "story grammar")

Researchers have shown varied results in the use of text structure or formal schema for processing and selecting information depending upon the reader-based or the text-based factors in processing. For example, studies investigating text-based factors have shown that there are structural features of the text that operate independently of the content of the text or certain rhetorical structures have proven easier to read and recall than others. 29

Carrell has made interesting observations with regard to the use of formal schema on reading in ESL by taking both narrative and expository texts. Her study on the effects of a simple narrative formal schema in ESL reading has shown "differences among ESL readers in the quantity and temporal sequences of the recall between standard and interleaved versions of simple stories." 30 While the quantity of recall enhanced when the story's rhetorical organization conformed to a simple schema story, violation of the story schema altered the temporal sequencing of the recall. That is, the "temporal sequencing of the reader's

29. Ohlhausen and Roller have dealt with both text-based and reader-based factors in detail.

30. Carrell op cit. 1987: 463
recalls tended to reflect the story schema order rather than the temporal order of presentation in the story.\textsuperscript{31} Her study on the effects of expository formal schema has also indicated differences in the reading recall of ESL readers of various native language backgrounds.

3.4 Attributes of Schema

Inspite of categorization of schemata according to their form and content, there are several common assumptions that underlie the various formulations of schema theory. These underlying commonalities include five putative properties or attributes of schemata\textsuperscript{32} which are as following:

3.4.1 Conceptual Abstraction:

There is a prototypical abstraction of the concept represented by a schema. This abstraction encodes the constituent properties that define a typical instance of its referent. The constituent properties may consist of perceptual features, states or events in the world, or other schemata. Depending upon the abstraction, the schemas vary. Some schemas are very concrete and specific, whereas others are vague and abstract. For example, concepts like

\begin{itemize}
  \item Carrell, \textit{op cit} 1987: 463
  \item Thorndyke and Yekovich \textit{op cit} 1980: 27-29
\end{itemize}
Animal, mammal, Dog represent animal beings, but the schema for each of these concepts vary in terms of abstractions. Animal is more abstract than mammal, mammal is more abstract than dog.

3.4.2 Hierarchical Organization:
Schemas may embed within one another in a hierarchical fashion. The hierarchy relates concepts of different degrees of specificity. For example, schema for a birthday party and a more general PARTY may have many of the same properties but the properties of the birthday party are more precisely determined than for the generic party.

3.4.3 Instantiation:
The process of matching inputs or incoming information slots in the schema is called instantiation of the schema. For example, in a sentence: "John's birthday party was great. He appreciated both the cake and the new sweater", instantiation would permit us to assume that the cake was John's birthday cake and the sweater was his present.

3.4.4 Prediction:
Incomplete information become meaningful through reasoning. This reasoning takes the form of expectations.

33. Example, for elaboration, has been taken from Thorndyke and Yekovich, op cit 1980: 28
about information we expect to obtain to fill the slots in the currently active schema. Such predictions help us interpret the incoming information and also support inferential processes that match input to expectations, as in the case of attributing sweater to birthday present.

3.4.5 Induction:

Schemata are formed by induction from numerous previous experiences with various exemplars of the generic concept. This is an ongoing process— as we accumulate additional experiences with a concept, our expectations for the expected properties of the concept become more clearly defined. All these consequently lead to successive refinement of the developed schemata. For example, returning to BIRTHDAY PARTY example for illustrating this ongoing process, our repeated participation at birthday parties over the years would lead us to develop and modify our knowledge of party formats and traditions.

3.5 Functions of Schema

The utilization of schema can be sub-divided into two basic processes, namely, schema identification and schema application. Schema identification is a data-driven pattern recognition process in which the comprehender

accrues enough information to identify a particular schema as being relevant from the previous conceptual elaborations. Schema is essentially activated by information that is available to the comprehender just before the schema is identified. Inasmuch as all the schemas in long-term memory are waiting to be identified and called for duty at the appropriate moments by the information that has been accrued, they have been compared to the demons that have been introduced in the theories of pattern recognition.

Certain factors have been said to influence the course of schema identification, the first of which is the goodness-of-fit, and the second one is the amount of information that accumulates. Goodness-of-fit identifies relevant schema if there is a good match between the target schema and the information that has been accrued. Ambiguity would occur if more than one schema were to provide a good match. A second factor helps the identification become easier because as the information increases, the informational array becomes more distinct and the chances of alternative schemas get reduced, thus leading to smooth determining of the target schema.

Schema theorists have identified a number of processes with which a schema proceeds during schema
application (Adams and Collins 1978; Bobrow and Norman 1975; Bregman 1977, Minsky 1975, Ortony 1978; Rumelhart and Ortony 1977, Schank and Abelson 1977). In the process of schema application, the first function of a schema is to provide the background knowledge that is needed for interpreting a specific input relevant to the schema. This background knowledge, as discussed earlier, is a necessary condition to understand a specific event.

As a second function schema provides the background knowledge needed for generating inferences. The process of comprehension takes into account a configuration of inferences where the source is not always provided by linguistic knowledge. To quote Graesser's examples for elaboration, "In the predominant reading of the sentence A policeman held up his hand and stopped the car the comprehender may draw a large number of inferences...." Specific schemas are, therefore, needed in order to generate different inferences.

A schema is also expected to generate expectations. Schank and Abelson's (1977) reference, to

35. Graesser op cit 1981: 33
36. Ibid, p.34
37. Ibid, p.35.
38. Ibid, p.34.
schemata as 'scripts, plans and goals' or Tannen's reference to schemata as 'expectations' can be seen as closely resembling to expectations used in the present context. Once a schema has been identified, it is the content of the schema that provides the knowledge needed for the comprehender to expect and predict future events.

As a fourth function schemas have also been said to guide the comprehender's attention and two ways have been suggested as to how they do it. First, attention is directed to those regions where schema is expected to actively participate. It issues command to test where schema elements are expected to be present and in case it is missing, attention is fixed on the area where the part may be absent.

On the other hand, attention is also likely to be directed to parts deviating from the schema and this may be observed in either the deletion of the schema or the insertion of atypical information.

Another function of the schema is the correction and adjustment that it makes while receiving the feedback about previous actions and consequences of these actions.

39. Graesser op.cit 1981: 34
40. Ibid, p.34
They perceive and monitor the outcome of the thought processes and also execute commands which in a number of cases depends on the context and feedback.

Schemas, therefore, are viewed as potential knowledge structures which instigate interpretations, inferences, expectations, attention, feedback, etc. Anderson and Pichert (1978) have sought to explore how a reader's schema affects learning and remembering of information and ideas in a text. They have proposed six functions which are as follows:

Firstly, schema is said to provide ideational scaffolding for text assimilation which means that it provides a slot for the information in a text.

Secondly, it facilitates selected allocation of attention by providing part of the knowledge for comprehension.

Thirdly, schema enables inferential elaboration, for no text is completely explicit and, therefore, it requires the reader's efforts in order to go beyond the literal information thus provided.

The fourth function of a schema allows for orderly searches of memory by providing certain views as to the type of information needed.

The fifth function of a schema is editing and summarizing the information by including the significant propositions and omitting the trivial ones.

Lastly, schema deals with inferential reconstruction by helping in generating hypotheses about the missing information. An indirect reference about any aspect may trigger off certain relevant details thereby substantiating the missing information.

Schema functions as an important knowledge bank for the reader and it is therefore important that it is activated and assimilated in order to assist in the reading process.

3.6 Schema Activation and Assimilation

Rumelhart and Norman (1978\textsuperscript{42}, 1978\textsuperscript{43}) talk of three basic modes of learning or producing new schemas.

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The first mode of learning is accretion which involves the addition of new data or information to the existing schemata without changing the already present organization. Rumelhart and Norman are of the opinion that augmentation in the existing schema occurs through the normal process of information processing into some memory unit with the structure itself remaining unchanged. This process of accretion and retrieval is, therefore, a step towards the process of learning.

The second mode of learning, which has been labelled as fine tuning, involves modification in the categories of interpretation where the basic structure of schema remains unchanged. The variables subject to modification are done with a view to improving accuracy, generalization, specificity and determination of default values.

Restructuring, which is the third mode of learning, can occur in two ways. New schema may be monitored here for the unfamiliar information, or the existing schema may be restructured. In case the latter does not take place, new schema is created for the understanding of the existing knowledge. Restructuring then, takes place only after a considerable lapse of time and effort.
The patterning of new schema on an old one, referred to as 'pattern generation', could occur in many ways. The creation of new schema could take place by generating the old one or by modifying the old one. New schema in the second instance could be induced by schema induction where configuration of sentences occurring spatially or temporally lead to the formation of a new schema.

Theories concerning schema, have looked into the aspect of activating the existing schema and into activating prior knowledge in the reading process (Adams and Collins 1979; Rumelhart 1980). Some of the strategies suggested for activating the existing schemata are the use of analogies, personal anecdotes, etc.

The activation of prior knowledge has differed variously by either providing contextual clues to activate schema, or by locating subjects with different pre-existing orientations, or by specifying subjects with varying knowledge about a topic.

45. Rumelhart op cit 1980
46. Gordon and Rennie op cit 1987: 165
With regard to assimilation of new information, many studies which have supported the beneficial effects of prior knowledge and cultural schemata, have also been concerned with situations in which the reader is assumed to spontaneously assimilate new information. There were some studies which tried to look into determining whether direct teaching of background knowledge on a topic would have any useful effects on reading passages. Gordon (1980)\textsuperscript{47} in his study on elementary school children demonstrated how adding relevant facts to the knowledge base would make a difference. The relevance of the new information to the target story was not stated to the subjects. The results showed that addition of knowledge base without causing structural changes in the existing schemata proved beneficial to the inferencing process.

Stevens (1982)\textsuperscript{48} demonstrated in a schema availability study how students who had been given the background information were able to comprehend better through the ideational scaffolding.


\textsuperscript{48} Stevens, K.C. 1982, "Can we improve reading by teaching background information?" \textit{JOURNAL OF READING}, 25
Schema theorists have almost unanimously used experiments supporting the need for the activation of pre-existing schemata. Due to the knowledge gaps, it becomes necessary at times to help readers in developing new schemata or in developing more refined ones. This is in consistent with Ausubel's 'theory of advance organizer'. David P. Ausubel, an eminent educationist and psychologist, has influenced the current educational research workers immensely. His thinking can be traced to the time of Bartlett and Gestalt psychologists, which, however, he denies.49

Ausubel (Ausubel 1983;50, Ausubel and Robinson 196951) specifies that meaningful learning takes place when the general ideas support the specific propositions in the text. This can be effective if the existing ideas are sound, clear and relevant to the required material. At other times, the text itself may be quite clear and comprehensible.

49. Ausubel op cit 1978


If, however, these two functions fail then Ausubel suggests the use of 'advance organizers'. This has been elucidated in the following terms by Anderson and Pearson as: "An advance organizer is a statement written in abstract, inclusive terms deliberately introduced before a text and intended to provide a conceptual bridge between what the reader already knows and the propositions in the text that it is hoped he will understand and learn."52

Ausubel has not termed this as schema theory and this was to come later as a study of human cognition. Anderson and Pearson (1981) have in their discussion talked of the schema needed for ship christening. According to them, a person's knowledge of this can be analyzed into different slots or variables which are instantiated when the schema is activated. Even if it is assumed that schema activation gives rise to thoughts connected with the slots, this cannot be necessarily reversed. In trying to draw a connection between ship christening and a celebrity, it is more likely that the mention of ship christening would trigger off the slot of celebrity than the other way round. The reason here would be that the celebrity would be the component of many schema of which ship-christening would not be the prominent one.

52. Anderson and Pearson *op cit* 1988: 41
Certain assumptions which have evolved here are that some components have a higher probability of bringing to mind the schema and therefore, a higher diagnostic value. The other assumption is that the activation of two or more schema components in all likelihood would set off in motion the recall of the entire schema. Ross and Bower (1981)\textsuperscript{53} had worked out a formal experimental version of the schema activation which had been experimented. One of the experiments had 80 subjects who studied sets of 40 words, each related to similar schema. They then attempted to recall the words along with the given cue. This gave a good account of the recall pattern and it was rated higher than a model based on S-R learning theory and traditional associationism.

Schema theorists have been almost unanimous in emphasizing the 'nonarbitrary nature of knowledge'. John Bransford (1983)\textsuperscript{54} has stressed that the drawing of the relation of a component to the whole schema is an essential condition of the comprehension theory. It was observed that


recall of core sentences improved when the core sentences were elaborated. Strong evidence showing the benefits of integrating arbitrary information under the schema theory has been presented by Smith, Adams and Schorr (1978)\textsuperscript{55}.

It is important at this point to probe into how schema may be modified to assimilate information which may be new. Put simply, schema may be modified by people by being given some new information related to the already stored concepts. A person may check to make sure of the consistency of the new schema with the old and whether there is any need for this change or not. Lipson (1983)\textsuperscript{56} suggests that young readers would reject text information which does not accrue to their previous information. A source of data for schema change and development is experience with particular cases. But the question of how has intrigued scholars since ancient times, and it was generally assumed that people make inductive generalizations based on certain perceptible functions. Recent theories talk of inferential heuristics and generalizations from a few cases. This calls for questioning the relationship between

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the knowledge embodied in schemata and the knowledge of particular scenes or happenings. One attractive theory, as an answer to it, is that a schema includes just the propositions that are true of any member of a class.

In this context Collins and Quillian (1989)\(^{57}\) proposed additional interesting assumptions and, therefore, suggested that for reasons of 'cognitive economy' the general case is not included in the particular ones. They theorized that knowledge division can be viewed semantically where each concept would have certain assumptions. They further stated that human memory is not infinite and that it should be beneficial to store information at some inclusive levels in their knowledge. The issue of concept analysis, however, has come under attack in recent years. Wittgenstein (1953)\(^{58}\) spelt out that it would be difficult to specify the necessary features of concepts. Putnam (1975;\(^{59}\) Kripke 1972)\(^{60}\) have asserted how features which are considered

necessary would really be characteristic features. If this is taken as true then the theory of knowledge consisting of summaries of particular case would become redundant. This would also lead to giving importance to the role of memory for making specific calculations based on what is known for particular concepts. Therefore, it was concluded that the role of inference is a major one in schema activation and language comprehension requires reliance on particular and general schema. In this process of inferencing it would be worth pondering into the effects of prior knowledge and cultural schemata on the comprehension of readers.

3.7 Prior Knowledge and Comprehension

One clearly articulated claim in the literature on comprehension is that prior knowledge facilitates comprehension. The importance of prior knowledge has been established by a number of researchers and the different models of reading have also emphasized its importance. In the words of Adams and Bruce (1980):("In fact, reading comprehension involves the construction of ideas out of preexisting concepts. A more correct statement of the role of background knowledge would be that comprehension is the use of prior knowledge to create new knowledge. Without prior knowledge, a complex subject, such as a text, is not

just difficult to interpret; strictly speaking, it is meaningless."

Studies ascertaining the importance of prior knowledge in comprehension and recall have evolved along several lines. The materials used in these studies have ranged from ambiguous passages (Bransford and Johnson 1972) to specifically constructed passages (Carrell 1983), to ordinary children's materials (Pearson, Hansen and Gordon 1979).

By using ambiguous passages— a Balloon Serenade passage and a Washing Clothes passage— Bransford and Johnson's (1972) experiments demonstrated that subjects who received background information before listening to a passage understood it better than those who did not get the background information.

Connecting the background information with correct passage reading, Pearson et al (1979) investigated its applicability to grade school readers using "natural" texts. After testing the second grade students of their background


63. Pearson, P.D., J. Hansen and C.J. Gordon 1979 THE EFFECT OF BACKGROUND KNOWLEDGE ON YOUNG CHILDREN'S COMPREHENSION OF EXPLICIT AND IMPLICIT INFORMATION
knowledge of spiders, they were given a passage to read about them. Those who had the background knowledge of spiders prior to reading the passage read it significantly better compared to those who did not have.

Carrell's (1983) results have been slightly different from the other studies. In her experiments on native (English) and non-native (ESL) readers she adapted Bransford and Johnson's materials and procedures. She broke down background knowledge into three components, namely familiarity, context and transparency, and operationalized each one them in the following way—familiarity by designating Balloon Serenade and Washing Clothes as unfamiliar and familiar, respectively, context as seeing or not seeing a picture, and transparency by choosing content words which did or did not reveal the content area. Her results indicated that "unlike native speakers for whom all three components of background knowledge play a significant role in reading, understanding and recalling a text, non native readers show virtually no significant effects of background knowledge. Further, also unlike native readers, non native readers appear not to have a good sense of how easy or difficult a text is for them to understand." 64

Roller and Matambo (1992)\textsuperscript{65} in their experiment, which tried to explore Zimbabwean bilingual reader's use of background knowledge in reading comprehension, reported that familiarity and context of the background do improve comprehension considerably.

Notwithstanding the claim that prior knowledge is important for comprehension, the question that has intrigued some theorists is that "what happens when students independently develop background information through the reading process itself?"\textsuperscript{66}

Following this line of investigation Crafton (1983)\textsuperscript{67} sought to answer two questions in this regard. The first one was to see how the feedback differ in content and organization when high school children read two texts that were and were not topically related, and the second one was to see the difference in processing of these texts. It was noted that the experimental group focussed on the larger

\textsuperscript{65} Roller, C.H. and A.R. Matambo 1992 "Bilingual reader's use of background knowledge in learning from text," TESOL QUARTERLY, 26.1

\textsuperscript{66} Gordon, and Rennie op cit 1987: 166

\textsuperscript{67} Crafton, L.K. 1983 "Learning from reading: What happens when students generate their own background information?" JOURNAL OF READING 7
units of the text in reading. Texts which had related topics, generated more inference and personal involvement in reading. The retellings of two different readings differed both in content and organization. The study, therefore, supported the common view of reading as a natural knowledge generating activity in which readers incorporate new information for schema development. Reading, therefore, can become an effective tool for the readers to generate or develop their own background information.

Recent studies have focussed their attention on how far texts compatible or incompatible with a reader's background, display changes in reading comprehension. Lipson (1982) in this regard found out that children with no prior knowledge about a topic are more susceptible to all what is stated in a text. Research has also focussed on situations in which schemata are restructured (Lipson 1983; Spiro 1980). Maria's (1981) study was concerned with restructuring schemata by presenting children with texts containing information which was contradictory to their

knowledge. The texts involved common misconceptions about topics in science and social studies. For those subjects that shared a particular misconception, Maria attempted to restructure their knowledge by refuting the misconception.

In another study, Maria and MacGinitie (1984)\(^{71}\) prefaced reading of the text by some instructional procedure in a class discussion and clarifications of certain misconception. Children were then asked to write a paragraph reflecting the misconception. Preliminary findings suggested that the sequence of presentation or structure had an effect on the process of reportation. These studies reveal how in cases where incompatibility exists between prior knowledge and a text, it was the former which was more likely to overrule.

This view has been challenged by others and refuted, for they assert the supremacy of the text over the prior knowledge in case of a mismatch (Peeck, van den Bosch and Kreupeling 1982).\(^{72}\) They asserted that textual incompatibility facilitated recall but prior knowledge activation did not have any effect on recall of compatible

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72. Ibid 1987: 169
textual information. Extending this research, Smith, Readence and Alvermann (1984)\textsuperscript{73} stated that subjects who underwent activation of prior knowledge before reading compatible text comprehended more. Their findings were similar to those of Lipson (1982)\textsuperscript{74} which state that prior knowledge would override textual considerations.

In their study on fifth grade subjects, Alvermann, Smith and Readence (1985)\textsuperscript{75} presented them with information which was either compatible or incompatible with their background knowledge. Post texts findings showed that prior knowledge activation in text which was incompatible with their knowledge led to the overriding of their knowledge of experiences. A text which was compatible with a reader’s knowledge did not show any significant change with the prior knowledge activation.

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\item \textsuperscript{73} Smith L.C., J.E. Readence, and D.E. Alvermann 1984 cited in Gordon and Rennie \textit{op cit} 1987: 168
\item \textsuperscript{74} Lipson 1982 \textit{Ibid} 1987: 167
\item \textsuperscript{75} Alvermann, D.E., L.C. Smith and J.E. Readence, 1985. "Prior knowledge activation and the comprehension of compatible and incompatible text." \textit{READING RESEARCH QUARTERLY} 21
\end{itemize}
The research undertaken by Gordon and Rennie (1987) was to examine the extent to which content schemata would be restructured through reading activities. A total of 23 students ranging between ages nine to eleven were presented with varying degrees of textual information and instructions. The children's background knowledge was pretested. The research aimed at finding out the extent to which treatment conditions created new schemata and the valuable sources of restructuring. It was found that texts given as a pretest technique brought into better results.

Two other studies concerned with the effect of providing prior cultural information showed contrasting results for the ESL students. Yousef (1968) says that a Middle Eastern student's inability to comprehend texts from American culture was because of his negative attitude. This also affected and reduced their motivation to learn. On the other hand, Gatbonton and Tucker (1971) propagated a

76. Gordon and Rennie, op cit 1987
different viewpoint. According to them, Filipino ESL student's misunderstandings and prejudices regarding Americans showed a change when they were provided relevant cultural information. Their comprehension also improved after this.

Patricia Johnson's (1981)' study on the effects of prior knowledge and linguistic complexity on reading comprehension has demonstrated that the effects of simplification of vocabulary and syntax did not show any significant results if the passage was similar to the ESL reader's background but it showed a difference if the passage was of foreign cultural origin. This study was designed to obtain data on the influence on reading comprehension of ESL students. The aspects of prior inexperience on reading was measured by the subject's written recall. The subjects were 72 students, from advanced level reading classes, representing various nationalities. The reading passage contained familiar as well as unfamiliar subjects. The sentence recognition task sought to measure the understanding of target vocabulary words and the familiar and unfamiliar information in the text. The results indicated that prior experience in the American culture

79. Johnson P. 1981 "Effects on reading comprehension of language complexity and cultural background of a text", TESOL QUARTERLY, 15.2
seemed to affect the ESL student's comprehension. The statistical analysis indicated that real experiences provided background information for more effective reading comprehension. Memory based on inferences and familiarity with background knowledge may lead to the construction of highly plausible meanings. Experiments in four different groups here did not support the correlation between vocabulary knowledge and reading comprehension. This however showed unclear results in case of ESL readers. Much has been said and written on the effects of prior knowledge. The need is to now look at the effects of cultural schemata on the comprehension of readers.

3.8 Cultural Schemata and Comprehension

Interactive effects of cultural origin of a text on the reading comprehension of ESL students have been a concern of many researchers. Several studies using culturally sensitive passages have convincingly demonstrated the importance of one's own cultural background in the interpretation of a text. Cultural schemata assumes importance particularly when there is a mismatch between the reader and the writer. Steffensen, Joag-dev and Anderson (1979) have shown how culturally familiar text provides an

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80. Steffensen, M.S., C. Joag-dev and R.C. Anderson 1979 "A Cross cultural perspective on reading comprehension" READING RESEARCH QUARTERLY. XV/1
easier reading than an unfamiliar one. In this study, subjects from American and Indian universities were asked to read letters about an Indian and American wedding. It was seen that culturally familiar material was assimilated more rapidly whereas distortions surfaced in texts which were culturally alien to the reader. It was demonstrated that implicit cultural knowledge assumed by the text and that of the reader provides an easier reading.  

Carrell's (1981) study of advanced ESL Chinese and Japanese students was based on recall of folktales from three different cultural perspectives—native culture, second culture and totally unfamiliar culture. The results indicated that the text's cultural origin and the subject's prior familiarity/unfamiliarity with that culture largely affected the ESL's judgement of the level of difficulty of the texts as well as their recall of information from the text. Johnson's subsequent studies dealing with the cultural


specificity of content schemata and their effects on ESL reading have further reiterated the importance of familiar cultural schema for comprehension. In his earlier study with native Iranian and American subjects, Johnson (1981)\textsuperscript{83} found that a text's semantic and syntactic complexity had less effect on comprehension than did its cultural origin. In the later study Johnson (1982)\textsuperscript{84} he further observed that prior experience prepared ESL students to comprehend information about Halloween in a better way, thereby ascertaining the significance of cultural schemata on comprehension.

Carrell's study in this context is very interesting since it collapses both the culture-specific content schemata and the formal schemata. Taking two groups of readers (students of Muslim and Catholic/Spanish backgrounds) faced with texts representing both the types of schemata (texts with culturally familiar/unfamiliar context and texts with familiar, well-organized rhetorical format/unfamiliar, altered rhetorical format, respectively), she concluded that "when both form and content are familiar, the reading is relatively easy; when both...are unfamiliar, 

\textsuperscript{83} Johnson \textit{op cit} 1981

\textsuperscript{84} Johnson P. 1982 "Effects on reading comprehension of building background knowledge", TESOL QUARTERLY, 18.4
the reading is relatively difficult (and) when either form or content is unfamiliar, unfamiliar content poses more difficulties for the reader than unfamiliar form.° Her conclusions reiterate Steffensen et al contention that "the schemata embodying [culture and] background knowledge about the content of a discourse exert a profound influence on how well the discourse will be comprehended, learned and remembered."°

Thus, researches on schema theory have pointed out that comprehension of a text depends upon both the reader's background and his cultural experience. With an increasing focus on the process of meaning creation, the findings of these researchers indicate that literature can be used in the act of meaning generation, since it helps explore, understand and reflect on the strategies by which readers generate meanings in the act of reading. A literary text not only enables the readers to perceive the precision and vitality of the language employed by the author but also helps them clarify their meaning all of which leads to a deeper understanding of the language. It is through literary texts that ESL learners become aware of the different modes

85. Carrell, op cit 1987: 476
86. Steffensen et al., op cit 1979: 19
that writers employ in order to create texts to engage readers. By leaving much for the reader to imagine, the study of literature creates a demand for the search of meaning from his cognitive frameworks. This demand for the search of meaning brings both literature and culture into an active alliance with language pedagogy for comprehension.