CHAPTER - II
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2.1 General

Linguistic activity on the whole is based on certain order which is the outcome of actions and reactions of an organised system and their interrelations. The order and the underlying workings of the organised system has to be analysed and explained. Any scientific discipline explains the order and the organised system in a much more organised way through the formulation of theories and models which give a generalised and specific views on the solution of certain problems. The theories are worked out in two different ways. Certain theories are based on generalisation, which are the outcome of conjectures and certain theories are formulated by collection of data and surveying it to give empirical evidences to prove the theories. However theoretical insight give solution to problems, it is always put in to test. The outcome may be either the formulation of new theories or the rejection or acceptance of the existing theory because even a strain of falsification of evidence will go in, to disapprove the whole theory.

The fundamental point that has been adapted here is to bring out the most significant theories and models in psycholinguistics particularly related to understanding and recall. The models and theories all differ in certain details but they share the common purpose to explain the complexities of the cognitive aspects relating to understanding and recall. All these
theories pave the way to prove with some empirical evidence, how
human process information and the process of attaining it based
on the input, storage and output and the workings of memory
system. On the whole these theories are considered to be the
contributing factors to explain what happens during language
comprehension and the recall of comprehended messages because as
Sutherland has aptly put it,

"the task of psycholinguistics is not to confirm
chomsky's account of linguistic competence by
undertaking experiments ..... The task of
psycholinguistics is to my mind very much more difficult
and interesting. It is by doing experiments, to find out
what are the mechanisms that underlie linguistic
competence" (Sutherland, 1966, 161 - 2).

2.2 The Theories and Models

2.2.1 The Multi-Store model of memory and The human Processing
system versus levels of Processing: Type II Processing:

Multi-Store model states that memory system
contains several stores and the external stimuli is processed
into various stages in these stores. Wessels (1982) explains
vividly the working of these various stores based on the research
made by Atkinson and Shiffrin (1968). The raw informations in the
sensory form and auditory form consisting of physical properties
like colour, shapes, lines, loudness and pitch of voice are
stored in the sensory form. The sensory form has the capacity to
store large amounts of information, but it can retain the
Figure 2.1 A multistore Model of human information processing and the primary characteristics of each memory store [From Michael, 1982: 31]
information for less than one second. To retain the informations the external stimuli should enter into the short-term store, after the information has been recognised and categorised. On the other hand the short term store has a limited capacity store since it can hold only seven items at a time, the information also lasts for only fifteen seconds and it gradually starts decaying. If the information is passed.

On to the long term store, it can be retained because the long term store stores information for long periods of time and it has no capacity limits. The short term and long term store stores informations which has been categorised such as names of letters and meanings of words. Apart from this long-term store retains two kinds of informations namely : episodic which is perceptual and contextual in nature and semantic which is conceptual in nature. Episode information includes our own past experiences which happened at a particular place and time, Semantic information consists of the knowledge of world and general facts (1972).

Craik and Lockhart proposed the levels of processing model and it is based on the model of attention. Type I processing of informations does not go into deeper levels. Type II processing, process information at a deeper level leading to the retention of the information for a longer period of time. Type I and Type II processing is similar to short-term and long-term store, but it also differs because the emphasis is given to one memory store. The information can be processed at
Figure 2.2 The levels of Processing Model [From Michael, 1982: 132]
various levels depending on the depth of processing, if it is greater the item will be remembered for a longer time.

The model portrays various depths of processing. This levels of processing model differs from multi-store model since it gives importance to the encoding process.

2.2.2 Models of Semantic Memory

Semantic memory stores knowledge of facts and meaningful informations about the language and the world. Semantic memory for the knowledge of word meanings has been explained by Michael by the following three models:

2.2.2.1 The Hierarchical Network Model

This model formulated by Collins and Qillan states that semantic knowledge can be represented as a network of interconnected concepts and the concepts are arranged in a hierarchy based on the inclusiveness of the concepts. The concepts are categorised as superordinate and subordinate depending on the inclusiveness and are placed either at the higher or lower levels of hierarchy. This network representation portrays our knowledge as an highly organised and interrelated one, because it enables the identification of relations and connection between various concepts. The knowledge of facts is stored in the network and the interconnection between the network serves as a path when memory for the knowledge is searched to make simple inferences.

2.2.2.2. Spreading Activation Model

Collins and Loftus explain that the memory network is structured around the principle of semantic relatedness or
semantic distance. It is based on the interconnection of two concepts, the semantic relatedness and semantic distance depends on the superordinate concepts or subordinate concept. The links are either stronger or weaker depending on the experience and frequency of the usage of the link. The stronger the path the time taken to traverse will be less because the link has been frequently used. If the link has never occurred in the experience, it takes longer time to traverse and the link will be weak and inaccessible. So the spreading activation network depends on the activation of the memory and how stronger the links are connected.

2.2.2.3 The Feature - Comparison Model

The Hierarchical Networks Model and the spreading activation model is based on the assumption that the knowledge is presented in memory. But feature-comparison model is based on the activity of computation of the knowledge from the information stored in memory. This model formulated by Smith, Shoben and Rips explain words as sets of features and attributes and the features are classified as defining features and characteristic features are classified as defining features and characteristic features. A semantics space resembling a map is constructed to analyse the degree of relatedness of the concept and the similarity between the concepts are categorised as high or low depending on the degree of relatedness. If the concept are more closely related the distance in the semantic map will be shorter.
2.2.3 Models on word recognition

The models on word recognition are based on two components, they are: stored word forms and stored word meanings which explain the word recognition process as perceptual and contextual. The perceptual aspects of word recognition detects the words as straight lines, curves and the overall shape of the words, but the contextual aspect of the word recognition reveal the mental lexicon in terms of linguistic – semantic relationship and it taken in to consideration the cognitive attributes of the words such as associative and image-based properties and how the information of a word is detected from the current discourse or test.

2.2.3.1 Direct Access Model or Logogen Model

This model is proposed by Morton (1969, 1979) and
The operation of this model consists of two levels, they are:

1. The initial level explains how words are perceptually detected and
2. Final level explains how the perceptually detected words are passed onto the cognitive system enabling the computation of sentential context. In short it describes the interaction between the sensory and contextual input.

The operation starts initially by detecting the phoneme, the phoneme sequence is then traced until the word matching that sequence is encountered. This model is called direct access because the perceptual features lead directly into a set of features counters called logogens. Each and every word a person knows is represented by a logogen and logogen for a word is triggered off, after the perceptual features of that particular word is recognised.

For Morton it is easier to recognise a word in a supporting context than in isolation. So the features of the logogen can be incremented not only by the perceptual information, but also by the contextual information, because the logogen is passed on to the cognitive system and response channel, when the representation of the context is constructed.

The input and output balances are explained by the concepts of thresholds and frequency effect. If the logogen of a particular word is used frequently the threshold of that particular logogen will be lower and it also requires less processing to yield access.
Figure 2.3 The Logogen Model of Morton [From Garman, 1985: 46]
2.2.3.2 Indirect access model or the search model

Indirect model formulated against the direct model which states that perceptual information has direct access to lexical entries. In indirect access model when a perceptual information of word is encountered the whole of the list of entries of lexicons stored in the access files is searched for till the correct match is found. The access files are of three types they are 1) Orthographic files for recognizing written words 2) phonological files used in language production. These three files are linked to a master file which represents the entries in the lexicon, when the entry in the master file is accessed, it is available for any kind of response, whether it is speaking, writing or understanding a word. This concept of search model is formulated by Forster (1976, 1979) and he further classifies the access files in to bins. Unlike logogen models the contest effects are not briefly explained because Forster suggests that context effect of the lexical access is the outcome of word associations.

2.2.4 Models of Structural Semantics

While the lexical semantics deals with the meaning of the words, the structural semantics deals with the meaning of the parts and how they are put together to form the meaning underlying complex expressions.

2.2.4.1 Tarki's Theory

Language is the expression of truth and in order to explain the theory of truth from the object i.e. language the
complete syntax and semantic of the expression should be provided because each and every word and its meanings are combined to produce the meanings of any complex expressions. So each and every sentence of a language should be explained through a structure called model, which denotes the set of objects in the sentences of language. The interpretation function bring out the truth value in a sentence by giving the meanings of the words and how the words are put together by the syntactic structure to form the set of objects termed model.

2.2.4.2. Model Theoretic Semantics

This model explains that every sentence of a language should be explained by the same model, irrespective of its theoretical context. This leads to the conclusion that the structure of the text determines whether the sentence is true or not and not the truth value of the sentence.

2.2.4.3 Kamp’s Model

Kamp (1979) suggested that the structure of the events in the shorter text is different from that of the longer text. So the discourse and stories should be explained in terms of a mini model which is derived from partial submodel of the world that is represented by the text itself. His views are closely related to the mental model, because he advocates two stages in process of understanding a text. First the discourse representation which indicate the relation between items in the text is constructed and then it is compared with the model of the real word.
2.2.5 Models on the process of language understanding

The models describing language understanding explain what process are involved when the language is comprehended and the explanation is based on the linguistic models and psychological based model. Three dominant views on language processing can be explained they are

i) Autonomous process

ii) Mixed model and

iii) Interactive process.

These models have been clearly explained by Flores D'Arcais and Jarvella (1983).

2.2.5.1 Autonomous process

Autonomous process give importance to the syntax, to understand a sentence the structural description and its underlying grammatical representation should be computed and this computation is made without the assistance of the semantic and pragmatic cues. Foster and Olbrei call this autonomous view as constancy hypothesis and considers that the time taken to interpretate the syntatic structure of the same syntactic pattern followed in various sentences with different meaning should be the same. Based on this hypothesis he formulated a theory stating that analysis of syntatic structures are based on syntatic cues alone and semantic process is analysed after the syntatic processing of the structure is carried out. The views on the autonomous process is always put into question; Whether the autonomous and independent perceptual processing of the syntax is
essential for the computation of the comprehension of the message.

2.2.5.2 Mixed Model

Holmes formulated a kind of mixed model for analysing the process of understanding based on three stages. First the surface structure is analysed, secondly the semantic analysis is carried out and finally a checking process is made out of the output of the syntactic and semantic process.

2.2.5.3 Interactive Process

An interactive process has gained prominence among psycholinguistic theories. All the theories of psycholinguistic is based on the contribution of either the top down or bottom up processing of the informations. But all the interactive models proposed share a common feature and they can be explained by the following:

"(a) processing proceeds in parallel at all levels. This means that work at one level does not wait until processing has been completed at other levels.

(b) Result from one processing level are available at all other levels. This means that a central processor might rely on computation from one level for making decisions at some other level. One may think of the interaction among levels in two ways: one in which they are organised hierarchically, such that information from non-adjacent levels has to pass through intermediate levels and another, a cross-talk model in which all levels communicate with
each other directly.

(c) The processor is free at any moment to use evidence available from any level to continue its work. This is a direct consequence of (a), but also means that the processor may choose to use whatever information is more useful, be it phonological, syntactic, semantic or grammatic". [Flores D`Arcais and Jarvella 1983 : 9 - 10].

2.2.6 Knowledge Based Mental Models

The presentation of the message is not ascribed to the linguistic structure, but it is the outcome of the inferential and construction process based on the linguistic context, nonlinguistic context and general knowledge shared by the encoder and decoder. The cognitive status of knowledge are expressed in the sentence form and this states of knowledge has been in the process in various ways.

2.2.6.1. Propositional Model

This model explains propositions as the basic unit of meaning. Clark and Clark (1977) views that this model is somewhat like millers theory (1962) of derivational complexity, which states "that sentence are ultimately represented as Kernal sentences plus information about how they fit together. Altered a little and put into our terminology, it assumed that sentences are represented as propositions plus their interaction" (1977 : 144). The proposition consists of combination of concepts, one concept form the nucleus. This theory is explained by the following examples.
1. The fresh young troops defeated Napoleon’s army
2. a. The troops were fresh
   b. The troops were young
   c. The army belonged to Napoleon
   d. The troops defeated the army" (1977 : 13)

The units in 2 are not sentences or clauses but they are the units of meanings called propositions, all the proposition correspond to the unitary idea expressed in sentence 1. Each propositional unit consists of one verbal unit and one or more nouns. When sentences are encountered the specific idea around which the sentences are constructed can be conveyed by the propositional content, or the ideational context of the information.

2.2.6.2 Minsky’s Concepts of Frame

Every sentence or discourse that it formulated by the encoder has a purpose to convey some message and they are related to some knowledge domain which the decoder has to decode by forming some kind of mental representation of the knowledge domain while the message is understand. Minsky (1975) formulated the concept of frame model based on the situational knowledge. Minsky’s frame are the basic units of knowledge and its memory system for information consists of millions of frames which are in the form of hierarchical data structures. The necessary and important features of a situation comprises the top level and the features which are less important and optional comprises the lower level. Sanford and Garrod (1981) give an example of a
Birth party frame. The top level features consists of host and guests the lower level consists of heading like games, present, decor etc. The important features of normal expectations are called default values, they are in the higher level of hierarchy and frames consists of many default values depending on the situation, the frames and the default values are fixed and they also initiate slots. Minsky describes variety of frames they are: Frames for objects Temporal or Programmatic frames, Mixed frames for situations, grammar frames, Narrative or text frames and scientific paradigms.

Frames are related to one another by the process called embedding. "Part of a restaurant frame might include a reference to a general frame for paying bills for instance. Another is through subframes: a room frame may have specific versions for lecture room, office, bedroom, bathroom etc. Similarly, a soccer frame may have certain general rules associated with it, but could be related to a number of specific subframes. Such subframes may be five-a-side soccer, informal soccer games, children's pretend soccer games, etc. If the processor is using the general soccer frame initially, it could move to a specific related subframe by a particular instantiation or by mismatches" (34 – 35). The second way through which frames can be lined is similarity networks. Minsky uses an examples of the concept of furniture, which has been handled through the problem of family resemblance. During the understanding process frames provide a more organised way of handling the word
meanings, sentences and discourse whether they are perceptual, contextual or prescription of action. While reading frames are formulated according to matching process and once a mismatches is detected it becomes a pointer to the next frame.

2.2.6.3 The script theory

The script theory explains how knowledge is used to understand episodes, while examining the given text and the idea evoked by the text. All the tests can be understood if they are related to a situational stereotype and by evoking the sequence of events happening in the text to the knowledge of the situation and of the world. Schank (Schank and Abelson, 1977) has formulated a representation of this predictable situational stereotype called scripts. A script is a detailed list of events and sequence that happen, in a given situation. Fig. 2.4 A fragment of the restaurant script (from Schank and Abelson, 1977). In Fig. 2.4 Schanks shows the structure of a Restaurant script of what happens when a customer enters into a restaurant.

Like Minky’s frame, the script theory also revolves around the entities and actions, which are default values and slots. In the example Mr. X is purchasing a book; Mr. X is the value and the customer role in the slot.

2.2.6.4 Kintsch’s Theory

Kintsch (1974) theory is based on the fact that the texts are understood by the underlying Propositional content and recalled in the form of hierarchies of proposition. The propositions formulated from a passage evoke a kind of structure
Figure 2.4 A fragment of the Restaurant Script [From Sanford and Garrod, 1981: 55]
or text base in the mind of a reader. Different surface structures can be produced for any text and Kintsch calls the dominating propositions as upper most propositions. The upper most propositions of the text will be better recalled than the dependent proposition.

2.3 Survey of Literature

Various studies have been undertaken either to prove or disapprove some of the psycholinguistic theories. Various kinds of such empirical works are mentioned below:

Sterberg (1971) in "Memory Scanning": Mental processes revealed by the Reaction time experiments has experimented on the retrieval of information from human memory through the study of the structure of Reaction-time and the organisation of the mental process.

Potter, Fai So, Eckardt and Fieldman (1984) have worked on the "Lexical and conceptual representation in beginning and proficient bilinguals". This aim is to test the work association hypothesis and concept mediated hypothesis. Word association hypothesis backs the view that association are used to understand and produce words in second language by the retrieving word in the first language. Concept mediated hypothesis propose that the connection between two languages is through an underlying a model conceptual system.

Vande Kopple (1982) has experimented with paragraphs which has the same truth value but differs in the way the given. New strategy is applied. First paragraph facilitates
given new strategy and second frustrates the given New Strategy (a knowledge based model) enables the readability and retention of some natural expository paragraphs.


"A multivariate study of immediate recall of CVC Trigrams varying in meaningfulness and pronounciability" (1977), was conducted by Mukherjee and Janbandhu based on the measures of numbers of correct recall, extra list intrusion errors and correct serial position recall.

Reder (1983) studied the effect of time and error in the process of comprehension, based on the effect of contextual information on sentence comprehension and on some models like lexical access, lexical disambiguation, spreading activation and semantic priming.

Zimmer (1983) has worked on "verbal communication of relationally given and new information in standard Sentences".

Vonk (1979) in her book "Retrieval from semantic memory" has experimented on "A model for verifying semantic relations based on empirical study".

Keenan, Baillet and Brown (1984) have studied on "The effect of casual cohesion on comprehension and memory". Their theory explains that the Reading time increased as the causal relatedness of the sentences deceased.

Barry Gordan (1983) formulated his views on the
serial search hypothesis in making a lexical decision, based on the principle that the search is terminated when the correct word match is found.

Krulee, Fair Weather, and Bergquist (1979) have worked on the "organising factors in the comprehension and recall of connected Discourse".

Doneman and Green (1986) in their experiment on "Individual difference in comprehending and producing words in context" have proposed that the working memory capacity determines the capacity of individuals to use context to comprehend and produce words.

Ganguly (1986) has undertaken in Bilingual comprehension in the second language to find out whether the advanced competence in a second language will enable to cope up with the demands that the language makes on them in classroom and outside, at par with the first language speaker. His data and results prove that both monolingual and bilingual have the ability to organise their expression conceptually and it tends to support the contention that language represents a segment of total cognitive schemata and the aspects of bilingualism and language has no effect or understanding level.

Forrest-Pressley and Waller (1984) in their book "cognition Metacognition and reading" have experimented various types of skills and strategies involved and employed during the process of reading.

Simpson (1987) has experimented with what process
is involved in understanding a word or concept, how the word knowledge is measured and how an alternative format can be given to teachers.

Rakes and Smith (1987) have worked on "Strengthening comprehension and recall through the principle of recitation".

Konopak (1982) studied on how contextual information can be used for word learning.

2.4 The significance of the study

Studies undertaken to examine the bilingual language proficiency always test the influence of one language over another, whether the comprehension and recall is based on interactive or independence hypothesis becomes the point of argument. Here the study is based on the independence hypothesis and English language which plays the role of second language in India is taken for testing. Secondly even though various studies have been undertaken based on certain models of comprehensive views of understanding and recall, all the linguistic elements namely word and sentence are not studied together. Thirdly hardly any attention has been paid on the structure of the recalled material and this study focuses its attention on it.

2.5 Scope of the study

This study is based on the evaluation and clubbing up of two factors, namely the psycholinguistic study and the second language. The psycholinguistic study is based on the cognitive process of two levels namely understanding and recall.
To test the understanding and recalling process, the second language which is taught through the educational Curriculum has been taken as the testing tool to test the levels of understanding and recall. This study is based on six levels.

1. The first level gives the description of the working of the cognitive system, when a particular test is administered.
2. The Language i.e. English serves as a tool for testing the understanding and recall.
3. Various theories and models related to the process of understanding and recall are tested depending on the items variations.
4. The level of understanding and recall of various linguistic units namely word level and sentence level are quantified.
5. Various factors and strategies followed during the understanding and recalling process are quantified and compared with the quantified level of understanding and recall to gauge their influence.
6. The attitude and the disposition of the informants towards this test are collected to judge the individual variations.

The methodology which has been adopted to undertake this kind of study is mentioned briefly in the next chapter.