ESSENTIALS OF PSYCHOLINGUISTICS : AN INTRODUCTION TO MODERN APPROACHES

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Introduction

That this study is titled "Essentials of Psycholinguistics" is, no doubt an indication that the concept, psycholinguistics is a wide linguistic phenomenon whose artifacts cannot be absolutely highlighted within the parentheses this study. The best that could be done here is to emphasize some notables of the concept to expose students to its multi-facetted nature. As a way of introduction, it is apt to start with Libben's (2000:447) definition which states that "psycholinguistics is the study of language processing mechanisms". Libben continues that the discipline focuses on "how word meaning, sentence meaning and discourse meaning are computed and represented in the mind.

Language processing is indeed a complex phenomenon that requires a great extent of understanding of the working of the mind. Psychology as it were, is a discipline that studies the working of the human mind. This is the primary point of interface between the field of linguistics – the scientific study of language – and psychology, the study of the human mind. This fact explains why psycholinguistics is more often considered as a marriage of two disciplines (linguistics and psychology). According to Libben,

> We engage in language processing most everyday of our lives. This processing takes place when we watch television, listen to radio, read a passing billboard while driving, or discuss the weather. (2000:447)

All these activities, as Libben posits, are carried out with great ease and in a "subconscious manner". The, understanding of these activities *vis a vis* language processing and production is the foundation of psycholinguistics. Therefore, this chapter, *inter alia*, introduces the field of psycholinguistics by focusing on its "essentials" which include its definitions, scope, and methods of investigation and analysis.

Psycholinguistics: Definition and Origin

As a complementation of Libben's (2000) definition cited above, Carroll (2004:3) defines psycholinguistics as "the study of how individuals comprehend, produce, and acquire language". With this emphasis we are made to see the field as that akin to cognitive science, a discipline whose priorities reflect insights of psychology, linguistics, neurosciences and to a lesser extent philosophy. Little wonder Carroll claims, "as the name implies, psycholinguistics is principally an integration of the field, of psychology and linguistics" (2004:04). Stillings et al. (1995:3) explain that psycholinguistics is "the part of the emerging field of study called cognitive science". Consequently, Carroll is quick to admit that "the psychological study of language is called psycholinguistics." This, no doubt, has shown that the discipline is a branch of Applied Linguistics whose interests applies insights from psychology to the study of language.

The history of psycholinguistics can be divided into two periods. These periods are explicated by Carroll as follows:

> The first period was dominated by Wundt who presented a cognitive view of language. The behaviourist position later held that verbal behaviour can be explained in terms of environmental contingencies of reinforcement and punishment. This view was criticized by Chomsky, leading to a second wave of psycholinguistic activity. This period was characterized by an effort to incorporate linguistic theory in psychological research as well as by the view that innate linguistic mechanisms are necessary to explain child's language acquisition (13).

Altmann (2001:129) is to add that "Psycholinguistics boomed (as did the rest of psychology) in the early to mid 1960's."

Altmann tells us that "the Chomskyan revolution promoted language and specifically its structures as obeying laws and principles in much the same way as, say, chemical structures do" (2001:129). As at the time Chomsky wrote his influential books (e.g Chomsky 1957), an important legacy of the Saussurean linguistics (structuralism) was the study of language as an entity that could be studied "independently of the machinery that produced it; the purpose that it served, or the world within which it was acquired and subsequently used" (Altmann 2001:129). Recognizing the need to break away from this emergent legacy, Chomsky 1957, 1959) argued that the behaviourist accounts of language were inadequate, claiming that "it would be an error, then to suppose all properties, or the intersecting

properties of the [linguistic] structures that have evolved can be explained in terms of natural selection" (1975:59). Russel (1959:3) seems to lend credence to this when he posits that any linguistic philosophy "which cares only about language, and not about the world is like the boy who preferred the clock without the pendulum because although it no longer told the time, it went more easily than before and at a more exhilarating pace"

Psycholinguistics evolved, when it did, at the instance of the recognition of the inescapability of language from its underlying mental machinery and the external world. As at the time of Wilhem Wundt, psycholinguistics had become, primarily, a field which is as concerned with the mind as much as it is with language. The term psycholinguistics was first deployed by J.R. Kantor in his *Objective Psychology of Grammar* (1986) a book in which, according to Altmann (2001:130), Kantor "attempted to refute the idea that language reflected any form of internal cognition or mind". The term became:

> more firmly established with the publication in 1954 of a report of a working group on the relationship between linguistics and psychology entitled psycholinguistics: A survey of Theory and Research Problems

This report according to Altman, was published simultaneously in two journals that separately, serve the linguistics and psychology disciplines. This has opened up a myriad of publications embellishing and modifying the discipline of psycholinguistics.

The year 1957 was indeed something of a "watershed" for psycholinguistics because of two significant books – Skinner's *Verbal Behavior* and Chomsky's *Syntactic Structure*. In fact, Chomsky's book started the argument that premised grammatical competence on an individual's psychological apparatuses, and which started to lay to rest the behaviourist enterprise. Consequently,

> with Chomsky, out went Bloomfield and in came mental structures, ripe for theoretical and empirical investigation. Chomsky's influence on psycholinguistics, let alone linguistics, cannot be overstated (Altmann, 2001:129).

This was how the Chomskyan revolution threw out the Behaviourist game plan with his dynamic linguistic standpoints which reintroduced the mind and mental representation into the theories of language.

Over the years (at least with effect from the Wundtian hypothesis) psycholinguistics has developed into a fully fledges scientific discipline. In the 1960's, the psychologists George Miller created an important bridge between psychology and linguistics by introducing many psychologists to

Chomsky's idea. Not only this, the period witnessed a fruitful collaboration between Chomsky and many psychologists to advance publications that were at the forefront of psycholinguistic research "to determine the psychological reality of linguistic rules" in language development (Carroll 2004:13). This set the linguistic pace which emphasized rekindled interest in language acquisition and learning. This paddles the boat of psycholinguistics towards innatism rather than towards Behaviourism.

The imposing influence of Chomsky in psycholinguistic investigation looms large as this is indicated in the number of reference to the Jewish American linguist. By the early 1980's the already over-stressed influence of Chomsky started to fade as fresh insights that transcends the mere study of language processing became the emergent trend. The latest trend in the psycholinguistic interests has embraced, among the related interest, the investigation of language deficiencies/disorders like aphasia, amnesia, spoonerisms etc. Invariably as things stand now, the discipline has:

    i.   increasingly been viewed as a portion of the interdisciplinary field of cognitive science which includes contributions from computer science, philosophy, neuroscience and other related fields.

    ii.   added another dimension to its elaborated wave of interest in psycho-syntactic fusion of the Chomskyan revolution by the extended interest in how people understand, remember and produce discourse units of language larger than the science.

    iii.   embellished its psychological indices to account for the presence of a mental lexicon within the human's pre-verbalizing stage of speech making.

    iv.   ensured that interest in innate language mechanisms has been complemented by a resurgence of the child's linguistic environment.

These put together, we discover that the field of psycholinguistics is now a more diversified field than what it used to be. This is because, as Carroll educates us,

> Neither psychology nor linguistics is dominated by a single theoretical viewpoint, and the impact from this other fields within cognitive science has added new perspectives and insights that have been incorporated into the growing field [psycholinguistics] (2004:15).

Carroll further tells us that remarkable progress has been made in applying psycholinguistic research to topics such as reading (as attempted by Jack and Carpenter 1987), bilingualism (as attempted by Bialystock 2001),

and language disorder (as attempted by Tatter, 1998). There is no doubt that the field of psycholinguistics has surpassed that initial simplistic marriage of the two fields of linguistics and psychology. For instance, as we are informed once more by Carroll, books on reading comprehension now integrate linguistic theories of sentence structure; computer simulations of reading and psychological experimentation on eye movements and saccades. This invariably gives us that mandate to accept psycholinguistics as an interdisciplinary work on language (Miller 1990).

Psycholinguistics as a Fusion of Disciplines: An Overview of the Scope

Though we have stressed that psycholinguistics is now more of a melting pot (or a meeting point) for disciplines in recent times. However, this does not de-emphasize the fact that it is primarily a business of the linguists and psychologists as the term implies. This is why it is more often elegant to accept such definitions that consider the discipline as "that area of study which draws from linguistics and psychology" as elegant and acceptable. ("Definition of Psycholinguistics" http Answer.Com). Such affiliation between linguistics and psychology has indubitably made it difficult to draw a line between psycholinguistics and what is generally known as psychology of language as both are interested in the psychological factors that enable humans to acquire, use, comprehend and produce language. The modern researchers of psycholinguistics have brought fresh insights from biology, neuroscience, cognitive science and information theory to the study of how the brain processes language. This neuro-cognitive/biological interest in language processing has opened the frontiers for many sub-disciplines of psycholinguistics. Hence, we have areas like

Cognitive science
Computational linguistics
Forensic linguistics
Neuro linguistics
Psychology
Linguistics etc.

Linguistic-Related Areas of Psycholinguistics

Phonetics and Phonology: These aspects of linguistics are concerned with the study of speech sounds. Psycholinguistic interests more often focus on how the brain processes and understands these sounds ("Definition of Psycholinguistics" http Answer.Com).

Morphology: Morphology is the study of word structures, especially the relationship that exists among related words as well as the function of words based on certain rules. Chomsky ties the understanding of these rules to some kind of Native Speakers' psychology.

Syntax: This is the study of patterns which dictate how words are combined to form sentences. Chomsky also believes that correctness and grammaticality are the functions of the native speaker's know-how.

Semantics: Semantics deals with the meaning of the words and sentence. Ogden and Richards define semantics as the "meaning of meanings". Whereas syntax is concerned with the formal and rule-governed structures of sentences, semantic deals with the actual meaning of sentences. Linguists generally believe that it takes some psycholinguistic commitment to deduce the meanings of expression.

Pragmatics: This is concerned with the significance of situational context in the interpretation of meaning. The speaker/hearer relationship operates much on the psycholinguistic environment presented at the instance of any communication event.

Psychology-Related Areas of Psycholinguistics

Developmental Psychology

This branch of psychology studies children ability to learn and process language either through experimental method or quantitative method.

Cognitive Psychology

This branch of psychology evaluates an individual's level of understanding based on his utterances. A psychologist is bound to assume that a child of a particular age is, or is not, capable of expressing himself in a certain manner.

Psychoanalysis

Another name for this branch of psychology is "talking cure". It is a sub-discipline of clinical psychology. It was initiated by the works of Sigmund Freud. Psychoanalysis was recommended as a viable prognosis for specialists in psychiatric science to help them analyze the speech form of a mentally damaged individual in a bid to determine the extent of madness as well as the medication.

Science Related Areas
Neurological Science

Neurological medicine is a branch of medicine that examines and treats all forms of brain disorders. This field offers more practical tools of analysis to psycholinguistics. These tools have helped to discover that some parts of the brain are more involved in speech production than the other.

Theoretical Methods of Psycholinguistics

Psycholinguistic methods are, in most cases, based on experiments incorporating lexical decision tasks. Here, language users are viewed and

examined as SUBJECTS and they are presented and evaluated based on their linguistic inputs. Subjects are often asked to perform a task and the psycholinguistic researcher attempts to measure the levels of performance. Here is Libben's explanation on the choice of method of a psycholinguist:

> A substantial additional challenge for the psycholinguistic researcher is presented by the fact that most of language processing does not involve observable physical events such as eye movement … Research in this field therefore requires that mental language-processing events be inferred from observable behaviour. Consequently, a large part of psycholinguistic research is concerned with the development of new (and often very clever) techniques to uncover how language processing is accomplished (2000:448).

As Libben educates us, two methods or techniques of psycholinguistic investigation are always available. These are FIELD TECHNIQUES and EXPERIMENTAL PARADIGMS.

Field Technique

In field technique a psycholinguistic researcher is expected to observe human physical events, without necessarily controlling the subjects' inputs, and fashion his hypotheses. Within the frontiers of field technique are the analysis of events as eye movements during reading, speech disorders like slips of the tongue and the evaluation of the human being in relation with other animals (e.g. the ape). In what follows are some examples of field technique analyses:

Slips of the Tongue (Spoonerism)

Slip of the Tongue is otherwise named after William Spooner as spoonerism. According to O'Grady and Archibald (2000:629) Slip of the Tongue is "a type of speech error in which words or sounds are re-arranged with often humorous results". It is a kind of speech production misplacements that result in performance errors. Some of the notable errors from slips of the tongue, as highlighted by Libben (2000) are presented below.

1. Intended   :   You have missed all my history lectures
    Error   :   You have hissed all my mystery lectures
2. Intended   :   Noble sons of toil
    Error   :   Noble tons of soil
3. Intended   :   You have wasted the whole term

	Error	:	You have tasted the whole worm
4.	Intended	:	The dear old Queen
	Error	:	The queer old dean.

The Hypothetical Projects of Psycholinguistic Research

One of the interests of psycholinguistics has been to prove that language is *specie specific*. That is, language is the exclusive properties of human beings. Psycholinguists have therefore embarked on many research projects that attempted to teach the chimp how to use language basically because of the perceived intelligence of the animal and its supposed anatomical sophistication that is close to that of man. Three of the projects are succinctly expressed below.

Project Vicki

One of such chimps subjected to the experimental procedures of the psycholinguists was named VICKI. Vicki was raised for 7 years by Keith and Catherine Hayes. According to Finegan (2004:22), at the end, Vicki "could only utter four words – mama, papa, up and cap – and she managed them only with considerable physical strain". This reveals, at least, according to Finegan that "chimps are simply not equipped with suitable mouth and throat organs to enable them speak".

Project Nim

Psycholinguistics soon discovered that the sounds made by the members of the ape family were not productive sentence that can parallel those made by human beings to communicate. Consequently, a more concentrated effort at making the ape to generate language was carried out on a chimp named Nim Chimpsky (after Chomsky). After five years of working on Nim, psycholinguist Herbert Terrace concluded that chimps were not capable of learning language despite the fact that it appears that "Nim had several linguistic accomplishments [and] in part repeating the achievements of his predecessors" (Finegan, 2004:24). At the instance of this project, researchers discovered that even with elaborate training, Nim produced very little response.

Project Washoe

Also because of the need to further proof whether or not chimps have the physiological capability to speak, and the mental capacity to learn language, Allen and Beatrix Gardiner started to raise a ten month old chimp which they christened WASHOE. The couple attempted to raise Washoe as a human child. After a considerable number of months, Washoe, who appears

more brilliant than her predecessors, could do almost everything a human child is capable of doing. But, she could not speak.

The Gardiners adopted the American Sign Language (ASL) approach and in fifty one months, Washoe had acquired about a hundred and thirty two signs which enabled her to communicate well. Finegan concludes:

> The Gardiners made the simple but crucial assumption that human language is acquired by children in a rich social and intellectual environment and such richness contributes to the child's cognitive and linguistic life. The Gardiners' research with cross-fostered chimpanzees has persuaded some observers that there is no absolute difference between human language and the communicative system that chimps can learn. (2004:23)

Other psycholinguistic projects also took interest in a child's language acquisition process and the influence of the parental inputs. Psycholinguists believe that it is

> Impossible to shy away from the necessity of adult's input in child's acquisitional process especially as it is obvious that a child requires interactions with speakers of the language. (Afolayan, 2009:35).

Finegan (2004:341 establishes this position with a project carried out on little Genie, a girl who was locked away from language for thirteen years:

> As a witness to the necessity of adults input, there is the case of Genie, a child who was not exposed to any language while she was growing up. Genie's parents locked her away for the first 13 years of her life and seldom spoke to her. When she was discovered, she was unable to speak.

Susan Curtis tried to teach Genie how to speak English, she was not successful because, as Finegan makes us believe, "deprived of linguistic input in the first few years of life, Genie's capacity for language acquisition had become impaired" (2004:34l).

Experimental Method

The Experimental method of psycholinguistic investigation employs direct paradigms to evaluate the various language processing activities of human beings.

Lexical Decision

Psycholinguists believe that there is a mental lexicon within human's language processing faculty which is a collection of the individual units of expression. The mental lexicon is perceived as a more flexible version of the desktop dictionary. Lexical Decision is one of the experimental paradigms through which the richness, or otherwise, of an individual's mental lexicon is determined. Libben (2000:450) informs that:

> In the Lexical Decision paradigm, the experimental subject is seated in front of a computer screen. A word appears in the middle of the screen and [the subject] is expected to judge…whether or not the word is a real English word by pressing a button labeled 'yes' or a button labeled 'no'.

In this paradigm, there are two *Dependency Variables* (i.e what to be measured). These are the time of response and the accuracy of the response.

The Priming Paradigm

This is an extension of the Lexical Decision paradigm, only that the word to be judged (target) is preceded by another stimulus (prime). What is measured here is the extent to which the prime influences the subject's decision. Both Lexical Decision and Priming are relevant at the morphological level as the machinery of the mental lexicon cannot adequately account for sentence processing (Libben, 2000). The two experimental paradigms that touch sentence processing directly are TIMED READING experiment and EYE MOVEMENT experiment.

Timed Reading

Timed Reading experiment is based on the assumption that the more difficult it takes to read a sentence the more difficult it could have taken its processing (Libben, 2000). One of the commonplace timed reading experimental paradigms is the BAR PRESSING PARADIGM. In this experiment, the subject also sits in front of the computer to press the bar on the keyboard as each word in a given sentence appears on screen. Here, the amount of time needed in sentence processing is determined.

Eye Movement Study [EMS]

The psycholinguistic term for Eye Movement, especially during reading activities is called saccade. Eye movement is always used to determined fixation time – the time it takes the eyes it takes to capture the words in a sentence. In eye movement study,

> The detail of eye movements in sentence reading are studied with sophisticated laboratory procedures in which a subject is seated in front of a computer screen on which text is displayed. A low intensity infra-red beam of light is bounced off the subject's eye ball and registered on a video camera. The image of the video camera is fed to a computer that calculates where on the screen the subject is currently fixating (Libben, 2000:464).

Through this study, it is more often discovered that fixation times are longer for less-frequent words. This study also reveals that the points of fixation are more often centred   on words like nouns and verbs rather than functional words. It is also through this kind of study that researchers have discovered the reading disorder known as REGRESSIVE SACCADE, the backward jump in reading a sentence.

Event Related Potential (ERP)

Event Related Potential is a kind of experimental method which is devoted to the brain activities. This paradigm attempts to measure the electrical activities in the brain.

Neuro-Linguistics

Neuro-linguistics is more of a sub-field of psycholinguistics. It is simply the study of how language is represented and processed in the brain. This seeks to discover which parts of the brain are involved in various aspects of language production. Neuro-linguistics therefore ventures into the area of language processing through the understanding of the human brain.

The Human Brain

Libben (2000) explains that the brain is the pinkish white matter in the skull which is about 1400 grams. Aristotle believes that the brain's primary function was to cool the blood. This reasoning is biological. Biology, however, does not seem to provide empirical explanation to how human experiences like fear, dream and knowledge are coded in the brain which is composed of nerves called neurons. The brain is the upper chamber of the spinal cord. It is believed that the activities of language processing and language presentation are concerned with the workings of the cerebral cortex. The cerebral cortex is divided into two hemispheres (right and left) which can be sub-divided into:

Sulcus (plural sulci): The fold in cortex

Gyrus (plural gyri): The fold out cortex

Longitudinal fissure: The separator of the hemispheres

Neuro-linguistics is not so much directly concerned with all the complex activities of the brain but with those connected with language processing as it involves the brain.

Brain Damage

Occasionally, the human brain gets damaged. The most prominent of such damages is stroke otherwise known as cerebro-vascular accident. When a brain damage result in language disorder, such is called aphasia.

Type of Aphasia

Non Fluent (Motor) Aphasia

This type results from damage to the front of the central sulcus. It is tagged 'non fluent' because patients exhibit great strain and effort to produce speech forms. Non fluent aphasia can either be GLOBAL aphasia, which renders patients completely nut; or BROCA aphasia which causes patients to produce halting speeches that are laden with phonemic errors.

Fluent (Sensory) Aphasia

Fluent Aphasia results from damage to the left hemisphere of the cortex. The patience affected by this deficiency has no difficulty producing language but in selecting and organizing language products. The most prominent of this type is WERRNICKE aphasia (named after Carl Wernicke, a German psychologist). Wernicke aphasics rarely make sense in their speeches. Libben (2000) cites an example of this case with a conversation between an examiner (E) and a Wernicke's aphasic patient (P).

E: How are you today Mrs A?
P: Yes.
E: Have I ever tested you before?
P: No, I mean I haven't.
E: Can you tell me what your name is?
P: No, I don't…right I am right now here.
E: What is your address?
P   I cud if I can help these this like you know… to make it. We are seeing for him. That is my father.

The patient here is a Wernicke's aphasic who, though capable of generating well-formed structures, is grossly incoherent.

Conclusion

Mey (2001) suggests that psycholinguistics belongs to the hyphenated areas of research and this summarily accounts for its complexity. As stated in the beginning of this chapter, the field is too complex a

discipline to explore in an essay of few pages. This is because of its materials that spread across the board of the disciplines of humanities, social sciences and, in resent times, sciences.

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