UNIT 2 LANGUAGE PROCESSING (COMPREHENSION AND LANGUAGE EXPRESSION)

"Language is a process of free creation; its laws and principles are fixed, but the manner in which the principles of generation are used is free and infinitely varied. Even the interpretation and use of words involves a process of free creation."

– Noam Chomsky

Structure

2.0 INTRODUCTION

One form of knowledge shared by all human societies is the knowledge of language. Language is the principal means by which we acquire and express knowledge; thus, the study of how language is used is a central concern of cognitive psychology. In the previous chapter, we studied the modes of language acquisition; here we will do an overview of the research on the processes of language involving the comprehension and expression of language.

Language, like other cognitive functions, is a (dynamic) *process*. Such an enterprise requires that we examine the microstructure of the entire process as it occurs in real time. It is only through the careful examination of the temporal course of mental operations involved in the various levels of analysis underlying speech that we can hope to discover its nature.

How do we understand language, given its multifaceted encoding? One approach to this question centers on the psychological processes involved in speech

perception (Hickok & Poeppel, 2000). It also considers how listeners deal with the peculiarities resulting from the acoustic (related to sound) transmission of language. A, second, more linguistically oriented approach focuses on descriptions of the grammatical structure of language. Finally, a third approach examines the psycholinguistic processes involved in language comprehension at the discourse macro-level of analysis. All three approaches overlap to some degree and offer interesting insights into the nature of language, its use, and understanding.

2.1 OBJECTIVES

After reading this unit, you will be able to:

- Examine the basic features involved in the language processing;
- Explain the expression and comprehension of language;
- Elucidate the functions of Language;
- Analyse the structure of Language;
- Explain the processes in Language; and
- Describe Walter Kintsch's model of comprehension.

2.2 FUNCTIONS OF LANGUAGE

Language serves many functions, which are all related to the fundamental process of communication. Perhaps most important is that language conveys meaning and is part of almost all kinds of social interaction. Language conveys intentions, motives, feelings, and beliefs. Language is used to issue requests and commands; and is also used to teach and to convey information. Language is useful because it can represent ideas and events that are not tied to present. You can also describe abstract ideas, such as beauty and justice, as well as concrete objects of everyday experience. Thus, language is *symbolic*, in that speech sounds and utterances stand for or represent various objects, ideas, and events.

Regardless of whether we are considering spoken language, written language, or sign language, there are three elements of language expression and human communication that have been identified as operating in the speaker-listener situation: *speech acts, propositional content, and thematic structure.* A brief description from the analysis by Clark & Clark (1977) is as follows:

i) **Speech Acts**: Speakers normally intend to have some influence on their listeners. To do so, speakers get the listeners to recognise the speakers' intentions. Indeed, failure to recognise these intentions can result in awkward situations. Speech-act theory holds that all utterances can be classified as to the type of speech act they represent. For example, speech acts may make assertions, make verbal commitments, convey thanks, give a warning, or issue a command. Typical examples of speech acts including the following: "I insist that you turn down the volume on the stereo" (a command); "What are your plans for weekend?" (a question); "I promise to pay you tomorrow" (a verbal commitment), symbolise ordering, questioning, committing etc, which are common *direct* speech acts.

Searle (1969) pointed out that some speech acts are *indirect*. When your mother asks if you live in a barn, a guest in your house asks if you are chilly,

they are conveying information about their desires, but in a rather indirect, nonliteral way. The meaning of any particular speech act, including whether it is direct or indirect, will depend on the *context* in which it is uttered (Gibbs, 1986), as well as its content.

ii) **Propositional Content***:* The second element of communication concerns the *propositional content* of a sentence. In communication, speakers want to convey certain ideas, and to do this, they must be sure that they are understood. Thus, the content around a speech act is very important. As a general rule, the propositional content of a sentence is used to describe certain states or events; it can be part of other propositions. For example, the sentence "The bright student received an *A* in Mathematics" expresses two separate propositions: "the student is bright" and "the student received an *A* in Mathematics." Combined into a single sentence, the propositions convey what the speaker intends to convey. There is experimental evidence that we represent as propositions. For example, the more propositions contained in a sentence, the longer the time required to read the sentence (van Dijk & Kintsch, 1983)(discussed in detail in last section).

iii) **Thematic Structure:** The third component in communication is *thematic structure*. To communicate effectively, good speakers pay careful attention to their listeners. Good speakers have to judge what listeners do and do know, keep track of where they are leading their listeners, and regularly examine any assumptions about the listeners' knowledge of the topic being discussed. In short, the speaker must be able to make reasonably accurate judgments of the listener's current level of understanding. All of these features are present in good teachers, entertaining and effective storytellers, and interesting conversationalists.

2.3   STRUCTURE OF LANGUAGE

A theoretical intervention about the process which leads to the understanding of an utterance in communication should involve two aspects. Firstly, the aspects of language linked to the recognition of the form of the utterance itself (phonology, morphology, and syntax); secondly, questions about how the meaning of what is understood can be defined, which are linked to semantics and pragmatics of the communication process. These two aspects cannot be separated, and in order to analyse the process of language, both are to be taken into consideration. Thus, to understand the language processes, it is fundamental to understand the basic structure of language first.

As should be evident by now, language can be divided into three basic parts, each with its own structure and rules: phonology, syntax (grammar), and semantics. The first of these, *phonology*, concerns the rules for pronunciation of speech sounds. The second aspect of language, *syntax*, deals with the way words combine to form sentences. And *semantics* focuses on the meaning of words and sentences.

2.3.1   Basic Units of Language: Phonemes and Morphemes

All languages are made of basic sounds called *phonemes*. Adult human beings can produce approximately 100 phonemes, and the English language is made up

of about 45 phonemes. Languages vary in the number of phonemes, ranging from as few as 15 to as many as 85. One reason why it is difficult for many Americans to learn foreign languages is that different phonemes are used. For instance, Germanic and Slavic languages contain phonemes never used in the English language. (Phonemes and morphemes have already been defined in the previous chapter).

2.3.2   Higher Levels of Linguistic Analysis

The study of speech sounds which make up a language is called *phonology*, and the study of how these sounds combine to produce morphemes is called *morphology*. However, psychologists are frequently interested in a more global analysis of language than is provided by phonology and morphology. Psychological investigations of language typically adopt words, phrases, sentences, or prose, rather than more elementary speech sounds, as the most fundamental unit of analysis.

There are several levels at which these higher-order analyses can be made.

1)   First, one could analyse the *lexical content* of a sentence or of some other unit of language production. When a lexical analysis is performed, the question is simply, what words are used, and how many times they are used in this sample of language? Information gained from lexical analysis of language, such as that by Thorndike and Lorge, has proved to be very useful in predicting the ease with which different words can be learned in laboratory situations.

2)   At another level of linguistic analysis, the syntactic content of language text may be investigated. In the study of syntax, interest is focused on the arrangement or ordering of words to form phrases and sentences. The question asked in this type of analysis is, how is this phase (or sentence) structured? Psychologists and linguists interested in syntactic theory have attempted to specify rules that account for the productivity of language (Chomsky, 1985). The set of rules indicating how the elements of the language may be combined to make intelligible sentences is referred to as a *grammar*. Although a large number of different grammars have been proposed, there is little agreement about the necessary features of an adequate grammar.

3)   Another level of analysis of language is the one that considers the *semantic content* or meaning of passage. This perspective on language results in the asking of questions such as the following: What does the passage communicate? What is the meaning of this particular sentence?

   Word meaning is a function of the interaction between word features and the extent to which they match those belonging to certain prototypical and nonprototypical contexts (Lakoff, 1987). Here, both feature theory and prototype theory are seen as important.

   The critical role of semantics is not under question and has been clearly demonstrated in a number of psychological investigations. In general, current views of semantics and comprehension view the listener (or reader) as an active participant who formulates hypotheses about subsequent input based on context (both verbal and situational), on knowledge of constraints in the language, and on knowledge of the world. This is in contrast to the more

passive view of the comprehended as someone who waits for the input before acting upon it.

2.3.3 Phase Structure of Sentences

In order to understand language in an adult, it is necessary to examine the structure of sentences. At one level of analysis, a sentence can be regarded simply as a string of phonemes. At another level, a sentence can be regarded as series of morphemes, which are grouping of phonemes. From this viewpoint, however, the sentence is viewed as a string of words. Linguists have found it more useful to describe a sentence in terms of *phrases*, which are grouping of words.

Analysis of a sentence into its various phrases describes the *phrase structure* of a sentence. A sentence is viewed as composed of two basic phrases, a *noun phrase* and a *verb phrase*, which in turn are composed of subcomponents.

Figure 2.1 shows the phrase structure of a simple sentence, "The boy ate an apple." The noun phrase is composed of a *determiner* and a *noun,* and the verb phase is composed of a *verb* and *noun phrase*; the latter noun phrase is also composed of a determiner and a noun. Pause in speech usually reflect underlying phrase structure. For example, we are most likely to say, "The boy…ate…an apple," pausing ever so briefly after *boy* and *ate*. We are not likely to say, "The….boy ate…an apple," or "The… boy ate an….apple," grouping *boy, ate,* and *an*. While in normal speech a speaker may search and grope for a particular word and, thus, alter the pauses, the listener still tends to understand the message.
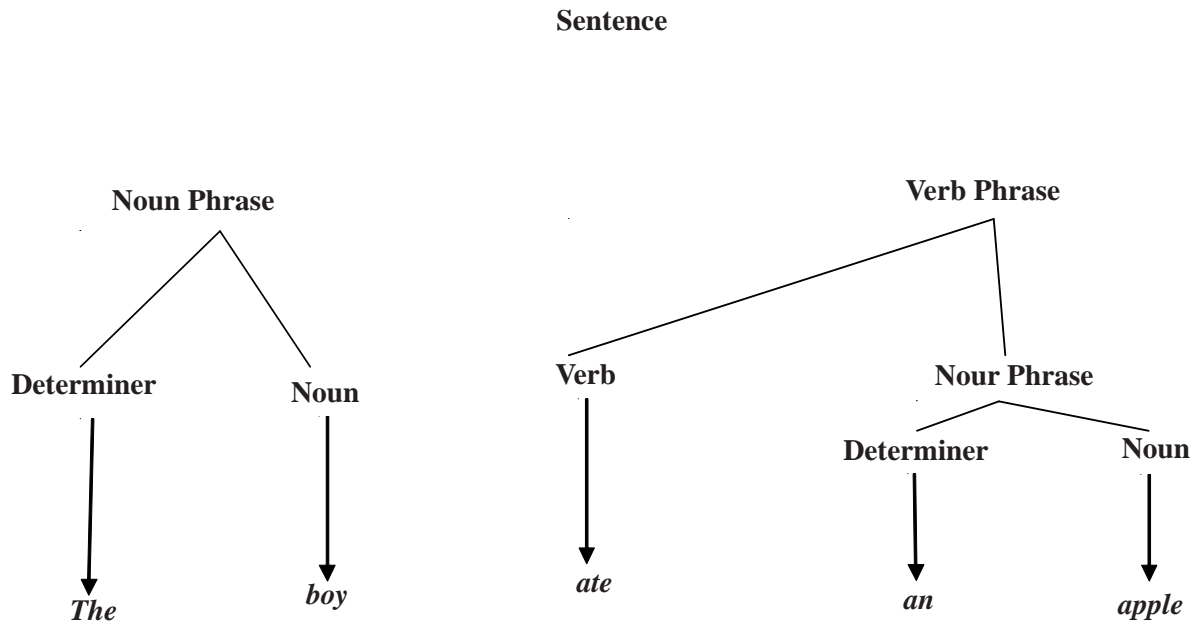
Sentence

Fig. 2.1: Phrase structure in a sentence represented by a tree diagram (adapted from Hunt & Ellis, 2006)

2.3.4 Structure and Deep Structure in Sentences

The *surface structure* is the organisation that describes the sequences of phrases in a sentence as it is actually spoken (or read) and reflects the phonological realisation of the complex, underlying linguistic structure.

Deep structure, in contrast, refers to the underlying structure that includes the relevant string of linguistic units, the grammatical requirements for lexical (word)

selection, and the grammatical relations between words in sentences. The deep structure of a sentence, thus, specifies the derivations of both its surface structure and meaning.

Consider the sentences, "Rohit threw the ball" and "The ball was thrown by Rohit." Both sentences convey the same meaning despite the fact that they sound different. Hence their deep structure is same. But consider the sentence "The lamb is ready to eat," which can have two meanings. The lamb may serve as food to be eaten, or as an animal, the lamb is prepared to eat food. Thus, the deep structure can vary within the same sentence, depending on what meaning the speaker wishes to convey. Evaluate the meaning of the following ambiguous sentences" "Visiting relatives can be a nuisance," "the corrupt police can't stop drinking."

Sentences with essentially a single deep structure and two or more surface structures are *synonymous*. Sentences with different deep structures and the same surface structure are *ambiguous*. Thus, important problem remaining concerns the theoretical rules by which the deep structure of a sentence comes to be realised in a particular surface structure. Rules for the specification of this linkage process, called *transformational rules*, have been developed by Noam Chomsky (Chomsky, 1965, 1975) and other linguists.

Transformational rules have clear implications about what features of sentences human beings do store in memory. If the sentence is simple, then features of the surface structure may be stored. As sentences become more complex, what is thought to be stored is some underlying base structure, or *schema*, plus one or more "footnotes" that serve as rules necessary to regenerate the sentence in its original surface form. Thus, what is stored is some coded representation of the complex sentence.

Information contained in a linguistic message tends to be comprehended, and sometimes is remembered, in syntactically defined chunks, although semantically based chunking also may be used, depending on the demands placed upon the listener and the nature of the material (Marschark, 1979). Thus, the phrase structure of a sentence appears to play an important organisational role in language processing at a very basic level (Ferreira & Clifton, 1986).

Self Assessment Questions

1) Explain language in your words.

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2) What are the three functions of language?

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3) Explain surface structure and deep structure.

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2.4   PROCESSES IN LANGUAGE

In this section we will examine some basic processes in language. The focus is on three processes: (i) production of language, (ii) speech perception and comprehension, and (iii) language development.

2.4.1   Production of Language

The beginning of a dialogue is usually the production of speech by one of the participants, although a gesture or other sign may initiate such an interaction and have its origins in a similar verbal plan (McNeil, 1985). But, before uttering a sentence or manually expressing any information, the speaker must do some planning based on the intended effect the utterance is to have on the listener; based on the speaker's knowledge of the listener's scope of understanding (example, is the listener familiar with the topic?); and based on the syntactic, semantic, and *pragmatic* (or social) form that the production and its desired effects requires. Thus, speaking is very much an *instrumental act*, which is to say that speakers talk in order to produce an effect of some kind.

The process of speaking is basically concerned with planning and execution. But just how is speech planned and executed? Clark & Clark (1977) described a rough outline of this process, which involves five steps. The first step for speakers is to decide on the kind of discourse to be initiated, which is the issue of *discourse plans*. Do they want to engage in a conversation, to describe an event, to give instructions, or to regale a friend with a humorous story? Each type of discourse has a particular structure, and speakers must plan their utterances to fit that structure.

For example, if you are telling a joke, you first describe the setting or context, then describe the sequence of events, and end with the punch line. If you fail to follow this structure, you obviously will not be an effective joke teller. If you give away the joke by accidently telling the punch line before the appropriate time, you will defeat your purpose. Similarly, instructions and conversations have an orderly structure.

One set of guidelines that speakers and listeners seem to follow to foster good communication during a conversation has been described by Grice (1975) and others (e.g., Levelt, 1989). These "Gricean Maxims" are:

Quantity: Avoid running off at the mouth.

Quality: Don't lie or stretch the truth.

Relation: Avoid making statements irrelevant to the topic of conversation.

Manner: Avoid vague or ambiguous statements.

Failure to follow these maxims often results in a *conversational implicature*. For example, imagine that you are reviewing an applicant's letter of recommendation for a highly technical job, and the letter reads as follows:

I am writing a letter on behalf of Gopal Bhatnagar. Gopal dresses very well and has a charming wife. He also drives a nice automobile and sings in his church's choir. Thank you.

Would you hire Gopal based on this letter? Probably not. Clearly, the content of this letter violates the Relation Maxim. Because of this, the letter writer has conversationally implied that John is not the person for the job. Speakers (and letter writers) usually adhere to these Gricean Maxims; but, as this example demonstrates, it is quite informative when they don't.

Planning discourse is planning at global level. The second stage of speech production involves *planning of sentences*, the components of discourse. Once the nature of discourse is decided, specific sentences that will accomplish the objective must then be selected. The speech act, the propositional content, and the thematic structure need to be determined. The order in which sentences are produced and the type of information to be conveyed must be thought about. For example, suppose you are describing your new house. You might first describe the location; next, you might describe the overall type of house; then you might proceed to describe the floor plan and arrangement of rooms and, finally, give sfics of each room. Notice that there is a structure that involves going from global, or general information, to progressively more specific details.

The third phase of speech production deals with *constituent plans* of the sentence. Once a sentence is decided on, its components must then be planned. The appropriate words, phrases, and so forth must be picked out and put in the right order. These first three phases describe three levels of planning. At the most general level, planning is directed towards the type of discourse. At the next level, planning concerns the type of sentence to be uttered. At the third level, planning deals with specific components of the sentence.

An interesting feature of slips of the tongue is that they point out regularities in the planning stages of productions. For example, slips are seldom "illegal" combinations of sounds for the language; morphemes tend to slip as entire units (Clark & Clark, 1977). Some classics slips are known as "bloopers" in the world of radio and television. Some bloopers are fairly obvious. For example, an announcer for the 'Friendly Homemaker Program' said, "And now we present our homely friendmaker. Another example is a remark of the commentator covering visit of the king and queen of England: "When they arrive, you will hear a 21 *son* salute."

The fourth phase of speech production deals with what is called the *articulatory program*. This concerns the plans for the execution of speech, which is a coordinated sequence of muscular contractions in and about the mouth. And the final phase of speech production is *articulation* itself. This is the actual output of speech. Interested readers are referred to Clark & Clark (1977) and Levelt (1989) for a detailed discussion of planning and execution of speech.

2.4.2 Speech Perception and Comprehension

To understand speech is crucial to human communication. Hence, speech perception is fundamental to language use in our day to day life. We are able to perceive speech with amazing rapidity. On the one hand, we can perceive as many as fifty phonemes per second in a language in which we are fluent (Foulke & Sticht, 1969). On the other hand, we can perceive only about two thirds of a single phonemes per second of nonspeech sounds (Warren et al., 1969). This is why foreign languages are difficult to understand when we hear them. Even if we can read them, the sounds of their letters and letter combinations may be different from the sounds corresponding to the same letters and letter combinations in our native language.

The comprehension of speech begins with the perception of raw speech sounds. Comprehension starts where speech production ends. Speakers produce a stream of sounds that arrive at the listener's ears; then, listeners are able to analyse the sound patterns and to comprehend them. Speech perception is not, however, the simple identification of sounds.

It involves the complex processes of encoding and comprehension. In other words, interpretative processes, meaning, contextual influences, and the like play important roles in speech perception. Thus, the transformation from raw speech sounds to propositions in memory is a complex process. The physical signal that reaches the ear consists of rapid vibrations of air. While the sounds of speech correlate with particular component frequencies, there is no direct one-to-one correspondence between the sounds of speech and the perception of listeners.

Recognition of words is very much dependent on context, explanations, and knowledge. For example, a hungry child can interpret the question "Have you washed your hands for dinner?" as a call to come directly to dinner (i.e., as indirect speech act rather than a direct question).

The role of context also can be easily seen in complete sentences in which context allows words to be inferred quite easily. For example, the sentence "The young girl was awakened by her frightening d…." allows listeners to infer *dream*. There is no need to think about what the word might be; it just seems to pop out automatically.

A similar context effect was studied in the laboratory of Warren (Warren & Obusek, 1971) using phonemes. Subjects were read sentences that had a single speech sound obscured. For example, the sentence "The state governors met with the respective legislatures convening in the capital city" had the first *s* in *legislatures* masked by a coughing sound. The experimenter then asked the subjects to identify where the cough had occurred. [The results indicated that subjects somehow "restored" the missing *s* sound and were unable to locate the interjected cough.]

The phenomenon, appropriately called *phonemic restoration,* has been shown to be even more likely when more than a single word can result from the restoration (example: "_egion" can become either "legion" or "region"), indicating an active word-searching process in speech perception (Samuel, 1987).

Many people have the impression that the words they hear are distinct, separate combinations of sounds, but this impression in not correct. Cole (1979, 1980)

and other speech researchers have demonstrated that words usually run together as sound patterns. This is seen by use of a spectrograph, an electronic device for measuring the variations in energy expended when a person talks. Moreover, it is often the case that a single word cannot be recognised correctly when it is taken out of its sentence context. This was shown some years ago by Pollack and Pickett (1963), who played different segments of a normal conversation for subjects. When the subjects heard just one word from the conversation, it was often incomprehensible. Without the context of the meaningful sentence, the single word could not be understood.

More generally, an important feature of speech perception is that speech is not comprehended simply on the basis of the sounds per se. Rather, speech is comprehended on the basis of many additional factors (e.g., intentions, context, and expectations) from which an interpretation of what the speaker says is constructed. (Tyler & Marslen-Wilson, 1986; see Paivio & Begg, 1981, for a review).

One main approach equates processes of speech perception with processes of auditory perception of other sounds. These kinds of theories emphasises either template-matching or feature-detection processes. Such theories postulate that there are distant stages of neural processing. In one stage speech sounds are analysed into their components. In another stage these components are analysed for patterns and matched to a prototype or template (Kuhl, 1991; Massaro, 1987). One theory of this kind is the phonetic refinement theory (Pisoni et al.,1985), which says that we start with an analysis of auditory sensations and shift to higher level processing. A similar theoretical idea is embodied by the TRACE model (McClleland & Elman, 1986). According to this model, speech perception begins with three levels of feature detection: the level of acoustic features, the level of phonemes, and the level of words. According to this theory, speech perception is highly interactive. Lower levels affect higher levels and vice versa.

One attribute of these theories have in common is that they all require decision-making process above and beyond feature detection or template matching. Thus, the speech we perceive may differ from the speech sounds that actually reach our ears. The reason is that cognitive and contextual factors influence our perception of sense signal. For example, the phonemic-restoration effect involves integrating what we know with what we hear when we perceive speech (Samuel, 1981; Warren, 1970).

2.5 LANGUAGE DEVELOPMENT

Language acquisition and development follows a fairly orderly course. (This order has been discussed in detail in the earlier chapter on Language Acquisition). Here we will focus on development of *semantics* which ultimately help the child in comprehending the language.

Making speech sounds is only the first step in acquiring language. The sounds must come to represent objects, symbols, and events in the child's environment and they must acquire *meaning* for the child.

Children are familiar with many aspects of their environment before they learn to speak. Their parents, toys, pets, siblings, and household objects are familiar

stimuli. At this early stage of language development, their task is one of learning to associate particular environment stimuli with particular sound symbols and responses. For example, they must learn to associate the sight of mother with the sound of *Mama*.

Only when such associations are acquired, the speech sound come to represent or symbolise a specific object or event for the child. These associations are only a part of language development. Thus, the development of meaning begins with the acquisition of associations between objects/events and speech sounds.

One popular view of the acquisition of word meaning is that children learn semantic features and then attempt to apply an original word that includes the features to objects that share those features. For example, a child may learn the word *ball* and then *overgeneralise* it to other round objects such as moon and orange.

Gradually, the child begins to construct more complex sentences that take on the characteristics of adult language. This is an enormously challenging task (Brown, 1973). What the child learns are sets of *grammatical, semantic*, and *pragmatic* rules for constructing sentences. Usually, children are unable to verbalise the rules, but their linguistic *performance* indicates that they do possess linguistic competence, the knowledge necessary to produce all and only those situations of a given language.

Indeed, many adults who speak grammatically acceptable English are unable to specify the rules they use. But these rules allow us to generate the almost infinite number of sentences. One of the best pieces of evidence for learning syntactic rules is the phenomenon of overgeneralisation. For example, children learn to say *went* correctly, apparently by rote, then learn the rule of forming the past tense by adding *ed*, and then incorrectly as *goed*. They later learn the exception to the rule and go back saying *went*. Similar overgeneralisations occur in deaf child's acquisition of sign language.

This brief description only begins to sketch some of the complexities of language development. What is clear is that young children have an enormously complex task in learning to speak, read, and use language in a meaningful fashion. The fact that human beings can acquire and use language emerges as a remarkable achievement.

Finally, relating language development to the earlier discussion on speech acts, there have also been some interesting findings. For example, it appears that younger children view the meaning of "I Promise" differently than do older children and adults. According to philosopher Sourly (1969), certain conditions must be present for a sincere promise to be made.

One condition is that the person making the commitment actually intends to carry out the promised action. A second condition is that it is apparent that the person to whom the promise is directed desires the action to be carried out. In a recent study, Bernicot & Laval (1996) report that 3-year-olds have difficulty understanding only the second condition. But, by age 10, children evaluate both conditions equivalently well in determining the outcome of a scenario (concerning the occurrence of the promised activity), where these conditions were manipulated.

These findings indicate that the meaning of "I Promise" is quite different, depending on the age of the child to whom it is said. Specifically the understanding of the contextual circumstances underlying the making of a verbal commitment increments with age. Initially, children are primarily concerned with whether the promised activity simply occurred; as they grow older, they begin to grasp the intentions of the speaker in evaluating the likely outcome of that activity (Astington, 1988).

2.6 COMPREHENSIVE MODEL OF LANGUAGE PROCESSING

This chapter has progressed systematically from the simple linguistic entities (phonemes and morphemes), to syntax and grammar, to speech perception and comprehension. One might wonder, whether there are any comprehensive theories of language. In fact there are many. One by Kintsch is particularly significant because it incorporates many bits of wisdom from earlier studies and, at the same time contains a model of the mind. Let's discuss now the principal components of the most influential, extensive and comprehensive model of language processing by Kintsch and van Dijk (Kintsch, 1974, 1979, 1988, 1990; Kintsch & van Dijk, 1978) briefly.

2.6.1 Kintsch's Model of Comprehension

This model of comprehension is more than a system that deals with the way textual information is understood. It is a theory that cuts across many topics in cognitive psychology, including memory and comprehension of the written and spoken language. Comprehension is dependent on two disparate sources that are similar to top-down and bottom-up processing. [Borrowed from computer language, *bottom-up* processing is cognitive processing initiated by the components of a stimulus pattern which, when summed, lead to recognition of the whole configuration; whereas *top-down* processing is hypothesis-driven recognition of the whole stimulus configuration, which leads to the recognition of component parts.] At the highest level is the goal schema, which decides what material is relevant. At the opposite extreme of the model is the text.

The model is based on a proposition. A proposition is an abstraction, and, as such, it is difficult to define concretely. However, some characteristics of propositions can be identified: they are abstractions based on observations (such as reading text material or listening to a speaker); they are retained in memory and follow the laws governing memory processes; and, in Kintsch's system, they consist of a predicate and one or more arguments. Predicates corresponds to verbs, adjectives, adverbs, or connectives in the words a person reads or hears. This is called the *surface structure*, a term already discussed in previous sections. Arguments correspond to nouns, noun phrases, or clauses. The model is illustrated with the following little story:

The Swazi tribe was at war with a neighbouring tribe because of a dispute over some cattle. Among the warriors were two unmarried men, Kakra and his younger brother Gum. Kakra was killed in battle.

The first sentence is divided into five groups: the swazi tribe…..was at war with….a neighbouring tribe…. because….a dispute over some cattle. According

to coherence analysis of this sentence, only first three of the factors are in working memory. The predicate "was at war with" is considered the most important part of this sentence insofar as comprehension of the story is concerned. The other parts are clustered around it.

A significant feature of the model is that the initial processing of the text is assumed to take place in Short Term Memory (STM), which we know has limited capacity. Because of this constraint, only a portion of the propositions is held in memory. With the reading of the second sentence, some of propositions from the first sentence are still vital in STM. The reader tries to connect the old and new propositions but finds no match between them.

Failing to find a match between the propositions in STM, the reader searches Long Term Memory (LTM) for a possible match. This search in the LTM is called *reinstatement search* and is one reason that text material may be hard to read. In the example, the lack of a match between propositions in the first and second sentence requires the reader to construct a new network for the ideas and to attempt to relate the two sentences.

One inference that the reader makes is that the two men were members of the Swazi tribe, a reasonable conclusion even though that the fact is not stated directly. With the reading of more sentences, the semantic network begins to get more complicated and interrelated. The reading of the sentence "Among the warriors were…., Kakra and……." Retains in memory the names of the men, which can easily be related to the information in the last sentence "Kakra was killed in Battle."

2.6.2   Propositional Representation of Text and Reading

As stated before the model of comprehension holds that the underlying unit of memory for text material is the proposition. Additionally, the model predicts that sentences of greater propositional complexity are more difficult to comprehend than sentences with simple propositional structure, even if the surface complexity of the two sentences is about the same. Kintsch and Keenan (1973) designed an experiment to test this prediction. A sample from many experiments is reported here.

Subjects were asked to read ten sentences, all of which had about the same number of words but varied greatly in the number of propositions. Some sentences had as few as four propositions, and others had as many as nine. For example, read the following two sentences:

Romulus, the legendary founder of Rome, took the women of Sabine by force.

Cleopatra's downfall lay in her foolish trust in the fickle political figures of the Roman world.

Which sentence was more difficult to read? If you are like the subjects in Kintsch's and Keenan's experiment, you had more difficulty with the sentence about Cleopatra than the sentence about Romulus. Even though the surface complexity of the two sentences is about the same, they differ markedly in the number of propositions and the macrostructures that are required to interconnect the propositions.

In the Kintsch's and Keenan's experiment, subjects were presented with sentences similar to those just discussed above by means of slides. The subjects were asked to read each sentence and then to write it. They could then advance the slides and see the next sentence. Time taken in reading each sentence was noted. The authors found an extraordinarily consistent relationship between the number of propositions and the time required to read the sentences.

2.7   LET US SUM UP

In all, the approaches that have been taken in exploring many of the issues involved in the perceptual analysis of language and lexical processing merely scratch the surface of the complexity of both theory and fact that must be developed to provide a sufficient characterisation of the cognitive system. Language processing requires a multidisciplinary examination. To conclude, we can say that, like many other cognitive process, language processing is a very dynamic and complex process. No single method, function or theory can explain the process of language completely in itself; only a comprehensive approach should be appropriate and applied for the comprehension of language.

2.8   UNIT END QUESTIONS

1)   Note the various experimental tasks that have been used to study language comprehension. Have you run into any of them before in this course?

2)   It is intuitively obvious that context facilitates word interpretation, but how can it interfere with interpretation?

3)   What is the role of context and expectations in the interpretation of speech? How has the influence of context been studied experimentally?

4)   What are several major features of language development?

5)   Compare and contrast the role of speech perception, syntax and semantics in the development and understanding of language.

6)   What are the different processes involved in language comprehension?

7)   The exposition of Kintsch's model is necessarily abstract and therefore difficult to comprehend. Preserve in your reinstated searches! See if you can use it to deal with a new example of text selected from another course.

8)   What factors are included in Kintsch's model? How does the reader enter into this model?

9)   Give an example of a humorous violation of one of Grice's four maxims of successful conversation.

2.9   SUGGESTED READINGS AND REFERENCES

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