UNIT 1 LANGUAGE ACQUISITION

Structure

1.0 INTRODUCTION

People talk or use language incessantly. Language, to cognitive psychologists, is a system of communication in which thoughts are transmitted by means of sounds (as in speech and music) or symbols (as in written words and gestures). As you read this text, you are engaging in one of the mind's most enchanting processes – the way one mind influences another through language. In this process, some cell assemblies in your brain are permanently changed, new thoughts are made, and, in a very real sense, you are changed.

Cognitive psychology concerns both language and thought and has been popular only since the 1950s. Before that, many psychologists believed that the scientific method could not be applied towards the study of a process as private as thinking. From ancient Greek times, only philosophers and metaphysicians studied the nature of language and thought. The metaphysician René Descartes, for example, famously argued, "I think, therefore I am."

Today, thanks to increasingly sophisticated tools for studying brain activity, cognitive psychology is a thriving science. Cognitive psychologists explore such questions as how language affects thought, whether it is possible to create a "thinking" machine, and why humans are motivated to create art.

1.1 OBJECTIVES

After reading this unit, you will be able to:

- Define and elucidate the concept of language;
- Describe language and cognition;
- Explain theories of language acquisition and their limitations; and
- Explain biology of language acquisition.

1.2 LANGUAGE AND COGNITION

The study of human language is important to cognitive psychologists for the following reasons:

- Human language development represents a unique kind of abstraction, which is basic to cognition. Although other forms of life (bees, birds, dolphins, dogs and so on) have elaborate means of communicating and apes seem to use a form of language abstraction, the degree of abstraction is much greater among humans.
- Language processing is an important component of information processing and storage.
- Human thinking and problem solving can be conceptualised as processes involving language. Many, if not most, forms of thinking and problem solving are internal, that is, done in the absence of external stimuli. Abstraction of puzzles, for example, into verbal symbols provides a way to think about a solution.
- Language is the main means of human communication, the way in which most information is exchanged.
- Language influences perception, a fundamental aspect of cognition. Some argue that how we perceive the world is affected by the language we use to describe it. On the other hand, language development is at least largely based on our perception of language. So the perceptual-language process is one of interdependency; both significantly influence the other. Language from this point of view operates as a window.

The processing of words, speech, and semantics seem to engage specific cerebral areas and thus provide a meaningful link between neuro anatomical structures and language. In addition, the study of pathology of the brain has frequently shown manifest change in language functions, as in the case of aphasia.

1.3 LINGUISTICS

The study of linguistics is the formal description of the structure of language, including a description of speech sounds, meanings, and grammar. Language as

studied by linguists tends to be competency based (dealing with some ideal potential of the speaker-listener), while psychologists generally view language in terms of performance, or how humans use language. The discipline that incorporates both approaches to the study of language is called psycholinguistics.

1.3.1 The Structure of Language

Language is a system of symbols and rules that is used for meaningful communication. A system of communication has to meet *certain criteria* in order to be considered a language:

A language uses symbols, which are sounds, gestures, or written characters that represent objects, actions, events, and ideas. Symbols enable people to refer to objects that are in another place or events that occurred at a different time.

A language is meaningful and therefore can be understood by other users of that language.

A language is generative, which means that the symbols of a language can be combined to produce an infinite number of messages.

A language has rules that govern how symbols can be arranged. These rules allow people to understand messages in that language even if they have never encountered those messages before.

1.3.2 The Building Blocks of Language

Language is organised hierarchically, from phonemes to morphemes to phrases and sentences that communicate meaning

Phonemes are the smallest distinguishable units in a language. In the English language, many consonants, such as *t*, *p*, and *m*, correspond to single phonemes, while other consonants, such as *c* and *g*, can correspond to more than one phoneme. Vowels typically correspond to more bonhomie. For example, *o* corresponds to different phonemes depending on whether it is pronounced as in *bone* or *woman*. Some phonemes correspond to combinations of consonants, such as *ch*, *sh*, and *th*.

Morphemes are the smallest meaningful units in a language. In the English language, only a few single letters, such as *I* and *a*, are morphemes. Morphemes are usually whole words or meaningful parts of words, such as prefixes, suffixes, and word stems.

Example: The word "disliked" has three morphemes: "dis," "lik," and "ed."

Syntax is a system of rules that governs how words can be meaningfully arranged to form phrases and sentences.

Example: One rule of syntax is that an article such as "the" must come before a noun, not after: "Read the book," not "Read book the."

1.4 LANGUAGE ACQUISITION

Language acquisition is one of the central topics in cognitive science. Every theory of cognition has tried to explain it; probably no other topic has aroused such controversy. Possessing a language is the quintessentially human trait: all

normal humans speak, no nonhuman animal does. Language is the main vehicle by which we know about other people's thoughts, and the two must be intimately related. Every time we speak we are revealing something about language, so the facts of language structure are easy to come by; these data hint at a system of extraordinary complexity. Nonetheless, learning a first language is something every child does successfully, in a matter of a few years and without the need for formal lessons. With language so close to the core of what it means to be human, it is not surprising that children's acquisition of language has received so much attention. Anyone with strong views about the human mind would like to show that children's first few steps are steps in the right direction.

In the past, debates about the acquisition of language centered on the same theme as debates about the acquisition of any ability – the nature versus nurture theme. However, current thinking about the language acquisition has incorporated the understanding that acquiring language really involves a natural endowment modified by environment (Bates and Goodman, 1999; Dehaene-Lambertz, Hertz-Painter & Dubois, 2006; Lightfoot, 2003; Maratos, 2003). For example, the social environment, in which infants use their social capacities to interact with others, provides one source of information for language acquisition (Snow, 1999; Tomasello, 1999). Thus the approach to studying language acquisition now revolves around discovering what abilities are innate and how the child's environment tempers these abilities. This process is aptly termed innately guided learning (see Elman & associates, 1996; Jusczyk, 1997).

Before examining the various theories of language acquisition, let's take a look at a series of stages that seem to be universal in language acquisition.

1.4.1 Stages of Language Acquisition

Around the world, people seem to acquire their primary language in pretty much the same sequence and in just about the same way. Research on speech perception finds the same overall pattern of progression. They develop from more general to more specific abilities. That is, as infants we are initially able to distinguish among all possible phonetic contrasts. But over time we lose the ability to distinguish nonnative contrasts in favor of those used in our native language environment (see Jusczyk, 1997). Infants have remarkably acute language-learning abilities. They show these abilities even from an early age (Marcus et al., 1999; Pinker, 1997, 1999).

Within the first few years of life, we humans seem to progress through the following stages in producing language:

Cooing, which comprises of vowel sounds mostly. Cooing is the infant's oral expression that explores the production of vowel sounds. The cooing of infants around the world, including deaf infants, is indistinguishable across babies and languages. Infants are actually better than adults at being able to discriminate sounds that carry no meaning for them (Werker, 1989). They can make phonetic distinctions that adults have lost. During the cooing stage, hearing infants also can discriminate among all phones, not just phonemes characteristic of their own language.

Babbling, which comprises consonant as well as vowel sounds; to most people's ears, the babbling of infants growing up among speakers from different language

groups sounds very similar (Oller & Eilers, 1998). At the babbling stage, deaf infants no longer vocalise. The sounds produced by hearing infants change. Babbling is the infant's preferential production largely of those distinct phonemes-both vowels and consonants— that are characteristic of the infant's own language (Locke, 1994).

One-word utterances; these utterances are limited in both the vowels and the consonants they utilise (Ingram, 1999). Eventually, the infant utters his or her first word. It is followed shortly by one or two more. Soon after, yet a few more follow. The infant uses these one word utterances — termed holophrases — to convey intentions, desires, and demands. Usually the words are nouns describing familiar objects that the child observes (example; car, book, ball, baby, toy, nose) or wants (e.g. mama, dada, milk, cookie). By 18 months of age, children typically have vocabulary of 3 to 100 words (Seigler, 1986). The young child's vocabulary cannot yet encompass all that the child wishes to describe. As a result, the child commits overextension error. An *overextension error* is erroneously extending the meaning of words in the existing lexicon to cover things and ideas for which a new word is lacking. For example, the general term for any four legged animal may be 'doggie'.

Two-word utterances and telegraphic speech. Gradually, between 1.5 to 2.5 years of age, children start combining single words to produce two-word utterances. Thus begin an understanding of syntax. These early syntactical communications seem more like telegrams than conversation. The articles, prepositions, and other functional morphemes are usually left out. Hence, linguists refer to these early utterances with rudimentary syntax as *telegraphic speech*. e.g. "want juice", doggie bite", "mommy sit". These simple pairings of words convey a wealth of information about a child's intentions and needs.

Basic adult sentence structure (present by about age 4 years), with continuing vocabulary acquisition. Vocabulary expands rapidly. It more than triples from 300 words at about 2 years of age to about 1000 words at 3 years of age. Almost incredible, by age of 4, children acquire the foundations of adult syntax and language structure. By age of 5 years, most children also can understand and produce quite complex and uncommon sentence constructions. By age of 10 years, children's language is fundamentally the same as that of adults.

Normal children can differ by a year or more in their rate of language development, though the stages they pass through are generally the same regardless of how stretched out or compressed.

1.4.2 Language Acquisition and Cognitive Science

Language acquisition is not only inherently interesting; studying it is one way to look for concrete answers to questions that permeate cognitive science. The scientific study of language acquisition began around the same time as the birth of cognitive science, in the late 1950's. The historical catalyst was Noam Chomsky's review of Skinner's Verbal Behaviour (Chomsky, 1959). At that time, Anglo-American natural science, social science, and philosophy had come to a virtual consensus about the answers to the questions listed above. The mind consisted of sensorimotor abilities plus a few simple laws of learning governing gradual changes in an organism's behavioural repertoire. Therefore language

must be learned, it cannot be a module, and thinking must be a form of verbal behaviour, since verbal behaviour is the prime manifestation of "thought" that can be observed externally.

Chomsky argued that language acquisition falsified these beliefs in a single stroke: children learn languages that are governed by highly subtle and abstract principles, and they do so without explicit instruction or any other environmental clues to the nature of such principles. Hence language acquisition depends on an innate, species-specific module that is distinct from general intelligence. Much of the debate in language acquisition has attempted to test this once-revolutionary, and still controversial, collection of ideas. The implications extend to the rest of human cognition.

1.4.3 Language and Thought

Is language simply grafted on top of cognition as a way of sticking communicable labels onto thoughts (Fodor, 1975; Piaget, 1926)? Or does learning a language somehow mean learning to think in that language? A famous hypothesis, outlined by Benjamin Whorf (1956), asserts that the categories and relations that we use to understand the world come from our particular language, so that speakers of different languages conceptualise the world in different ways.

Language acquisition, then, would be learning to think, not just learning to talk. This is an intriguing hypothesis, but virtually all modern cognitive scientists believe it is false (see Pinker, 1994a). Babies can think before they can talk.

Cognitive psychology has shown that people think not just in words but in images and abstract logical propositions. Language acquisition has a unique contribution to make to this issue. As we shall see, it is virtually impossible to show how children could learn a language unless you assume they have a considerable amount of nonlinguistic cognitive machinery in place before they start.

1.5 THEORIES OF LANGUAGE ACQUISITION

How do we explain children's course of language acquisition — most importantly, their inevitable and early mastery? Several kinds of mechanisms are at work. As we will see in the next section, the brain changes after birth, and these maturational changes may govern the onset, rate, and adult decline of language acquisition capacity. General changes in the child's information processing abilities (attention, memory, short-term buffers for acoustic input and articulator output) could leave their mark as well. Language acquisition is so complex that one needs a precise framework for understanding what it involves.

Over the last fifty years, several theories have been put forward to explain the process by which children learn to understand and speak a language. They can be summarised as follows: (Refer to table below)

Table 1.1: Theory and the central idea associated with author

Theory	Central Idea	Individual most often associated with theory
Behaviourist	Children imitate adults. Their correct utterances are reinforced when they get what they want or are praised	Skinner
Innateness	A child's brain contains special language learning mechanisms at birth	Chomsky
Cognitive	Language is just one aspect of a child's overall intellectual development.	Piaget
Interaction	This theory emphasises the interaction between children and their care givers.	Bruner

We shall consider each of these in turn. Before we do, it is important to recognise that they should not be seen simply as conflicting theories, replacing each other in a sequence. Although Behaviourism is now seen as offering only a very limited explanation, each theory has added to our overall understanding, placing emphasis on different aspects of the process.

1.5.1 Behaviouristic Theory

The behaviourist psychologists developed their theories while carrying out a series of experiments on animals. They observed that rats or birds, for example, could be taught to perform various tasks by encouraging habit-forming. Researchers rewarded desirable behaviour. This was known as positive reinforcement. Undesirable behaviour was punished or simply not rewarded — negative reinforcement. The behaviourist B. F. Skinner then proposed this theory as an explanation for language acquisition in humans. In *Verbal Behaviour* (1957), he stated: "The basic processes and relations which give verbal behaviour its special characteristics are now fairly well understood. Much of the experimental work responsible for this advance has been carried out on other species, but the results have proved to be surprisingly free of species restrictions. Recent work has shown that the methods can be extended to human behaviour without serious modifications." (cited in Lowe and Graham, 1998, p.68)

Skinner suggested that a child imitates the language of its parents or carers. Successful attempts are rewarded because an adult who recognises a word spoken by a child will praise the child and/or give it what it is asking for. The linguistic input was key — a model for imitation to be either negatively or positively reinforced. Successful utterances are therefore reinforced while unsuccessful ones are forgotten. No essential difference between the way a rat learns to negotiate a maze and a child learns to speak.

1.5.2 Limitations of Behaviourism Theory

While there must be some truth in Skinner's explanation, there are many objections to it.

Language is based on a set of structures or rules, which could not be worked out simply by imitating individual utterances. The mistakes made by children reveal

that they are not simply imitating but actively working out and applying rules. For example, a child who says “drinked” instead of “drank” is not copying an adult but rather over-applying a rule.

The vast majority of children go through the same stages of language acquisition. Apart from certain extreme cases, the sequence seems to be largely unaffected by the treatment the child receives or the type of society in which s/he grows up.

Children are often unable to repeat what an adult says, especially if the adult utterance contains a structure the child has not yet started to use.

Few children receive much explicit grammatical correction. Parents are more interested in politeness and truthfulness. According to Brown, Cazden & Bellugi (1969): “It seems to be truth value rather than well-formed syntax that chiefly governs explicit verbal reinforcement by parents — which renders mildly paradoxical the fact that the usual product of such a training schedule is an adult whose speech is highly grammatical but not notably truthful.” (cited in Lowe and Graham, 1998)

There is evidence for a critical period for language acquisition. Children who have not acquired language by the age of about seven will never entirely catch up. The most famous example is that of Genie, discovered in 1970 at the age of 13. She had been severely neglected, brought up in isolation and deprived of normal human contact. Of course, she was disturbed and underdeveloped in many ways. During subsequent attempts at rehabilitation, her caretakers tried to teach her to speak. Despite some success, mainly in learning vocabulary, she never became a fluent speaker, failing to acquire the grammatical competence of the average five-year-old.

1.5.3 Innateness Theory

Noam Chomsky published a criticism of the behaviourist theory in 1957. In addition to some of the arguments listed above, he focused particularly on the impoverished language input children receive. This theory is connected with the writings of Chomsky, although the theory has been around for hundreds of years. Children are born with an innate capacity for learning human language. Humans are destined to speak. Children discover the grammar of their language based on their own inborn grammar. Certain aspects of language structure seem to be preordained by the cognitive structure of the human mind. This accounts for certain very basic universal features of language structure: every language has nouns/verbs, consonants and vowels. It is assumed that children are pre-programmed, hard-wired, to acquire such things.

Yet no one has been able to explain how quickly and perfectly all children acquire their native language. Every language is extremely complex, full of subtle distinctions that speakers are not even aware of. Nevertheless, children master their native language in 5 or 6 years regardless of their other talents and general intellectual ability. Acquisition must certainly be more than mere imitation; it also doesn’t seem to depend on levels of general intelligence, since even a severely retarded child will acquire a native language without special training. Some innate feature of the mind must be responsible for the universally rapid and natural acquisition of language by any young child exposed to speech.

Chomsky concluded that children must have an inborn faculty for language acquisition. According to this theory, the process is biologically determined - the human species has evolved a brain whose neural circuits contain linguistic information at birth. The child's natural predisposition to learn language is triggered by hearing speech and the child's brain is able to interpret what s/he hears according to the underlying principles or structures it already contains. This natural faculty has become known as the Language Acquisition Device (LAD).

Chomsky did not suggest that an English child is born knowing anything specific about English, of course. He stated that all human languages share common principles. (For example, they all have words for things and actions — nouns and verbs.) It is the child's task to establish how the specific language s/he hears expresses these underlying principles.

For example, the LAD already contains the concept of verb tense. By listening to such forms as "worked", "played" and "patted", the child will form the hypothesis that the past tense of verbs is formed by adding the sound /d/, /t/ or /id/ to the base form. This, in turn, will lead to the "virtuous errors" mentioned above. It hardly needs saying that the process is unconscious. Chomsky does not envisage the small child lying in its cot working out grammatical rules consciously!

Chomsky's ground-breaking theory remains at the centre of the debate about language acquisition. However, it has been modified, both by Chomsky himself and by others. Chomsky's original position was that the LAD contained specific knowledge about language. Dan Isaac Slobin has proposed that it may be more like a mechanism for working out the rules of language:

"It seems to me that the child is born not with a set of linguistic categories but with some sort of process mechanism — a set of procedures and inference rules, if you will - that he uses to process linguistic data. These mechanisms are such that, applying them to the input data, the child ends up with something which is a member of the class of human languages. The linguistic universals, then, are the *result* of an innate cognitive competence rather than the content of such a competence" (cited in Russell, 2001).

1.5.4 Evidence to Support Innateness Theory

Work in several areas of language study has provided support for the idea of an innate language faculty. Three types of evidence are offered here:

1) Slobin has pointed out that human anatomy is peculiarly adapted to the production of speech. Unlike our nearest relatives, the great apes, we have evolved a vocal tract which allows the precise articulation of a wide repertoire of vocal sounds.

2) Neuro-science has also identified specific areas of the brain with distinctly linguistic functions, notably Broca's area and Wernicke's area. Stroke victims provide valuable data: depending on the site of brain damage, they may suffer a range of language dysfunction, from problems with finding words to an inability to interpret syntax.

3) Experiments aimed at teaching chimpansees to communicate using plastic symbols or manual gestures have proved controversial. It seems likely that

our ape cousins, while able to learn individual "words", have little or no grammatical competence. Pinker (1994) offers a good account of this research.

The formation of creole varieties of English appears to be the result of the LAD at work. The linguist Derek Bickerton has studied the formation of Dutch-based creoles in Surinam. Escaped slaves, living together but originally from different language groups, were forced to communicate in their very limited Dutch.

The result was the restricted form of language known as a pidgin. The adult speakers were past the critical age at which they could learn a new language fluently — they had learned Dutch as a foreign language and under unfavourable conditions. Remarkably, the children of these slaves turned the pidgin into a full language, known by linguists as a creole. They were presumably unaware of the process but the outcome was a language variety which follows its own consistent rules and has a full expressive range. Creoles based on English are also found, in the Caribbean and elsewhere.

Studies of the sign languages used by the deaf have shown that, far from being crude gestures replacing spoken words, these are complex, fully grammatical languages in their own right. A sign language may exist in several dialects. Children learning to sign as a first language pass through similar stages to hearing children learning spoken language. Deprived of speech, the urge to communicate is realised through a manual system which fulfils the same function. There is even a signing creole, again developed by children, in Nicaragua (Pinker, 1994).

1.5.5 Limitations of Chomsky's Theory

Chomsky's work on language was theoretical. He was interested in grammar and much of his work consists of complex explanations of grammatical rules. He did not study real children. The theory relies on children being exposed to language but takes no account of the interaction between children and their caretakers. Nor does it recognise the reasons why a child might want to speak, the functions of language.

In 1977, Bard and Sachs published a study of a child known as Jim, the hearing son of deaf parents. Jim's parents wanted their son to learn speech rather than the sign language they used between themselves. He watched a lot of television and listened to the radio, therefore receiving frequent language input. However, his progress was limited until a speech therapist was enlisted to work with him. Simply being exposed to language was not enough. Without the associated interaction, it meant little to him.

Subsequent theories have placed greater emphasis on the ways in which real children develop language to fulfil their needs and interact with their environment, including other people.

1.5.6 Cognitive Theory

The Swiss psychologist Jean Piaget (1896-1980) placed acquisition of language within the context of a child's cognitive development. He argued that a child has to understand a concept before s/he can acquire the particular language form which expresses that concept. Cognitive theory views language acquisition within the context of the child's broader intellectual development. Since the cognitive

theory of language acquisition is based on Piaget's theory of cognitive development, a brief description and understanding of this theory is must.

Piaget suggested that children go through four separate stages in a fixed order that is universal in all children. Piaget declared that these stages differ not only in the quantity of information acquired at each, but also in the quality of knowledge and understanding at that stage. He suggested that movement from one stage to the next occurred when the child reached an appropriate level of maturation and was exposed to relevant types of experiences. Without experience, children were assumed incapable of reaching their highest cognitive ability. Piaget's four stages are known as the sensorimotor, preoperational, concrete operational, and formal operational stages.

The *sensory motor* stage in a child is from birth to approximately two years. During this stage, a child has relatively little competence in representing the environment using images, language, or symbols. An infant has no awareness of objects or people that are not immediately present at a given moment. Piaget called this a lack of object permanence. Object permanence is the awareness that objects and people continue to exist even if they are out of sight. In infants, when a person hides, the infant has no knowledge that they are just out of sight. According to Piaget, this person or object that has disappeared is gone forever to the infant.

The *preoperational* stage is from the age of two to seven years. The most important development at this time is language. Children develop an internal representation of the world that allows them to describe people, events, and feelings. Children at this time use symbols, they can pretend when driving their toy car across the couch that the couch is actually a bridge. Although the thinking of the child is more advanced than when it was in the sensory motor stage, it is still qualitatively inferior to that of an adult. Children in the preoperational stage are characterised by what Piaget called egocentric thoughts. The world at this stage is viewed entirely from the child's own perspective. Thus a child's explanation to an adult can be uninformative.

Three-year-olds will generally hide their face when they are in trouble—even though they are in plain view, three-year-olds believe that their inability to see others also results in others' inability to see them. A child in the preoperational stage also lacks the principle of conservation. This is the knowledge that quantity is unrelated to the arrangement and physical appearance of objects. Children who have not passed this stage do not know that the amount, volume or length of an object does not change length when the shape of the configuration is changed. If you put two identical pieces of clay in front of a child, one rolled up in the shape of a ball, the other rolled into a snake, a child at this stage may say the snake piece is bigger because it is rolled out. Piaget declared that this is not mastered until the next stage of development.

The *concrete operational* stage lasts from the age of seven to twelve years of age. The beginning of this stage is marked by the mastery of the principal of conservation. Children develop the ability to think in a more logical manner and they begin to overcome some of the egocentric characteristics of the preoperational period. One of the major ideas learned in this stage is the idea of reversibility. This is the idea that some changes can be undone by reversing an earlier action.

An example is the ball of clay that is rolled out into a snake piece of clay. Children at this stage understand that you can regain the ball of clay formation by rolling the piece of clay the other way. Children can even conceptualise the stage in their heads without having to see the action performed. Children in the concrete operational stage have a better understanding of time and space. Children at this stage have limits to their abstract thinking, according to Piaget.

The *formal operational* stage begins in most people at age twelve and continues into adulthood. This stage produces a new kind of thinking that is abstract, formal, and logical. Thinking is no longer tied to events that can be observed. A child at this stage can think hypothetically and use logic to solve problems. It is thought that not all individuals reach this level of thinking. Most studies show only forty to sixty percent of American college students and adults fully achieve it.

Piaget's suggestion, that cognitive performance cannot be attained unless cognitive readiness is brought about by maturation and environmental stimuli, has been instrumental in determining the structure of educational curricula.

Cognitive theory of language acquisition suggests that a child first becomes aware of a concept, such as relative size, and only afterward do they acquire the words and patterns to convey that concept. Simple ideas are expressed earlier than more complex ones even if they are grammatically more complicated— Conditional mood is one of the last. Conceptual development might affect language development: if a child has not yet mastered a difficult semantic distinction, he or she may be unable to master the syntax of the construction dedicated to expressing it.

The complexity of a grammatical form has a demonstrable role in development: simpler rules and forms appear in speech before more complex ones, all other things being equal. For example, the plural marker -s in English (e.g. cats), which requires knowing only whether the number of referents is singular or plural, is used consistently before the present tense marker -s (he walks), which requires knowing whether the subject is singular or plural and whether it is a first, second, or third person and whether the event is in the present tense (Brown, 1973).

There is a consistent order of mastery of the most common function morphemes in a language. Here's an example from English: first— -ing, then *in* and *on*, then the plural -s, last are the forms of the verb *to be*. Seems to be conditioned by logical complexity: plural is simple, while forms of the verb *to be* require sensitivity to both number and tense.

A good example of this is seriation. There will be a point in a child's intellectual development when s/he can compare objects with respect to size. This means that if you gave the child a number of sticks, s/he could arrange them in order of size. Piaget suggested that a child who had not yet reached this stage would not be able to learn and use comparative adjectives like "bigger" or "smaller".

Object permanence is another phenomenon often cited in relation to the cognitive theory. During the first year of life, children seem unaware of the existence of objects they cannot see. An object which moves out of sight ceases to exist. By the time they reach the age of 18 months, children have realised that objects have an existence independently of their perception. The cognitive theory draws attention to the large increase in children's vocabulary at around this age, suggesting a link between object permanence and the learning of labels for objects.

Clearly there is some link between cognitive development and language acquisition; Piaget's theory helps explain the order in which certain aspects of language are acquired.

1.5.7 Limitations of Cognitive Theories

This theory does not explain why language emerges in the first place. Apes also develop cognitively in much the same way as young children in the first few years of life, but language acquisition doesn't follow naturally from their development. Bees develop the cognitive ability to respond to many shades of colour, but bees never develop any communication signals based on shades of color.

During the first year to 18 months, connections of the type explained above are possible to trace but, as a child continues to develop, so it becomes harder to find clear links between language and intellect. Some studies have focused on children who have learned to speak fluently despite abnormal mental development. Syntax in particular does not appear to rely on general intellectual growth.

1.5.8 Input or Integrationist Theories

In contrast to the work of Chomsky, more recent theorists have stressed the importance of the language input children receive from their care-givers. Language exists for the purpose of communication and can only be learned in the context of interaction with people who want to communicate with the person. Interactionists such as Jerome Bruner (1966,68) suggest that the language behaviour of adults when talking to children (known as child-directed speech or CDS) is specially adapted to support the acquisition process. This support is often described to as scaffolding for the child's language learning. Bruner also coined the term Language Acquisition Support System or LASS in response to Chomsky's LAD. It has been noted that the turn-taking structure of conversation is developed through games and non-verbal communication long before actual words are uttered.

Children do not hear sentences in isolation, but in a context. Many models of language acquisition assume that the input to the child consists of a sentence and a representation of the meaning of that sentence, inferred from context and from the child's knowledge of the meanings of the words

1.5.9 Limitations of Input Theories

These theories serve as a useful corrective to Chomsky's early position and it seems likely that a child will learn more quickly with frequent interaction. However, it has already been noted that children in all cultures pass through the same stages in acquiring language. We have also seen that there are cultures in which adults do not adopt special ways of talking to children, so child directed speech may be useful but may not be essential.

As stated earlier, the various theories should not be seen simply as alternatives. Rather, each of them offers a partial explanation of the process.

1.6 THE BIOLOGY OF LANGUAGE ACQUISITION

Human language is made possible by special adaptations of the human mind and body that occurred in the course of human evolution, and which are put to use by children in acquiring their mother tongue.

Most obviously, the shape of the human vocal tract seems to have been modified in evolution for the demands of speech. Our larynxes are low in our throats, and our vocal tracts have a sharp right angle bend that creates two independently-modifiable resonant cavities (the mouth and the pharynx or throat) that defines a large two-dimensional range of vowel sounds (Lieberman, 1984).

It is tempting to think that if language evolved by gradual Darwinian natural selection, we must be able to find some precursor of it in our closest relatives, the chimpanzees. In several famous and controversial demonstrations, chimpanzees have been taught some hand-signs based on American Sign Language, to manipulate colored switches or tokens, and to understand some spoken commands (Gardner & Gardner, 1969; Premack & Premack, 1983; Savage-Rumbaugh, 1991). Though artificial chimp signaling systems have some analogies to human language (e.g., use in communication, combinations of more basic signals), it seems unlikely that they are homologous. Chimpanzees require massive regimented teaching sequences contrived by humans to acquire quite rudimentary abilities, mostly limited to a small number of signs, strung together in repetitive, quasi-random sequences, used with the intent of requesting food or tickling (Terrace, Petitto, Sanders, & Bever, 1979; Seidenberg & Petitto, 1979, 1987; Seidenberg, 1986; Wallman, 1992; Pinker, 1994a). These contrasts sharply with human children, who pick up thousands of words spontaneously, combine them in structured sequences where every word has a determinate role, respect the word order of the adult language, and use sentences for a variety of purposes such as commenting on interesting objects.

This lack of homology does not, by the way, cast doubt on a gradualist Darwinian account of language evolution. Humans did not evolve directly from chimpanzees. Both derived from common ancestor, probably around 6-7 million years ago. This leaves about 300,000 generations in which language could have evolved gradually in the lineage leading to humans, after it split off from the lineage leading to chimpanzees. Presumably language evolved in the human lineage for two reasons: our ancestors developed technology and knowledge of the local environment in their lifetimes, and were involved in extensive reciprocal cooperation. This allowed them to benefit by sharing hard-won knowledge with their kin and exchanging it with their neighbors (Pinker & Bloom, 1990).

1.6.1 Maturational Changes in Brain

The maturation of language circuits during a child's early years may be a driving force underlying the course of language acquisition (Pinker, 1994; Bates, Thal, & Janowsky, 1992; Locke, 1992; Huttenlocher, 1990). Before birth, virtually all the neurons (nerve cells) are formed, and they migrate into their proper locations in the brain. But head size, brain weight, and thickness of the cerebral cortex (gray matter), where the synapses (junctions) subserving mental computation take place, continue to increase rapidly in the year after birth. Long-distance connections (white matter) are not complete until nine months, and they continue to grow their speed-inducing myelin insulation throughout childhood. Synapses continue to develop, peaking in number between nine months and two years (depending on the brain region), at which point the child has 50% more synapses than the adult. Metabolic activity in the brain reaches adult levels by nine to ten months, and soon exceeds it, peaking around the age of four. Synapses wither from the age of two through the rest of childhood and into adolescence, when

the brain's metabolic rate falls back to adult levels. Perhaps linguistic milestones like babbling, first words, and grammar require minimum levels of brain size, long-distance connections, or extra synapses, particularly in the language centers of the brain.

Similarly, one can conjecture that these changes are responsible for the decline in the ability to learn a language over the lifespan. The language learning circuitry of the brain is more plastic in childhood; children learn or recover language when the left hemisphere of the brain is damaged or even surgically removed (though not quite at normal levels), but comparable damage in an adult usually leads to permanent aphasia (Curtiss, 1989; Lenneberg, 1967).

Newport and Gleitman (1995) shows how sheer age seems to play an important role. Successful acquisition of language typically happens by 4 and is guaranteed for children up to the age of six, is steadily compromised from then until shortly after puberty, and is rare thereafter. Maturational changes in the brain, such as the decline in metabolic rate and number of neurons during the early school age years, and the bottoming out of the number of synapses and metabolic rate around puberty, are plausible causes. Thus, there may be a neurologically-determined "critical period" for successful language acquisition, analogous to the critical periods documented in visual development in mammals and in the acquisition of songs by some birds.

1.6.2 Dissociations Between Language and General Intelligence

Humans evolved brain circuitry, mostly in the left hemisphere surrounding the sylvian fissure, that appears to be designed for language, though how exactly their internal wiring gives rise to rules of language is unknown (Zurif, 2000). The brain mechanisms underlying language are not just those allowing us to be smart in general. Strokes often leave adults with catastrophic losses in language (Zurif,2000; Pinker, 1994a), though not necessarily impaired in other aspects of intelligence, such as those measured on the nonverbal parts of IQ tests.

There are also syndromes showing the opposite dissociation, where intact language coexists with severe retardation. These cases show that language development does not depend on fully functioning general intelligence. One example comes from children with Williams Syndrome, an inherited condition involving physical abnormalities, significant retardation (the average IQ is about 50), incompetence at simple everyday tasks (tying shoelaces, finding one's way, adding two numbers, and retrieving items from a cupboard), social warmth and gregariousness, and fluent, articulate language abilities (Bellugi, et al., 1990).

1.6.3 Neural Networks

Some cognitive neuroscientists have created neural networks, or computer models, that can acquire some aspects of language. These neural networks are not preprogrammed with any rules. Instead, they are exposed to many examples of a language. Using these examples, the neural networks have been able to learn the language's statistical structure and accurately make the past tense forms of verbs. The developers of these networks speculate that children may acquire language in a similar way, through exposure to multiple examples.

1.7 LET US SUM UP

The topic of language acquisition implicates the most profound questions about our understanding of the human mind, and its subject matter, the speech of children, is endlessly fascinating. But the attempt to understand it scientifically is guaranteed to bring on a certain degree of frustration. Languages are complex combinations of elegant principles and historical accidents. We cannot design new ones with independent properties; we are stuck with the confounded ones entrenched in communities. Children, too, were not designed for the benefit of psychologists: their cognitive, social, perceptual, and motor skills are all developing at the same time as their linguistic systems are maturing and their knowledge of a particular language is increasing, and none of their behaviour reflects one of these components acting in isolation.

Learning anything about language acquisition at all, is only because a diverse set of conceptual and methodological tools has been used to trap the elusive answers to these questions: neurobiology, ethology, linguistic theory, naturalistic and experimental child psychology, cognitive psychology, philosophy of induction, theoretical and applied computer science. Language acquisition, then, is one of the best examples of the indispensability of the multidisciplinary approach called cognitive science.

1.8 UNIT END QUESTIONS

1) Describe some of the processes involved in language?
2) Why study of language is important for cognitive psychologists?
3) There is a universal course of development every child follows in the learning of language. Describe.
4) How do we acquire the ability to use language?
5) Compare and contrast the behaviourism and innateness theories of language acquisition.
6) Nature and nurture both influence the course of language development. Explain with empirical evidence.
7) Illustrate cognitive theory of language acquisition in detail.
8) Give a sample of an utterance one might reasonably expect to hear from an 18 month old child.
9) Give a detailed biological account of language acquisition.
10) Make a worksheet showing the initial stages of language acquisition in a child with elaborate examples and reference studies.

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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.

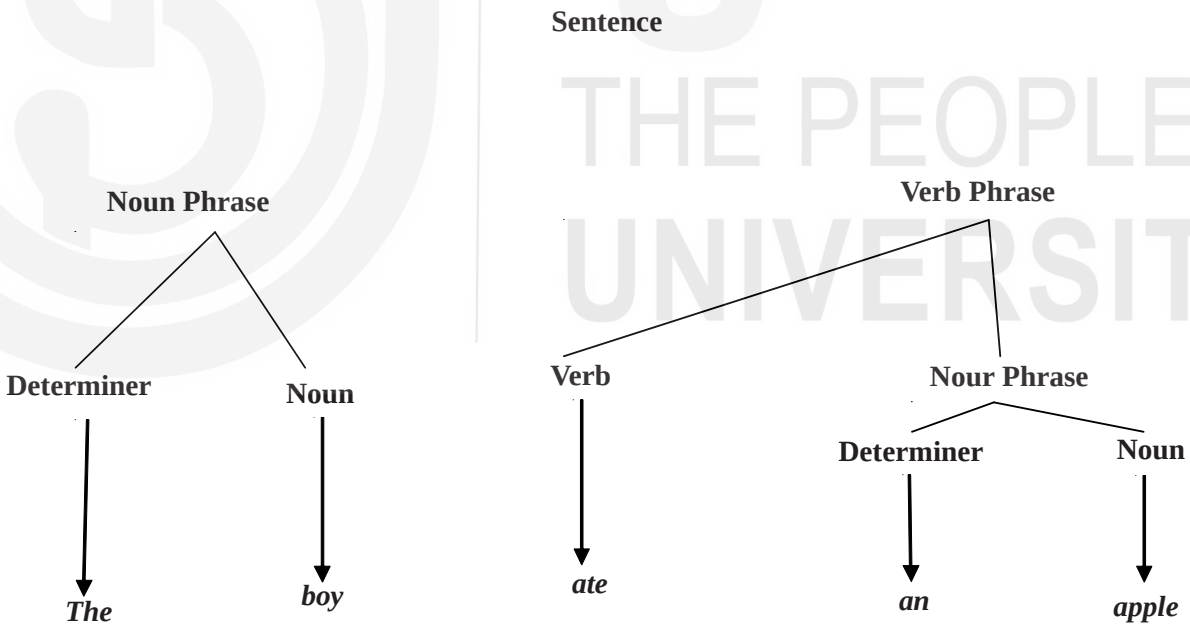

Fig. 2.1: Phrase structure in a sentence represented by a tree diagram (adapted from Hunt & Ellis, 2006)

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.

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UNIT 3 MULTILINGUALISM AND COGNITION

"To have another language is to possess a second soul." — Charlemagne (742/7 – 814), King of the Franks

Structure

3.0 INTRODUCTION

Multilingualism is the natural potential available to every normal human being rather than an unusual exception; it is only the environmental factors which may fail to provide the opportunity to learn another language that produce monolingual speakers: "Given the appropriate environment, two languages are as normal as two lungs" (Cook, 2002).

Every child is born with a language acquisition device having innate properties that plays a role in acquiring knowledge of language. This innateness is a biological endowment that Chomsky refers to as "Principles and Parameters". According to this theory, there is a universal grammar – where "Principles" are general features, while "parameters" are variables left open in the statement of principles that account for the diversity found in languages. Grammar is a collection of choices (example, a choice between SOV and SVO patterns of sentences). They define the limited numbers of grammatically permitted choices from the universal grammar menu of options. There are also lexical facts. Once the vocabulary is learnt and grammatical patterns are fixed, the whole system falls in its place and general principles programmed into general organ, just churns away to yield all the particulars of the language concerned (Chomsky as quoted in Jenkins, 2000).

In other words, there are different grammatical systems based on the choice of different parameters, when the child is exposed to them, his/her innate capacity

gets activated and he/she acquires knowledge of the rules of the language while using it for communication. When the child is exposed to more than one such linguistic system, he/she acquires more than one language and is known as multilingual.

3.1 OBJECTIVES

After reading this unit, you will be able to:

- Define basic concepts and structure of multilingualism;
- Explain multilingualism and cognition;
- Define acquisition of language; and
- Explain neural mechanism of multilinguals.

3.2 MULTILINGUALISM – BASIC CONCEPTS

Multilingualism is the knowledge of more than one language by a person or within a social group; it assumes the ability to switch from one language to another in speech, in writing, or in reading. Other terms describing this phenomenon include bilingualism, polylingualism, plurilingualism, diglossia, and languages-in-contact. Multilingualism may be personal, social, or intersubjective. A generic term for multilingual persons is *polyglot*. *Poly* (Greek word) means "many", *glot* (Greek) means "language"; and for the monolinguals is *monoglot*. *Personal multilingualism* refers to the knowledge and verbal behaviour of an individual, not necessarily shared by the whole community. *Social multilingualism* refers to the communicative practices of a nation, tribe, or other social group that sustains two or more languages. As in India, nearly 200 languages are spoken by its natives.

3.2.1 The Structure of Multilingualism

For many years, the popular belief was that a multilingual person should have learnt all of his or her languages simultaneously in early childhood and that he or she should have a native — like oral and written competence in all of them (Bloomfield 1933).

Today, a broader definition is more common. Accordingly, a person may be called multilingual if s/he uses his or her languages on a regular base and is able to switch from one to another where ever it is necessary, independently from the symmetry of his/her command of the languages, of the modalities of acquisition and of the distance between the varieties (Haugen 1953, Oksaar 1980 & Grosjean 1982). Thus, an Indian guest worker who learnt enough Swiss German dialect for his struggle for life in Switzerland may be considered bilingual with the same right (but not, of course, in the same way) as an interpreter working at the European Union and having systematically extended his or her 'native' French-English bilingualism.

Generally speaking, multilingualism is of two kinds: *Elite* – Language learned in a formal setting through planned and regular instruction as in a school system. *Neighborhoo*d – Here the language is acquired in a natural setting, acquired through the interaction with people speaking different languages. Theoretically

bilingualism is referred to as — *additive and subtractive bilingualism*. In *additive bilingualism*, a second language is acquired in addition to a relatively well-developed first language. In *subtractive bilingualism*, elements of a second language replace elements of the first language.

Researchers also distinguish between *simultaneous bilingualism*, which occurs when a child learns two languages from birth, and *sequential bilingualism*, which occurs when an individual first learns one language and then another (Bhatia & Ritchie, 1999). Either form of language learning can contribute to fluency. It depends on the particular circumstances in which the languages are learned (Pearson & associates, 1997).

It is known, however, that infants begin babbling at roughly the same age. This happens regardless of whether they consistently are exposed to one or two languages (Oller & associates, 1997). In the United States, many people make a big deal of bilingualism, perhaps because relatively few Americans born in the United States of nonimmigrant parents learn a second language to a high degree of fluency.

In other cultures, however, the learning of multiple languages is taken for granted. For example, in parts of India, people routinely may learn as many as four languages (Khubchandani, 1997). In Flemish-speaking Belgium, many people learn at least some French, English, and/or German. Often, they learn one or more of these other languages to a high degree of fluency.

No society or state has just one language, nor can language be isolated from culture. Societies are multilingual because of minorities that live within the dominant language group, and also because the official language itself presides over numerous dialects. In the Austro-Hungarian Empire, many linguistic and cultural communities had their own territories in a common state, dominated by German.

Language cannot be isolated from culture, because every language is a repository of values, images and memories: the semiotics of culture. The boundary between the semantics of language and the semiotics of culture is blurred, so that multilingualism shades into multiculturalism.

At the end of the 20th century, one or another form of multilingualism affect 60 per cent of the world's population. In other words, monolingualism is a boundary case of multilingualism, originated by very specific cultural conditions — and bilingualism is a particular form of multilingualism.

3.2.2 Multiligualism in India

India is said to be a socio-linguistic giant and the nerve system of this giant is multilingualism. "Indian multilingualism is huge in size, having 1620 mother tongues reduced to 200 languages….With the population of many of minorities larger than European countries"(Annamalai E. 2001).

This multilingual character of India is represented by its metropolitan cities like Mumbai and New Delhi, where people from all over come and settle down. For example, in Mumbai every child is exposed to at least four languages right from its infancy (Pai, 2005). Government of India has introduced the Three Language

Formula in its educational system, which means every child has to study two more languages other than their first language. The two languages are introduced simultaneously at upper primary level.

3.3 MULTILINGUALISM AND COGNITION

What all this means is that the monolingual approach is neither appropriate nor adequate for the investigation of language use in a society where multilingualism was endemic and where, for the education at least, mono lingualism was the exception and not the norm" (Trotter, 2000).

3.3.1 Relations Between Languages and Their Users

Multilingualism is a particularly timely issue concerning language competence. A state of multilingualism may be achieved *naturally,* when a person grows up with two parents speaking different languages, or is a member of a minority, or lives in a multilingual community. In many parts of the United States, children are exposed to two or more languages as they grow up. Some children learn one language at home and another in a school setting.

Other children learn both languages at home, where, for example, the grandparents speak one language to the child, but the parents and siblings speak another. Still other children immigrate to this country speaking one language and then learn a second language in school once they are settled in their new environment. It may also be *acquired* later in life, through immigration or learning. Regardless of how one actually learns his or her languages, the result is an individual who has a greatly enhanced ability to think and communicate.

In terms of language processing, multilingualism offers a rich source of information about the organisation and use of the structure and processes of language already discussed in earlier chapter – not only concerning bilinguals or multilinguals but monolinguals as well.

Participant languages may be associated with different communicative media: conversation, writing, reading, and symbolic systems can use different, and not necessarily overlapping, languages. Three recent issues about multilingualism are briefly explored here:

1) The first concerns *"code-switching"*, the ability of multilinguals to select words from either of their languages during the course of uttering a sentence. Code switching maximizes the bilingual's ability to convey his/her intended message to another bilingual and to understand another bilingual's code-switching message.

   What is fascinating is that code-switching often requires no additional time (and may, in fact, use less time) than when words from only one language are selected or perceived. One interesting study of this ability is by Peynircioglu & Tekcan (1993). In this study monolinguals and bilinguals searched a completed crossword puzzle for words in their language (Turkish and English). The bilinguals were equivalent to the monolinguals in the time they took to locate words in only one of their languages. But bilinguals were faster than monolinguals when they collectively located words in either of their languages. This finding indicates an advantage for bilinguals over

monolinguals in word recognition, which can be demonstrated when they are allowed to use a strategy of identifying all of the words they know (from both languages).

2) The second important issue concerns the treatment of lexical (grammatical) and semantic knowledge by multilinguals. One theoretical view places lexical knowledge in language-specific memory stores but semantic knowledge in a common conceptual memory store (Kroll & Sholl, 1992), whereas the other theoretical view places both types of knowledge in language-specific memory stores (Paivio, 1986).

   The first theory predicts, for example, that semantic processing of a word in one language (e.g., translating a word presented in a categorized list into another language) should facilitate memory for that word (relative to translating that word when it is presented in a random list), whereas the second theory predicts that no such facilitation would take place (because contacting the meaning of a word in one language should not involve contacting the meaning of the word in other language).

   To date, the evidence supports the first theory, known as *"Concept Mediation"* account, especially in fluent multilinguals (Amrhein & Sanchez, 1997; De Groot, Dannenburg, & Van Hell, 1994; Kroll & Sholl, 1992).

3) The third issue concerns how language familiarity influences a person's ability to correctly identify another person's voice. In a study conducted by Goggin, Thompson, Strube, & Simental (1991), English monolinguals and Spanish-English multilinguals heard texts read by the same person in either English, Spanish, or Spanish-accented English. A short time later, these subjects then heard a voice "line-up" of individuals reading a different text, again in either English, Spanish, or Spanish-accented English. Goggin & colleagues (1991) found a distinctly different pattern in the responses for monolinguals and bilinguals. For monolinguals, actual correct identifications were highest for their respective language. However, for bilinguals, correct identifications were generally the same across the three voice types.

Collectively, these findings indicate that bilinguals' knowledge of two languages aids in their identification of the voice source of the messages they encounter and represents an interesting interaction between speech perception and higher level of language analysis. These findings also represent an advantage multilinguals have over their monolingual counterparts.

3.3.2 Rule-governed Language Choice

How does a multilingual person make an appropriate choice from among the varieties that constitute his/her repertoire? There is consensus among specialists that this choice is not arbitrary but governed by rules (Grosjean 1982, 145). Macrosociolinguistic research established the existence of domains appropriate for the use of one or the other language in diglossic societies (Fishman 1967).

Multilinguals would thus choose the appropriate variety taking into account whether it is a private or public affair, whether the conversation concerns the professional world or leisure activities, religion or education, etc. Where domains entwine (e.g. when an adolescent speaks with a minister [religion] about football [leisure] in the school building [education]), individual factors are isolated and pondered over. Language choice would be determined by characteristic bundles

of situational factors (Grosjean 1982). The same applies to heterogeneous diglossic societies. In all these cases, the value of each language is thoroughly appreciated. By choosing one or the other variety of his/her repertoire, the multilingual speaker makes the most rewarding use of his communicative resources.

3.3.3 Mixing is Rule-governed Too

Sometimes the choice of the appropriate language is not evident. Multilinguals can choose between a monolingual mode and a bilingual mode (Grosjean 1985), i.e. between monolingual and bilingual speech (Lüdi & Pym, 1984) respectively.

In the first case, the language that is not used is 'switched off' as far as possible.

In the second case, the speaker's whole repertoire is activated. Possible criteria for the choice of the monolingual or bilingual mode are: the interlocutors' repertoire, the degree of formality of the situation, normative representations of the interlocutors, etc. In other words, the situation is not 'automatically' bilingual even if both interlocutors are similarly bilingual. Bilingual mode requires a — locally established — mutual agreement on its appropriateness. This holds true for balanced as well as for unbalanced bilingualism (e.g. in the case of learners).

Systematic observations of examples like this have led to the hypothesis that there are rules and norms that overlap single languages and govern the harmonic, i.e. the 'grammatical', mixing of elements from different languages. It may be assumed that the matrix language chosen for various reasons (level of competence of the speaker, presumed level of competence of the audience, conformity with the situation) is activated and provides the cognitive scaffolding for the semiotic organisation of a representation (Talmy, 1985, 1995).

Searching for the appropriate words for what he wants to say, the speaker then scans both of his lexica (or both subsets of his global bilingual lexicon). To fill the gap of words he does not know, that are momentarily not accessible or that may not even exist in the matrix language — or to achieve a special discourse effect —, he will switch to the embedded language. But this is only possible if the lemma of the embedded language word matches the slot provided by the matrix language.

If this is not the case, the speaker will choose to switch to the embedded language for a larger stretch and produce an *"embedded language island"* (Myers Scotton, 1993). Thus, a model of bilingual speech must provide control procedures for the local matching of both language systems (Myers Scotton, 1993; Jake 1995; Jake & Myers Scotton 1997).

Recently, MacSwan (1997, 1999) presented a minimalist approach to intrasentential code-switching. He claims that "nothing constrains code switching apart from the requirements of the mixed grammars", a claim that does not entail a theory about which principles of grammar are relevant to code switching, but "leaves open any and all independently motivated considerations in linguistic theory to the analysis of codeswitching data".

A theory of a multilingual competence should thus be identical with any linguistic theory in general. Consequently, it can be concluded that a linguistic theory must,

in order to be complete, give a full account of the ways multilingual repertoires can be used to produce mixed utterances. Thus, new research on the bilingual or multilingual lexicon (e.g. de Groot and Nas 1991, Cenoz et al. 2003) must be taken into account by every general theory of the lexicon.

Vice versa, each lexical — and language — theory will have to be judged by its capacity to account for bilingual speech.

3.4 MULTILINGUALISM AND THINKING

Suppose a person can speak and think in two or more than two languages. Does that person think differently in each language? Further, do multilinguals – people who can speak two and possible more languages – think differently from monolinguals – people who can speak only one language? What differences, if any, emanate from the availability of multiple languages versus just one? Might multilingualism affect intelligence, positively or negatively?

Does multilingualism make thinking in any one language more difficult, or does it enhance thought processes? The data are somewhat self-contradictory (Hakuta, 1986). Different participant populations, different methodologies, different language groups, and different experimenter biases may have contributed to the inconsistency in the literature. Consider what happens when bilinguals are balanced bilinguals, who are roughly equally fluent in both languages, and when they come from middle-class backgrounds. In these instances, positive effects of bilingualism tend to be found but negative effects may result under other circumstances.

Let us distinguish between additive versus subtractive bilingualism (Cummins, 1976). As we have studied earlier, a second language is acquired in addition to a relatively well-developed first language in additive bilingualism; whereas, in subtractive bilingualism, elements of a second language replace elements of the first language.

It appears that the additive form results in increased thinking ability. In contrast, the subtractive form results in decreased thinking ability (Cummins, 1976). In particular, there may be something of a threshold effect. Individuals may need to be at a certain relatively high level of competence in both languages for a positive effect of bilingualism to be found.

In a study by Eleanor (1993), the relationships among language proficiency, learning mode, learning style, abstract reasoning, and age of second language acquisition in 227 adults was investigated. The subjects, most of whom were university students, included 17 monolinguals, 120 partial multilinguals, and 90 competent multilinguals.

For comparison with competent multilinguals, the monolinguals and partial multilinguals were grouped together. All were tested for language proficiency, learning style (diverger, assimilator, converger, accommodator), learning mode (concrete experience, reflective observation, abstract conceptualisation, active experimentation), and analogy-solving ability. Native English-speakers had higher analogy-solving scores than native speakers of other languages, regardless of language proficiency; competent multilinguals scored highest.

Among competent multilinguals, native English-speakers scored higher than non-native speakers. Competent multilinguals scored lower on reflective observation than did other subjects. There was also a significant negative correlation between learning mode and analogy-solving ability.

No significant difference was found in learning styles, and no significant interaction effect between language proficiency and learning mode or style on analogy-solving ability. Individuals learning the second language after age 12 had higher analogy-solving scores than those learning it earlier. However, early-second-language-learners were more likely to be competent multilinguals.

3.4.1 Other Benefits

The advantages that multilinguals exhibit over monolinguals are not restricted to linguistic knowledge only, but extend outside the area of language (Cook, 1999, 2002), and the substantial long-lived cognitive, social, personal, academic, and professional benefits of enrichment bilingual contexts have been well documented (Thomas & Collier, 1998).

Children and older persons learning foreign languages have been demonstrated to:

1) Have a keener awareness (Galambos & Goldin-Meadow, 1990; Ewert, 2006, 2008) and sharper perception of language (enhanced metalingual abilities, e.g. detection of anomalous sentences; Bialystok, 2001).
2) Foreign language learning "enhances children's understanding of how language itself works and their ability to manipulate language in the service of thinking and problem solving" (Cummins, 1981);
3) Be consistently better able to deal with distractions, which may help offset age-related declines in mental dexterity (Bialystok *et al,*. 2004);
4) Have a better ear for listening and sharper memories (Ratte ,1968; Lapkin *et al.,* 1990);
5) Develop not only better verbal, but also spatial abilities (Diaz, 1983);
6) Display generally greater cognitive flexibility, better problem solving and higher-order thinking skills (Hakuta, 1986).
7) They have better 'measures of conceptual development', 'creativity' and 'analogical reasoning' (Diaz, 1985), divergent thinking and figural creativity (Landry, 1968, 1972, 1973, 1974).
8) Bilinguals or multilinguals are more used to switching thought patterns and have more flexible minds.
9) Foreign language learners consistently outperform their peers in core subject areas on standardised tests. For instance, multilingual children in Brussels secondary schools outperform their monoglot schoolmates in problem-solving and fraction exercises;
10) They possess extra skills in language use, e.g. engage in transfer, borrowing, insertional, alternational, inter- and intra-sentential code switching (Grosjean, 1989), mixing, and translation patterns that are usual and natural rather than exceptional (as is in the case of monoglots), and analyse as psycholinguistically motivated hybrid utterances serving different interactional, linguistic, pragmatic, cognitive and strategic functions (Majer, 2006).

Thus, just like Latin once used to be taught as an academic exercise, mental gymnastics with the aim of cognitive training, it has been demonstrated that people who know more than one language usually think more flexibly than monolinguals.

3.5 ACQUISITION OF A SECOND LANGUAGE

Languages are learnt at different ages, in different situations and up to very different levels of competence. This has of course consequences for the way multilingual repertoires will be structured. It is thus crucial to analyse the social context in which the different varieties making up a multilingual repertoire have been acquired. Recent research has shown for instance that "passive" exposure to other languages during childhood can lead to an unfocussed form of language learning and to a form of competence that can be reactivated at later stages if necessary (Ellis 1995, Franceschini 1996, 1999).

A significant factor believed to contribute to acquisition of a language is *'age'*. Research has shown that some aspects of a second language, such as vocabulary comprehension and fluency, seem to be acquired just as well after adolescence as before. The mastery of nativelike pronunciation, however, seems to depend on early acquisition. In any case, there do not appear to be critical periods for second-language acquisition (Birdsong, 1999). The possible exception is the acquisition of native accent.

Adults may appear to have a harder time learning second languages because they can retain their native language as their dominant language. Young children, in contrast, who typically need to attend school in the new language, may have to switch dominant language. They thus learn the new language to a higher level of mastery.

It is assumed that learning a (second) language is a series of cognitive procedures by which the learner progressively constructs the grammar of the new language, not only assisted by a "language acquisition device" (more for L1, less for L2), but also with the support from more competent members of the community (Vygotsky 1978) in the compass of a "language acquisition support system" based on social interaction (Bruner 1982, 1983).

Research on second language acquisition has shown the importance of a set of interactive procedures. These may be observed in exolingual situations that provide the non-native speaker the necessary help not only to communicate, but also to continue his/her learning process (e.g. Krafft & Dausendschön-Gay 1994).

What kinds of learning experiences facilitate second-language acquisition? There is no single correct answer to this question (Bialystock & Hakuta, 1994). One reason is that each individual language learner brings distinctive cognitive abilities and knowledge to the language-learning experience. In addition, the kinds of learning experiences that facilitate second-language acquisition should match the context and uses for the second language once it is acquired.

For example, consider four different individuals. Ria, a young child, may not need to master a wealth of vocabulary and complex syntax to get along well with other children. If she can master the phonology, some simple syntactical rules, and some basic vocabulary, she may be considered fluent.

Similarly, Kishen needs only to get by in a few everyday situations, such as shopping, handling routine family business transactions, and getting around town. He may be considered proficient after mastering some simple vocabulary and syntax, as well as some pragmatic knowledge regarding context-appropriate manners of communicating.

Meenakshi must be able to communicate regarding her specialised technical field. She may be considered proficient if she masters the technical vocabulary, a primitive basic vocabulary, and the rudiments of syntax.

Sumesh is a student who studies a second language in an academic setting. Sumesh may be expected to have a firm grasp of syntax and a rather broad, if shallow, vocabulary. Each of these language learners may require different kinds of language experiences to gain the proficiency being sought. Different kinds of experiences may be needed to enhance their competence in the phonology, vocabulary, syntax, and pragmatics of the second language.

When speakers of one language learn other languages, they find the languages differentially difficult. For example, it is much easier, on average, for a native speaker of English to acquire Spanish as a second language than is to acquire Russian. One reason is that English and Spanish share more roots than do English and Russian. Moreover, Russian is much more highly inflected than are English and Spanish. English and Spanish are more highly dependent on word order. The difficulty of learning a language as a second language, however, does not appear to have much to do with its difficulty as a first language. Russian infants probably learn Russian about as easily as U.S. infants learn English

3.5.1 Single-System Versus Dual-System Hypotheses

One way of approaching multilingualism is to apply what we have learned from cognitive-psychological research to practical concerns regarding how to facilitate acquisition of a new language. Another approach is to study multilingual individuals to see how multilingualism may offer insight into human mind. For example, some cognitive psychologists have been interested in finding out how the different languages are represented in multilingual's mind. The *single-system hypothesis* suggests that two or more languages are represented in just one system or brain region (see Hernandez & associates, 2001, for evidence supporting this hypothesis in early multilinguals).

Alternatively, the *dual-system hypothesis* suggests that two/different languages are represented somehow in separate systems of mind (De Houwer, 1995; Paradis, 1981). For instance, might German language information be stored in a physically different part of the brain than English language information?

One way to address this question is through the study the multilinguals who have experienced brain damage. Suppose a multilingual person has brain damage in a particular part of the brain. An inference consistent with the dual-system hypothesis would be that the individual would show different degrees of impairment in the different languages. The single-system view would suggest roughly equal impairment in all the languages. The logic of this kind of investigation is compelling. But the results were not. When recovery of language after trauma is studied, sometimes the first language recovers first, sometimes the second/latter acquired language recovers first. And sometimes recovery is about equal for all the languages .

In a related situation, an early bilingual aphasic was trained in his native language but was given no training in his second language (Meinzer & associates, 2006). The researchers found significant recovery of the first language but no change in the individual's ability to use the second language.

The conclusions that can be drawn from all this research are equivocal. Nevertheless, the results seem to suggest at least some duality of structure. A different method of study has led to an alternative perspective on multilingualism. Two investigators mapped the region of cerebral cortex relevant to language use in two of their bilingual patients being treated for epilepsy (Ojemann & Whitaker, 1978). Mild electrical stimulation was applied to the cortex of each patient. Electrical stimulation tends to inhibit activity where it is applied. It leads to a reduced activity to name the objects for which the memories are stored at the location being stimulated. The results for both patients were the same.

The results of this study suggest some aspects of the two languages may be represented singly. Other aspects may be represented separately.

3.6 NEURAL MECHANISM OF MULTILINGUALS

The question whether we may speak of one entwined or several separated systems cannot be fully answered alone by the experimental studies discussed above. Neurosciences may offer additional insights. The functional magnetic resonance imaging (fMRI) has been able to throw light on a large number of factors.

Answers to questions like whether there is a difference between balanced and unbalanced bilinguals, Whether there is a, relation between the neuronal network constructed when learning a second language and the 'classical' language centre, whether the first be integrated into the latter and whether.

The research findings in the neuroanatomy of bilinguals are still contradictory and the analysis of cases of bilingual speech used by speakers with different kinds of multilingual competencies could shed new light on these questions.

Early bilinguals seem to build up a network in sufficiently adaptable to allow the integration of later acquired languages. Late bilinguals have to establish new neural areas to guarantee development of their late-acquired languages. These results could have an important impact on the structure of an integrated language theory. Such a theory will consider multilingual repertoires and their use in different contexts the default case, monolingual competencies and monolingual speech representing just one many cases to be explained. It will match new ways of modelling the dynamics of intercultural communication and contribute to it.

3.7 LET US SUM UP

To summarize, different languages seem to share some, but not all, aspects of mental representation. Learning a second language is often a plus, but it is probably most useful if the individual learning the second language is in an environment in which the learning of the second language adds to rather than subtracts from the learning of the first language.

Moreover, for beneficial effects to appear, the second language must be learned well. In the approach usually taken in schools, students may receive as little as 2

or 3 years of second-language instruction spread out over a few class periods a week. This approach probably will not be sufficient for the beneficial effects of bilingualism to appear. However, schooling does seem to yield beneficial effects on acquisition of syntax.

This is particularly so when a second language is acquired after adolescence. Furthermore, individual learners should choose specific kinds of language-acquisition techniques to suit their personal attributes. These attributes include abilities, preferences, and personal goals for using the second language.

3.8 UNIT END QUESTIONS

1) Describe the various processes involved in multilingualism?
2) Why study of multilingualism is important for cognitive psychologists?
3) What can multilingualism tell us about language structures and processes?
4) What are the advantages of being bilingual? Can you think of any disadvantages?
5) Give a detailed account of language acquisition of a second language.
6) Suppose you are an instructor of English as a second language. What kinds of things will you want to know about your students to determine how much to emphasise phonology, vocabulary, syntax, or pragmatics in your instruction?

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UNIT 4 LANGUAGE AND SPEECH DISORDERS

"Language comes so naturally to us that it is easy to forget what a strange and miraculous gift it is." – Steven Pinker

Structure

4.0 INTRODUCTION

Communication is so pervasive in any community in its day-to-day activities that it is often taken for granted (Sternberg, 2001). Normal language develops over a period and it is sequential or ordered (Crystal, 1992). A child acquires vocalisation, speech sounds (vowels and consonants) and then prosodies. This acquisition is in recognisable stages that entail acquisition of form, content, and use (Seymour & Nober, 1997). The form is the system of symbols that convey meaning and it is made up of the phonology, morphology, and syntax of a language. The content includes the individual words and combinations of words to produce meaning in the language. Content is made up of the semantics of a language. Use involves how we use words in contexts and is made up of the pragmatics of a language.

Many things could go wrong with the natural order of language acquisition and development. In every community, we encounter individuals with language and/or a speech disorders. One in 10 people in the United States is affected by a communication disorder (speech, language, or hearing disorders). Unfortunately,

there is much ignorance as far as identifying these disorders is concerned. The ignorance more often than not leads to mishandling of the persons with language and speech disorders.

4.1 OBJECTIVES

After reading this unit, you will be able to:

- Define language and speech disorders;
- Explain speech disorders;
- List the causes for speech disorders;
- Enumerate the language disorders; and
- Explain treatment for the speech and language disorders.

4.2 DEFINITION OF LANGUAGE AND SPEECH DISORDERS

Language and speech are said to be disordered or impaired if they differ from what is considered the norm. As already indicated, the yardstick is embedded in the culture of each language; what may be considered disordered in one language will not necessarily be disordered in another language. There is need, therefore, to distinguish between genuine speech disorder and people's cultural tendencies or practices. For example, Kim (1985) notes that Asian Americans favour verbal hesitancy and ambiguity to avoid offence. They also avoid making spontaneous or critical remarks. One should respect such a community's culture and thus the hesitancy should not be confused with a fluency disorder.

The unique nature of the language and speech disorders is that they are not visible since mostly they are not physically manifested, except defects that affect articulation. Most disorders are not evident until a person opens her/his mouth to speak. The disorders, for the same reason, are often not considered a disability, even by the persons who have them.

Language and speech disorders may be due to factors such as physical, mental, or socialisation defects (Crystal, 1988). Though language and speech disorders are classified together they are slightly different from each other. Let's take them one by one:

4.3 LANGUAGE DISORDERS

Language is the rule-based use of speech sounds to communicate (Sternberg, 2000). Language disorders or language impairments involve the processing of linguistic information. Problems that may be experienced can involve grammar (syntax and/or morphology), semantics (meaning), or other aspects of language. Disordered language may be due to a *receptive problem*, that is, a difficulty in understanding speech sounds (involving impaired language comprehension). It can also be due to an *expressive problem*, that is, a difficulty in producing the speech sounds (involving language production), that follow the arbitrary rules of a specific language. A language disorder can also be due to problems in both reception and expression. Examples include specific language impairment and

aphasia, among others. Language disorders can affect both spoken and written language, and can also affect sign language; typically, all forms of language will be impaired.

Note that these are distinct from speech disorders, which involve difficulty with the act of speech production, but not with language. Language disorders, therefore, refer to the following:

The use of speech sounds in combinations and patterns that fail to follow the arbitrary rules of a particular language is a language disorder. For instance, the lack of communication etiquette is considered a language disorder. Talking out of turn, not talking when it is your turn, or not responding when you are expected to could be disorders if frequently observed in one's language behaviour.

The delay in the use of speech sounds relative to normal development in the physical, cognitive, and social areas is another language disorder. Most language disorders are often diagnosed in conjunction with other developmental delays — for instance, health, sensory, motor, mental, emotional, and behavioural development.

Language disorder is a disorder that is found in the development or use of the knowledge of language. It shows the breakdown in the development of language abilities on the usual developmental schedule. The disorders that come under language disorders are: Autism, Learning Disability, Specific Language Impairment, Developmental Phonological Disorders Aphasia, Dyspraxia, etc. We shall discuss the most common language disorders in detail:

4.3.1 Aphasia

Aphasia is an impairment of language functioning caused by damage to the left hemisphere of the brain (Garrett, 2003; Hillis & Caramazza, 2003). There are different type of aphasias, example; Broca's aphasia and Wernicke's aphasia.

Wernicke's aphasia is caused by damage to the left temporal lobe of the brain. It is characterised by notable impairment in the understanding of spoken words and sentences. People with Wernicke's aphasia have generally fluent phonetic and syntactic but semantically coherent speech.

This coherence is exhibited through the creation of nonsense words for real-world concepts and improper substitutions of function words for content words (e.g., nouns, verbs). It also typically involves the production of sentences that have the basic structure of the language spoken but that make no sense. They are sentences without any meaning, e.g. 'Yeah, that was the pumpkin furthest from my thoughts' and 'the scroolish prastimer ate my spanstakes' (Hillis & Caramazza, 2003).

In the first case, the words make sense, but not in the context they are presented. In the second case, the words themselves are neologisms, or newly created words. Treatment for patients with this type of aphasia frequently involves supporting and encouraging nonlanguage communication (Altschuler et al., 2006).

Broca's aphasia is caused by damage to the brain's premotor area, responsible, in part, for controlling motor commands used in speech production. A person suffering from Broca's aphasia exhibits speech containing excess pauses and

slips of tongue, and s/he has trouble finding words when talking. The person also fails to make use of function words such as *a, the,* and *of*. For this reason, Broca's aphasics also produce ungrammatical sentences (Tartter, 1987). Furthermore they have problem using syntactic information when understanding sentences (Just & Carpenter, 1987). For example, while a Broca's aphasic has no trouble understanding a sentence such as "The bicycle that the man is holding is blue", but s/he has trouble comprehending a sentence such as "the dog that the woman is biting is grey."

This difference is due to the fact that while the first sentence can be understood using real-world knowledge (e.g. bicycle, not people, are blue), the second sentence cannot (because it is unlikely that a woman would bite a dog). Because understanding the second sentence requires correctly using syntactic information, which Broca's aphasics have difficulty doing, the sentence poses problem for them (Berndt & Caramazza, 1980).

Broca's aphasia differs from Wernicke's aphasia in two key aspects. First is that speech is agrammatical rather than grammatical, as in Wernicke's. Second is that verbal comprehension is largely preserved.

Diseases like Broca's and Wernicke's aphasia, while tragic, tell us much about the critical functions of certain regions of the brain. Notably, their symptoms suggest that (at least certain) phonological, syntactic, and semantic, language information is stored and processed separately in the brain.

Global aphasia is the combination of highly impaired comprehension and production of speech. It is caused by lesions to both Broca's and Wernicke's areas. Aphasia following a stroke frequently involves damage to both Broca's and Wernicke's areas. In one study, researchers found 32 % of aphasias immediately following a stroke in Broca's and Wernicke's areas (Pedersen, Vinter, & Olsen, 2004).

Anomic aphasia involves difficulties in naming objects in retrieving words. The patient may look at an object and simply be unable to receive the word that corresponds to the object. Sometimes, specific categories of things cannot be recalled, such as names of living things (Warrington & Shallice, 1984).

4.3.2 Autism

Autism is a developmental disorder characterised by abnormalities in social behaviour, language, and cognition (Jarrold & Happe', 2003). It is biological in its origins, although the genes responsible for it have not been conclusively identified (Lamb et al., 2000). Children with autism are identified by around 14 months of age, when they fail to show expected normal patterns of interaction with others. They display repetitive movements and stereotyped patterns of interests and activities. When they interact with someone, they are more likely to view their lips than their eyes. About half of children with autism fail to develop functional speech. The speech they tend to develop is characterised by echolalia, meaning they repeat, over and over again, speech they have heard. Sometimes the repetition occurs several hours after the original use of the words by someone else.

Children with autism show abnormalities in many areas of the brain, including the frontal and parietal lobes, as well as the cerebellum, brainstem, corpus

callosum, basal ganglia, amygdala, and hippocampus. The disease was first identified in the middle of the twentieth century (Kanner, 1943). It is five times more common in males than females. The incidence of diagnosed autism has increased rapidly over recent years (Chen et al., 2007). Autism is diagnosed today in approximately 60 out of every 10,000 children (Fombonne, 2003). The increase in recent times may be a result of a number of causes, including changes in diagnosing strategies or environmental pollution (Jick & Kaye, 2003; Windham et al., 2006).

4.3.3 Learning Disability

Language-based learning disabilities are problems with age-appropriate reading, spelling, and/or writing. Most people diagnosed with learning disabilities have average to superior intelligence. . In *language-based learning disability* (or just *learning disabilities),* many children with reading problems have spoken language problems. *Dyslexia* has been used to refer to the specific learning problem of reading.

Dyslexia — Dyslexia has been around for a long time and has been defined in different ways. For example, in 1968, the World Federation of Neurologists defined dyslexia as "a disorder in children who, despite conventional classroom experience, fail to attain the language skills of reading, writing, and spelling commensurate with their intellectual abilities." Dyslexia is not due to mental retardation, brain damage, or a lack of intelligence. It is caused by an impairment in the brain's ability to translate images received from the eyes or ears into understandable language. The severity of dyslexia can vary from mild to severe. It is found more often in boys than in girls. The sooner dyslexia is treated, the more favorable the outcome; however, it is never too late for people with dyslexia to learn to improve their language skills (Schulte-Körne, Warnke, & Remschmidt, 2006).

Letter and number reversals are the most common warning sign of dyslexia (Birsh, 2005). Difficulty in copying from the board or a book can also suggest problems. The child may appear to be uncoordinated and have difficulty with organised sports or games. Difficulty with left and right is common, and often dominance for either hand has not been established. Auditory problems in dyslexia encompass a variety of functions. Commonly, a child may have difficulty remembering or understanding what he hears. Parts of words or parts of whole sentences may be missed, and words can come out sounding funny. Children struggling with this problem may know what they want to say but have trouble finding the actual words to express their thoughts (Sperling et al., 2006).

There are several types of dyslexia that can affect the child's ability to spell as well as read (Heim, Tschierse, & Amunts, 2008). *Primary dyslexia* is a dysfunction of, rather than damage to, the left side of the brain (cerebral cortex) and does not change with age. Individuals with this type are rarely able to read above a fourth-grade level and may struggle with reading, spelling, and writing as adults. Primary dyslexia is passed in family lines through their genes (hereditary). *Secondary* or *developmental dyslexia* and is felt to be caused by hormonal development during the early stages of fetal development. Developmental dyslexia diminishes as the child matures (Galaburda & Cestnick, 2003).

Dyslexia may affect several different functions. *Visual dyslexia* is characterised by number and letter reversals and the inability to write symbols in the correct sequence. *Auditory dyslexia* involves difficulty with sounds of letters or groups of letters. The sounds are perceived as jumbled or not heard correctly. *Dysgraphia* refers to the child's difficulty holding and controlling a pencil so that the correct markings can be made on the paper (Facoetti et al., 2003).

Many subtle signs can be observed in children with dyslexia. Due to the frustration arising from the difficulty in reading, children may become withdrawn and may show signs of depression and low self-esteem. Peer and sibling interactions can become strained. The child may become unmotivated and develop a dislike for school. The child's success in school may be jeopardised if the problem remains untreated.

4.3.4 Alzheimer's Disease

Alzheimer's disease is a brain disorder which leads to a decrement in language processing ability. This disease primarily afflicts elderly persons and causes progressive, diffused, and irreversible damage to the cortical regions of the brain, impacting markedly on memory functions. Comparison between the language decrements due to the dementing effects of Alzheimer's disease and those noted for the aphasics is useful because the average age of onset of Alzheimer's Disease overlaps that of aphasias (around 50 to 60 years of age).

The language of an Alzheimer's patient is marked by a striking simplification process wherein words that once precisely described some event are now lost and are replaced by more general terms because of a fundamental loss of categorical organisation in semantic memory (Chan et al., 1993; Martin & Fedio, 1983). It appears, however, that in patients suffering from Alzheimer's disease, phonological and syntactic knowledge and use is minimally affected. Finally, a deficit in pragmatic knowledge, concerning the correct recognition of the intention of a speech act (e.g., that an utterance is meant to be taken as a request), turntaking in a conversation, and so on also occurs. Interestingly, this pattern of deficits and nondeficits again argues for the distinctiveness of the various levels of language information similar to what was seen for Broca's and Wernicke's aphasias (Bayles & Kaszniak, 1987).

4.3.5 Specific Language Impairment

Specific language impairment (SLI) is a developmental language disorder in the absence of frank neurological, sensorimotor, nonverbal cognitive or social emotional deficits (see Watkins, 1994). SLI is used to refer to problems in the acquisition and use of language, typically in the context of normal development. Children with SLI lag behind their peers in language production and language comprehension, which contributes to learning and reading disabilities in school.

One of the hallmarks of SLI is a delay or deficit in the use of function morphemes (e.g., *the, a, is*) and other grammatical morphology (e.g., plural -s, past tense -ed). Individuals with SLI exhibit problems in combining and selecting speech sounds of language into meaningful units (phonological awareness).

These problems are different to speech impairments that arise from difficulties in coordination of oral-motor musculature (Cohen, 2002). Symptoms include

the use of short sentences, and problems producing and understanding syntactically complex sentences. SLI is also associated with an impoverished vocabulary, word finding problems, and difficulty learning new words, whereas the basic tasks for development of phonology and syntax are completed in childhood, vocabulary continues to grow in adulthood (Bishop, 1997).

Some researchers claim that SLI children's difficulty with grammatical morphology is due to delays or difficulty in acquiring a specific underlying linguistic mechanism. For example, difficulty in acquiring the rule that verbs must be marked for tense and number ("he walks", not "he walk") (Rice & Wexler, 1994).

These children have a deficit in processing brief and/or rapidly changing auditory information, and/or in remembering the temporal order of auditory information (Tallal, et al., 1985). Children with SLI have poor short-term memory for speech sounds (example, Gathercole, 1998). In a number of recent studies short-term memory for speech sounds has been shown to correlate highly with vocabulary acquisition and speech production. This has led to the hypothesis that a primary function of this memory is to facilitate language learning.

Moreover, among SLI children, about 50% will go on to experience reading difficulties and develop dyslexia (Bishop & Snowling, 2004).

4.3.6 Developmental Phonological Disorders

"Developmental Phonological Disorders, also known as phonological disability or phonological disorders, are a group of language disorders that affect children's ability to develop easily understood speech by the time they are four years old, and, in some cases, their ability to learn to read and spell. Therefore, Phonological disorders involve a difficulty in learning and organising all the sounds needed for clear speech, reading and spelling" (Bowen, 1998).

Individuals with this Communication Disorder of childhood demonstrate impairment in their ability to produce sounds as expected for their developmental level. Some children with developmental phonological disorders have other speech and language difficulties such as immature grammar and syntax, stuttering or word-retrieval difficulties.

The cause of phonological disorder in children is largely unknown. It has been suggested that this disorder has a genetic component due to the large proportion of children who have relatives with some type of similar disorder. However there is no available data to support these observations. Developmental phonological disorders may occur in conjunction with other communication disorders such as stuttering, specific language impairment (SLI), or developmental apraxia of speech. No matter what combination of difficulties a child with a developmental phonological disorder has, appropriate speech-language pathology treatment is usually successful in eliminating or at the very least, reducing the problem (Bowen, 1998).

4.3.7 Dyspraxia

Developmental dyspraxia is a disorder characterised by impairment in the ability to plan and carry out sensory and motor tasks (Dewey, 1995). Generally, individuals with the disorder appear "out of sync" with their environment.

Symptoms vary and may include poor balance and coordination, clumsiness, vision problems, perception difficulties, emotional and behavioural problems, difficulty with reading, writing, and speaking, poor social skills, poor posture, and poor short-term memory. Although individuals with the disorder may be of average or above average intelligence, they may behave immaturely (Henderson & Henderson, 2003).

Developmental dyspraxia is a lifelong disorder. Many individuals are able to compensate for their disabilities through occupational and speech therapy. Treatment is symptomatic and supportive and may include occupational and speech therapy, and "cueing" or other forms of communication such as using pictures and hand gestures. Many children with the disorder require special education (Alloway & Temple, 2007).

4.4 SPEECH DISORDERS

Speech disorders are characterised by a difficulty in producing normal speech patterns. Children go through many stages of speech production while they are learning to communicate. What is normal in the speech of a child of one age may be a sign of a problem in an older child. Speech is the vocal utterance of language and it is considered disordered in three underlying ways: voice, articulation, and fluency (Roseberry-McKibbin, 1995).

These disorders include *voice disorders* (abnormalities in pitch, volume, vocal quality, resonance, or duration of sounds), *speed sound disorders/articulation disorders* (problems producing speech sounds), and *fluency disorders* (impairment in the normal rate or rhythm of speech, such as stuttering).

4.4.1 Voice Disorders

Voice involves the coordinated effects of the lungs, larynx, vocal chords, and nasal passage to produce recognisable sounds. Voice can thus be considered disordered if it is incorrectly phonated or if it is incorrectly resonated. In the incorrect phonation an individual could have a breathy, strained, husky, or hoarse voice. With the incorrect resonation an individual could have hyper-nasality or hypo-nasality. The voice disorders could also be due to improper voicing habits.

Paralanguage issues, such as use of pitch, volume, and intonation, are diverse for they are culturally determined. Every sound of voice has a possible range of meanings that could be conveyed simply through the voice rather than the words we use. The features that should be considered in determining a voice disorder are:

Volume: how loudly or softly we speak

Pitch: how pleasant or unpleasant

Quality: the highness or lowness of one's voice

Rate: the speed at which one speaks

Voice disorders are interpreted variously in different cultures. For instance, in many African cultures masculinity and femininity are determined by paralinguistic features. A man who speaks in a low volume, a high pitch, or a smooth and slow voice, would be frowned upon and called upon to "speak like a man."

4.4.2 Speech Sound Disorders

These involve difficulty in producing specific speech sounds (most often certain consonants, such as /s/ or /r/), and are subdivided into articulation disorders (also called phonetic disorders) and phonemic disorders. Articulation disorders are characterised by difficulty learning to physically produce sounds.

Phonemic disorders are characterised by difficulty in learning the sound distinctions of a language, so that one sound may be used in place of many. However, it is not uncommon for a single person to have a mixed speech sound disorder with both phonemic and phonetic components.

i) **Articulation disorders:** Articulation involves the use of the tongue, lips, teeth and mouth to produce recognisable speech sounds. Articulation is disordered if sounds are added, omitted, substituted or distorted. Articulation disorders may be caused by factors such as structural abnormalities, for example, a cleft lip and/or palate, a tongue-tie, missing teeth, a heavy tongue, or a deformed mouth; faulty or incomplete learning of the sound system; or damage of the nervous system.

   Apart from affecting articulation, such conditions also affect the self-concept of the persons (Leonard et al., 1991). For instance, Pinky Sonkar, an eight-year-old girl from Mirzapur in Uttar Pradesh, (On her life the documentary Smile Pinky was made by American filmmaker Magan Mylan, which won Oscars for Best Documentary), had stopped smiling, even stopped going to school because she was ashamed of her cleft lip, a deformity 35,000 children are born with in India every year. Then in 2008, The Smile Train arrived in Pinky's village and a seemingly routine plastic surgery was offered free by doctors' abroad and her world was changed forever.

ii) **Phonemic disorders:** are speech disorders in which individuals have trouble physically producing certain sounds. In the general population phonemic disorders are sometimes called speech impediments. Usually individuals with phonemic disorders have trouble distinguishing the sounds made by certain letters so that some letters, for example all *"t"*s or all *"c"*s, are always pronounced with an incorrect sound as a substitution. Phonemic disorders usually improve with speech therapy, though how much improvement may be made will depend upon each individual case.

4.4.3 Fluency Disorders

Fluency involves appropriate pauses and hesitations to keep speech sounds recognisable. Fluency is disordered if sounds are very rapid with extra sounds (cluttered), if sounds are repeated or blocked especially at the beginnings of words (stuttered), or if words are repeated.

Fluency disorders are more prevalent in children and they are due to a combination of familial, psychological, neurological, and motoric factors.

The social nature of communication is affected when one has disfluent speech. Human beings are social and they spend much of their time together. They first learn how to communicate in a social set up — for instance, with parents, siblings, relations, or friends. Socialisation is adversely affected if one has a fluency speech disorder. A person with disfluency is often mishandled at home, in school, or in public place. Often the individual becomes withdrawn.

4.4.4 Apraxia of Speech

Apraxia of speech, also known as verbal apraxia or dyspraxia, is a speech disorder in which a person has trouble saying what he or she wants to say correctly and consistently. The severity of apraxia of speech can range from mild to severe.

There are two main types of speech apraxia: *acquired apraxia* of speech and *developmental apraxia* of speech. Acquired apraxia of speech can affect a person at any age, although it most typically occurs in adults. It is caused by damage to the parts of the brain that are involved in speaking, and involves the loss or impairment of existing speech abilities. The disorder may result from a stroke, head injury, tumor, or other illness affecting the brain. Acquired apraxia of speech may occur together with muscle weakness affecting speech production (dysarthria) or language difficulties caused by damage to the nervous system (aphasia) (Epstein, Perkin, Cookson, & de Bono, 2003).

Developmental apraxia of speech (DAS) occurs in children and is present from birth. It appears to affect more boys than girls. This speech disorder goes by several other names, including developmental verbal apraxia, developmental verbal dyspraxia, articulatory apraxia, and childhood apraxia of speech. DAS is different from what is known as a developmental delay of speech, in which a child follows the "typical" path of speech development but does so more slowly than normal. The causes of DAS are not yet known. Some scientists believe that DAS is a disorder related to a child's overall language development.

Others believe it is a neurological disorder that affects the brain's ability to send the proper signals to move the muscles involved in speech. However, brain imaging and other studies have not found evidence of specific brain lesions or differences in brain structure in children with DAS. Children with DAS often have family members who have a history of communication disorders or learning disabilities. This observation and recent research findings suggest that genetic factors may play a role in the disorder (Kasper et al., 2005).

People with either form of apraxia of speech may have difficulty putting sounds and syllables together in the correct order to form words. They also tend to make inconsistent mistakes when speaking. For example, they may say a difficult word correctly but then have trouble repeating it, or they may be able to say a particular sound one day and have trouble with the same sound the next day. They often appear to be groping for the right sound or word, and may try saying a word several times before they say it correctly. Another common characteristic of apraxia of speech is the incorrect use of "prosody" — that is, the varying rhythms, stresses, and inflections of speech that are used to help express meaning. The severity of both acquired and developmental apraxia of speech varies from person to person. It can range from so mild having trouble with very few speech sounds to the severe cases of being not able to communicate effectively.

4.4.5 Dysprosody

Dysprosody is the rarest neurological speech disorder. It is characterised by alterations in intensity, in the timing of utterance segments, and in rhythm, cadence, and intonation of words. The changes to the duration, the fundamental frequency, and the intensity of tonic and atonic syllables of the sentences spoken, deprive an individual's particular speech of its characteristics. The cause of

dysprosody is usually associated with neurological pathologies such as brain vascular accidents, cranioencephalic traumatisms, and brain tumors (Pinto, Corso, Guilherme, Pinho, & Nobrega, 2004).

4.4.6 Dysarthria

Dysarthria is a motor speech disorder. It is a weakness or paralysis of speech muscles caused by damage to the nerves and/or brain. The type and severity of dysarthria depend on which area of the nervous system is affected. Dysarthria is often caused by strokes, Parkinson's disease, Amyotrophic lateral sclerosis (ALS), head or neck injuries, surgical accident, or cerebral palsy.

A person with dysarthria may experience any of the following symptoms, depending on the extent and location of damage to the nervous system: "slurred" speech, speaking softly or barely able to whisper, slow rate of speech, rapid rate of speech with a "mumbling" quality, limited tongue, lip, and jaw movement, abnormal intonation (rhythm) when speaking, changes in vocal quality ("nasal" speech or sounding "stuffy"), hoarseness, breathiness, drooling or poor control of saliva, chewing and swallowing difficulty etc.

A speech-language pathologist (SLP) can evaluate a person with speech difficulties and determine the nature and severity of the problem. The SLP will look at movement of the lips, tongue, and face, as well as breath support for speech, voice quality, and more.

Children with isolated speech disorders are often helped by articulation therapy, in which they practice repeating specific sounds, words, phrases, and sentences. For stuttering and other fluency disorders, a popular treatment method is fluency training, which develops coordination between speech and breathing, slows down the rate of speech, and develops the ability to prolong syllables. Delayed auditory feedback (DAF), in which stutterers hear an echo of their own speech sounds, has also been effective in treating stuttering.

When a speech problem is caused by serious or multiple disabilities, a neurodevelopmental approach, which inhibits certain reflexes to promote normal movement, is often preferred. Other techniques used in speech therapy include the motor-kinesthetic approach and biofeedback, which helps children know whether the sounds they are producing are faulty or correct. For children with severe communication disorders, speech pathologists can assist with alternate means of communication, such as manual signing and computer-synthesised speech.

4.5 LET US SUM UP

In this unit we have defined both speech and language disorders. We have also indicated the various causative factors leading to these disorders. Language is the rule-based use of speech sounds to communicate (Sternberg, 2000). Language disorders or language impairments involve the processing of linguistic information. Problems that may be experienced can involve grammar (syntax and/or morphology), semantics (meaning), or other aspects of language. Disordered language may be due to a *receptive problem*, that is, a difficulty in understanding speech sounds (involving impaired language comprehension).

It can also be due to an *expressive problem*, that is, a difficulty in producing the speech sounds (involving language production), that follow the arbitrary rules of a specific language. A language disorder can also be due to problems in both reception and expression. Examples include specific language impairment and aphasia, among others. Language disorders can affect both spoken and written language, and can also affect sign language; typically, all forms of language will be impaired.

Note that these are distinct from speech disorders, which involve difficulty with the act of speech production, but not with language. Language disorders, therefore, refer to the following:

The use of speech sounds in combinations and patterns that fail to follow the arbitrary rules of a particular language is a language disorder. For instance, the lack of communication etiquette is considered a language disorder. Talking out of turn, not talking when it is your turn, or not responding when you are expected to could be disorders if frequently observed in one's language behaviour.

Language disorder is a disorder that is found in the development or use of the knowledge of language. It shows the breakdown in the development of language abilities on the usual developmental schedule. The disorders that come under language disorders are: Autism, Learning Disability, Specific Language Impairment, Developmental Phonological Disorders include Aphasia, Dyspraxia, etc.

Aphasia is an impairment of language functioning caused by damage to the left hemisphere of the brain (Garrett, 2003; Hillis & Caramazza, 2003). There are different type of aphasias, example; Broca's aphasia and Wernicke's aphasia.

Autism is a developmental disorder characterised by abnormalities in social behaviour, language, and cognition (Jarrold & Happe', 2003). It is biological in its origins, although the genes responsible for it have not been conclusively identified (Lamb et al., 2000). Children with autism are identified by around 14 months of age, when they fail to show expected normal patterns of interaction with others. They display repetitive movements and stereotyped patterns of interests and activities. When they interact with someone, they are more likely to view their lips than their eyes. About half of children with autism fail to develop functional speech. The speech they tend to develop is characterised by echolalia, meaning they repeat, over and over again, speech they have heard. Sometimes the repetition occurs several hours after the original use of the words by someone else .

Language-based learning disabilities are problems with age-appropriate reading, spelling, and/or writing. Most people diagnosed with learning disabilities have average to superior intelligence. . In *language-based learning disability* (or just *learning disabilities)*, many children with reading problems have spoken language problems. *Dyslexia* has been used to refer to the specific learning problem of reading.

Alzheimer's disease is a brain disorder which leads to a decrement in language processing ability. This disease primarily afflicts elderly persons and causes progressive, diffused, and irreversible damage to the cortical regions of the brain, impacting markedly on memory functions. Comparison between the language

decrements due to the dementing effects of Alzheimer's disease and those noted for the aphasics is useful because the average age of onset of Alzheimer's Disease overlaps that of aphasias (around 50 to 60 years of age).

The language of an Alzheimer's patient is marked by a striking simplification process wherein words that once precisely described some event are now lost and are replaced by more general terms because of a fundamental loss of categorical organisation in semantic memory .

Specific language impairment (SLI) is a developmental language disorder in the absence of frank neurological, sensorimotor, nonverbal cognitive or social emotional deficits (see Watkins, 1994).

Moreover, among SLI children, about 50% will go on to experience reading difficulties and develop dyslexia (Bishop & Snowling, 2004).

"Developmental Phonological Disorders, also known as phonological disability or phonological disorders, are a group of language disorders that affect children's ability to develop easily understood speech by the time they are four years old, and, in some cases, their ability to learn to read and spell. Therefore, Phonological disorders involve a difficulty in learning and organising all the sounds needed for clear speech, reading and spelling" (Bowen, 1998).

Developmental dyspraxia is a lifelong disorder characterised by impairment in the ability to plan and carry out sensory and motor tasks (Dewey, 1995). Generally, individuals with the disorder appear "out of sync" with their environment. Symptoms vary and may include poor balance and coordination, clumsiness, vision problems, perception difficulties, emotional and behavioural problems, difficulty with reading, writing, and speaking, poor social skills, poor posture, and poor short-term memory.

Speech disorders are characterised by a difficulty in producing normal speech patterns. Children go through many stages of speech production while they are learning to communicate. What is normal in the speech of a child of one age may be a sign of a problem in an older child. Speech is the vocal utterance of language and it is considered disordered in three underlying ways: voice, articulation, and fluency (Roseberry-McKibbin, 1995).

These disorders include *voice disorders* (abnormalities in pitch, volume, vocal quality, resonance, or duration of sounds), *speed sound disorders/articulation disorders* (problems producing speech sounds), and *fluency disorders* (impairment in the normal rate or rhythm of speech, such as stuttering).

4.6 UNIT END QUESTIONS

1) Compare and contrast the speech errors made by individuals in different speech disorders.

2) Based on the discussion of language disorders in this chapter, make a worksheet of different kinds of language disorders and their symptoms and causes.

3) What do brain disorders like Broca's and Wernicke's aphasias tell us about how a healthy brain processes phonological, syntactic and semantic information?

4) Speech disorders have a negative effect on the personality and overall development of the children. Explain with examples, how?

5) What are several major features of speech sound disorder?

4.7 SUGGESTED READINGS AND REFERENCES

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