Exploring the Genesis of Language through Aphasia in Sheila Hale's novel *The Man Who Lost His Language.*

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Abstract

Human brain's activity is not ambiguously assigned; specific parts of the brain are wired for specialized work. Biology of brain and language is coterminous. Neuropsychology, a branch of psychology, attempts an understanding at the cognition of the nervous system and concerns itself with how the brain influences behaviour. Human cognition's mechanical working dictates the activity of the brain and controls the language uttering abilities and comprehension. To elucidate further, brain's Broca area helps in the production of speech and Wernicke area helps in the language comprehension. Any damage/disorder in these areas of brain tunnels turns into the darker world of Aphasia, which then finds resolution in language pathology. John Hale's case of Aphasia finds itself on the same spectrum where his neurological abilities became severely stunted. The paper attempts to trace the understanding and development of neuroscience of language using Mr. Hale's case as a vantage point.

Keywords: Aphasia, Broca, Wernicke, Neuroscience, cognition, psychology, Language Pythology

Introduction:

Reading, Writing, and speaking are the basic elements of our daily life which emerges when we think. Thinking is the one thing which we do actually the whole discourse of our academics and knowledge formation is done through 'brain'. Brain is very important in our body as it is the CPU in which every data is loaded. The basic structure of brain is as complex as human itself. It's basically in the shape of walnut and hunk of the tissue weighting about 1.3 kilograms. John P.J. Pinel, Biopsychology (2007)

> Despite its disagreeable external appearance, the human brain is an amazingly intricate network of neurons (cells that receive and transmit electrochemical signals). Contemplate for a moment the complexity of your own brain's neural circuits. Consider the 100 billion neurons in complex array, the estimated 100 trillion connections among them and the almost infinite number of paths that neural signals can follow through this morass (2).

Mind is the most interesting thing to know as through this organ man was capable of creating an enigmatic smile of Mona Lisa, invention of technology of which we are taking the best use, supersonic aircraft. This brain has done wonders as to moving to moon while to measuring the depth of the sea. Therefore neuroscience helps to study brain in its complicated form.

Language formed in Mind:

Human speech belongs to the most complex part of the mind. It is best defined as the communication between two or many, either in the written form or in the spoken form. Language basically consists of words which further formulates in the contextual or literal meaning. The conventional view is that language is an adaptation and that it evolved in response to some selection demands to communicate among humans. Spoken language develops relatively early in life. The average 10- year-old comprehends around 40,000 different words, while teenagers have passive vocabularies of over 60,000(Anglin, 1993). If we define language as verbal communication, then the question arises of how we join words in order to achieve this communication. Rules are needed so that our thoughts can be conveyed to the listener and can be easily received by the receiver. In Linguistics, there are set of structural rules that govern the composition of words and sentences in a language are called grammar. The subcategories that make up grammar are as follows:

Morphology: Specifies the rules for combining words to make longer words, including the addition of suffixes and prefixes.

Phonology: Dictates the regulations involved when sound elements and phonemes are combined to form words.

Prosody: Consists of the arrangement of intonation and stress which for instance lets us distinguish questions from statements.

Syntax: Dictates the way in which words combine to make phrases and sentences in order to make the meaning clear.

Biological Sequel to Language:

The scientific working of mind, as how the language process or how the language is developed. Most of our knowledge about how the mind and behaviour are related came from lesion studies combined with an autopsy: neuropsychologists would discover which part of the mind had been damaged, and relate that information to behaviour. Now we have mind-imaging techniques available particularly MRI, which can also be used with non-mind – damaged speakers. These techniques indicate which parts of the mind are active when we do tasks such as reading or speaking. Many of us know that the mind is divided into two hemispheres. The two hemispheres of the mind are partly specialized for different task: broadly speaking, in most right-handed people the left hemisphere is particularly concerned with holistic, spatially based processing. For the great majority (96%) of right-handed people, language functions are predominately localized in the left hemisphere. We say that this hemisphere is dominant. According to Rasmussen and Milner, even 70% of left-handed people are left-hemisphere dominant. This localization of function is not tied to the speech modality; imaging studies show that just the same left-hemisphere mind regions are activated in people producing sign language with both hands.

Peeling the Mind

Let's move to the early timeline to know which part of the mind does what? In the 1950s, Penfield and Roberts (1959) studied the effects of electrical stimulation directly on the minds of patients undergoing surgical treatment for epilepsy. More recently, a number of techniques for mind imaging have become available, including PET and CAT scans. These techniques all show that there are specific parts of the mind responsible for specific language processes. Most of the evidence on the localization of language functions comes from studies of the effects of mind damage.

An impairment or breakdown in language production or comprehension as a result of mind damage is called Aphasia. The French neurologist Paul Broca carried out some of the earliest and most famous work on the effects of mind damage on behaviour in the 1860s. Broca observed several patients where damage to the cortex of the left frontal lobes resulted in impairment in the ability to speak, despite the vocal apparatus remaining intact and the ability to understand language apparently remaining unaffected. This pattern of behaviour, or syndrome, has become known as Broca's aphasia, and the part of the mind that Broca identified as responsible for speech production has become known as Broca's area. A few years later, in 1874, the German neurologist Carl Wernicke identified another area of the mind involved in language, this time further back in the left hemisphere, in the part of the temporal lobe known as the temporal gyrus. Damage to Wernicke's area results in Wernicke's aphasia, characterized by fluent language that makes little sense and a great impairment in the ability to comprehend language although hearing is unaffected.

Neural Bases for Comprehending Language:

Broca was basically correct in his assertion about the location and laterality of the lexical and syntactical aspects of language. Modern studies have confirmed that damaged in the vicinity of Broca's area is indeed responsible for many production aphasia, and that about 97 percent of individuals have the circuitry for both the production and comprehension of the lexical and semantic aspects of language primarily in the left cerebral hemisphere . However, he was off the mark in implying that language is a unitary function whose neural infrastructure is limited to a single brain region, or even a single hemisphere for that matter. It was Carl Wernike who first made clear that the instantiation of language in the brain is indeed more complex.

Wernike distinguished between the locations of lesions in patients who had lost the ability to produce language and locations in those who could no longer comprehend language.

For his own clinical observations, Wernicke concluded that some aphasic patients retain the ability to produce utterances with appropriate grammar and syntax but don't understand what is being said to them. In addition, they generate utterances that, although structurally coherent, convey little or no meaning. In general, the patients that fit Wernicke's description are found at autopsy to have lesions of the posterior and superior temporal lobe, almost always on the left side. These findings have led to the generalization that damage to the posterior and superior regions of the temporal lobe on the left causes a deficiency referred to as sensory, or receptive, aphasia. Deficits of reading and writing_alexias and agraphias_are related disorders that can arise from damage to other brain areas; most aphasics, however, also have difficulty with these closely linked abilities if the language that they speak has a written form. This region is referred to as Wernicke's area in honour of its discoverer, and the corresponding deficiency is also called Wernicke's aphasia.

In contrast to production Broca's aphasia, the major difficulty in a sensory Wernicke's aphasia is putting together objects or ideas and the words that signify them and subjectively comprehending this relationship. Thus, in a sensory aphasia, speech is superficially fluent and well structured but makes little or no sense because words and meanings are not correctly linked.

Characteristics of Broca's and Wernicke's Aphasias

Broca's aphasia	Wernicke's aphasia
Halting speech	Fluent speech
Tendency to repeat phrases or words	Little spontaneous repetition
Disordered syntax	Syntax adequate
Disordered grammar	Grammar adequate
Disordered structure of individual words	Contrived or inappropriate words
Comprehension intact	Comprehension not intact

Broca's aphasia is also called motor, expensive or production aphasia.

Wernicke's aphasia is also called sensory or receptive aphasia.

Forming a path through aphasia:

Aphasia is a communication disorder that results from the damage to the parts of the brain that contains language, basically in the left half of the brain. Individuals who experience damage to right side of the brain may have additional difficulties beyond speech and language issues. Aphasia may causes difficulties in speaking, listening, reading, and Writing, but does not affect intelligence. Individuals with aphasia may also have other problems, such as dysarthria, apraxia, or swallowing problems. Aphasia is mainly caused by stroke. However, any disease or damage to the parts of the brain that control language can cause aphasia. These include brain tumours, traumatic brain injury, and progressive neurological disorders. The National Institute on Neurological Disorders and Stroke estimates that approximately one million individuals suffer from aphasia in the United States.

Aphasia is communication disorder that affects a person's ability to process and use language.

Reopening the case of aphasia through John Hale's experience

The novel revolves around the man John Hale who suffered from aphasia about seven years. It all started on 29th July 1992, when Professor John Hale woke up, had breakfast, emptied the dishwasher and went to his study to write. He had recently completed the book that was to prove his masterpiece,(The Civilization of Europe in the Renaissance). His Wife Sheila Hale heard a crash and scream from the cleaner. She ran to investigate and found that John Hale was lying beside his desk. His eyes were open and were smiling. She says it was sweet and witless smile like that of a baby. He opened his mouth and said 'da woahs'. He would never speak again properly. Initially, the stroke seemed catastrophic. Asked to a razor, a clock, a pencil, some keys, in hospital, he failed utterly too much names to objects. Yet, right from the start, he could add and subtract and point out the year of his birth. And he understood concepts: shown a pyramid and a selection of trees, he knew the palm tree was the one that matched. No one will ever know whether some crucial area of his brain to do with speech had been obliterated or whether it was merely buried and might have healed itself. Sheila recently received a letter from a woman whose husband had a stroke with similar symptoms to John's at the same age, and who woke one morning, 12 years later, with his power of speech restored.

The question Hale doesn't answer, because she can't, is the extent to which John knew what was going on. He wasn't deaf, and he could understand what other people were saying: so why couldn't he hear himself making the sound 'da woahs, da woahs'? He would hold forth at length, never pausing to search for the right word. If someone claimed not to understand, he would slow down and speak more emphatically. Clearly, he felt fluent. 'He didn't know he was saying "da woahs"- that's for sure- and the fact that he didn't is a neurological affliction and not terribly well understood'. On a few occasions, she found him desperate, recognising he wasn't the person he used to be. But on the whole, he approached recovery with the verve he had previously brought to the renaissance.

> 'I remember once waiting hours at hospital. I was tired and irritable, and a nurse said to me, "You should have a bit of your husband's spirit". And it was true he had this extraordinary tolerance for discomfort and curiosity about life'. We're all in denial. We're all going to die. But she did grieve for his lost powers. 'I couldn't bear it for him. I loved him and he was being so brave. I didn't know I was capable of such compassion. A doctor told me I had to stop identifying with him, that we were two different people. But I really would have preferred to take his place'. (39)

John Hale died in his sleep- possibly following another stroke, perhaps from a heart attack- with Sheila beside him. Her account of his last years is the story of a man who lived by language and who cruelly lost his mastery of it. Yet, although John Hale was terribly altered by his stroke, he remained triumphantly himself: good company, fascinated by the world around him, cheerful and upbeat.

Scrutinizing aphasia through John Hale's Case Study

Before john's stroke and for some time after neither of us had more than a very vague idea of what the word aphasia describes or entails. Few people who are not directly affected by aphasia recognize or understand the condition, which is why aphasics are sometimes taken for drunk, or committed to psychiatric care, or ignored by busy doctors who don't always record the condition in their patients' case notes. Neither of us knowingly met an aphasic. If we had we would probably have dismissed that person as stupid or mad- as carelessly as Dr X had written off the 'infarcts' in his care. Chronic aphasia is quite a common condition, affecting approximately the same proportion of the population as multiple sclerosis or Parkinson's disease: up to 200,000 in Britain and one million in the United States. And despite its name- from the ancient Greek *aphatos*, meanings without speech- people who suffer from aphasia are not necessarily speechless. Aphasia can destroy, or impoverish to a greater or lesser extent, any or all or some components of verbal language- speech, writing, auditory comprehension, reading. It may or may not, be accompanied by paralysis or weakness of the limbs, usually of the right arm and leg. It can, but doesn't always, involve loss of control over the vocal muscles (a condition known as apraxia) (pg85).

Aphasia is not like the stroke that paralysed Jean- Dominique Bauby, the author of *The Diving Bell and the Butterfly (1997)*, nor is it like the motor neurone disease that afflicts Stephen Hawking. Although both are physically incapable of speaking and writing, they have produced great books: Bauby by signalling with the blink of one eye the letter or word he wished to use. Hawking by using a computer program with word prediction and a built-in-voice. Despite their inability to move more than a few muscles both retained access to their language: their problem was not loss of language but loss of control over their vocal organs and writing hands.

The study of aphasia suggests that meaning, concepts and facts are stored differently in the brain from the dictionary of words and grammatical rules that are used to represent them. Shown a drawing of a pyramid and different species of trees (a standard test for semantic memory known as ' Pyramids and palm Tree'), John, although unable to write or speak any relevant words, unerringly chose the palm tree as the one most closely associated with the pyramids. Aphasics like John with more severely impaired speech may repeat the same sound or word over and over. Nobody can say whether John's da woahs derives from a real word; or it is just the sounds he happens to be able to articulate, or if so why it is those sounds and not others. Some aphasics know that they are speaking in non-words but can't help it. Those who recognize their problem stand a better chance of recovery than aphasics like john who are unaware of what they are saying, or rather not saying, or rather not saying, and who cannot repeat their utterances at will. Most of the aphasics produce paraphasias or paragraphias, spoken or written words that are in some way associated with the target, such as *mug* for cup, *pen* for pencil, *breakfast* for lunch, *black* for white, *yes* for no. John, for a month or so after his stroke, could not even choose the appropriate gestures for *yes or no*. Although the tone of his grunts made it clear which he meant, he would often nod or give the thumbs up for no, or shake his head with thumbs down for *yes*. Some confuse semantically related words only when they are reading aloud or writing to dictation. Some aphasics are disproportionately impaired for long, unusual words, others for the shortest and most familiar words, such as and, the, was, in.

> A recovered Swiss aphasic described in his memoirs having had more difficulty pronouncing the French for *if* and *since* then *Nebuchadnezzar* and *Popocatepetl*. Some have more trouble with verbs than with nouns and vice versa. Some can speak nouns but not verbs, but when reading aloud it the other way round. There are aphasics who can say or read aloud certain words such as *park, walk, play,* as nouns but not the same words in their verb form or vice versa(90).

The most baffling, but also the most interesting single thing about aphasia in its variety and what that suggests about the intricate machinery that operates normal language. All higher cognitive functions are the product of assemblies of neuronal circuits sending out signals from control centres in diverse brain areas.

> Vision, the most researched brain function, is now better understood than language, and the often bizarre consequences of selective visual deficits have engaged the popular imagination thanks to readable books like Oliver Sack's *The Man Who Mistook His Wife for a Hat,* and V.S. Ramachandran and Sandra Blakeslee's *phantoms in the Brain.* Language, which comes second in the most-studied league table, has been slower to give up its secrets to science, and there are some specialists who suspect that language, like consciousness itself, may be beyond the reach of human understanding (pg 92).

Luria was not the first aphasiologist to apply to the study of aphasia principles that are believed to underlie normal language. But he and his follow Russians, **Lev Semyonovich Vygotsky and Roman Jakobson**, were twentieth- century pioneers of a systematic application of the idea that the structure of normal language might have a bearing on patterns of disordered language. Jakobson, in 1940, was the first linguist to appreciate that the observation of aphasic deficits might enlighten linguistic theory. Abstract linguistics, the discipline concerned not with individual languages but with the principles underlying all language, has been described as the most humane of the sciences and the most scientific of the humanities. More than a century ago the subject was characterized by the avant-garde Swiss linguist Ferdinand de Saussure as operating on the borderland between thought and sound. It is in this very borderland- so easy to take for granted but so difficult to map and describe- that aphasics lose their way. But it was not until the early 1970s that there was a widespread exchange of ideas between academic linguists and psychologists interested in aphasia.

The most influential linguistic theory of the last half-century has been generative grammar, the code or rules we use to translate thought into language, as developed by **Noam Chomsky** and his colleagues from the 1950s. Chomsky was a leader of the 'cognitive revolution' of the mid-twentieth century, when, as he put it; 'there was an important change of perspective: from the study of behaviour and its products…to the inner mechanisms that enter into human thought and action', at a time when 'advances in the formal sciences had provided appropriate concepts in a very sharp and clear form, making it possible to give a precise account of the computational principles that generate the expression of language'. Chomsky drew inspiration from a sentence written in 1836 by Wilhelm von Humboldt: 'The language process… confronts…a true boundless area, the scope of everything conceivable. It must therefore make infinite use of finite media…' Chomsky postulates a 'language organ' , an innate template built into the brains of all human beings(but not animals), which accounts for the astonishing ability of children between the ages of eighteen and thirty-six months to grasp: the property of discrete infinity, which is exhibited in its purest form by the natural numbers 1,2,3… Children do not learn this property of the number system. Unless the mind possesses the basic principles, no amount of evidence could provide them; and they are completely beyond the range of other organisms. Similarly, no child has to learn that there are three word sentences and four word sentences, but no three-and –a half word sentences, and that it is always possible to construct a more complex one, with a definite form and meaning.

Chomsky has drawn a distinction between 'competence', the idealized knowledge we all have of our native languages, and 'performance', the way ideal rules and structures are flouted or corrupted when we actually use language. Competence is necessarily the subject of pure linguistics. But, since abstract rules do not describe real behaviour, Chomsky maintains that the investigation of language must also take account of the mental processes that are the subject of psychology. Linguistics and psychology look at language from different perspectives, but the differences between them are differences of emphasis rather than of subject-matter. They cannot therefore be regarded as separate and autonomous disciplines.

Chomsky's transformational-generative grammar, the quasi-mathematical rules that govern the generation of one grammatical structure by another, provided a new conceptual framework for the investigation of aphasic difficulties with syntax and was a major influence on the aphasiology of the Boston neo-classicists. Although Chomsky himself, as far as I am aware, has never concerned himself with aphasia, the new generation of psycholinguists, who gather their material from studying speech errors in normal people, are increasingly informed by the evidence provided by the lacunae of aphasic language. And academic linguistics, since the 1970s, has provided the motivation and the vocabulary for associated disciplines that are concerned in one way or another with aphasia.

Another development of the 1970s is pragmatics, the branch of linguistics concerned with the effect of context on meaning and the way we perform in real time and space when we transmit and interpret non-verbal as well as verbal signals. Depending on the context, we can communicate a lot by remaining silent. Don de Lillo, in his novel *The Body Artist (2001)*, describes a woman trying to make sense of the utterances of a mentally disabled man whose speech is unsupported by 'the code in the simplest conversation that tells the speakers what's going on inside the bare acoustics'.

Many aphasics, by contrast, retain the ability to convey precisely those unspoken references. A psychologist specializing in pragmatics might take note of John's normal- indeed gracious- turn-taking in conversation; in the way he can use silence to convey scepticism or surprise; in the way he points his finger when he wants to indicate *here* or *there*, or *this* or *that*; in the body language that looks so normal from a distance and allows people who are on John's wave-length to enjoy his skills as a wordless conversationalist. When john converses he can calculate very precisely the effect of a gesture, the length of a gaze a pause, the lift of an eyebrow, the position of hand and fingers. He can modulate his vocal tones to convey the full range of crucial sub-texts-extreme courtesy, irritation, humility, sarcasm, irony, menace, and so on- without which spoken language loses much of its meaning.

The positive voltage P600, for example, is triggered by grammatical errors, and is an indicator of syntactic processing. If we write a sentence that are ungrammatical, my computer program underlines it in green, and when we read it our brain emits P600. A negative signal, N400, is produced when the brain is confronted with non-words or real words used in contexts that make no sense. When I write the sentence ‘Colourless green ideas sleep furiously’ (Chomsky’s famous illustration of the dissociation between correct grammar and meaning), my word processor takes no notice, but less than half a second after you read it the event activates in your brain the potential voltage N400. Because ERP (event-related potential) does not always reveal the source of the electrical activity, it is often used in combination with imaging. But a more recent development, magneto encephalography (MEG), which detects the magnetic fields generated by electrical currents, can record both magnetic activity and its source. It is also now possible-although nobody knows quite how-for some people to control their own brain waves well enough to move the cursor on a computer screen.

Hoping against the wind:

1 May. Venice. J looking especially striking. **Niels Birbaumer**, psycho physiologist interested in electrical brain activity. He is convinced that most people, including aphasics, can learn how to communicate with a computer by training their brain waves. He thinks, for example, that Chomsky is wrong that animals can’t learn language. *Of course* they can learn language. That has been proved with dolphins and monkeys. He has worked with dolphins in Hawaii and taught them over 400 words. They could learn an infinite number of words but don’t use them because words are not useful in their environment. Animals and humans learn language by associating words with sound responses in the environment, like a child babbling. First you find words for what you can see, hear, feel. That’s why the language centres are located near the sensory areas of the brain. But in principle any other parts of the brain could learn language. The brain is everywhere the same. The brain is basically a learning organ, it can change. It’s not like the colon. It is a dynamic, associative organ that has nothing to do with the rest of the body.

Whenever an MRI tells you, you don't know where anyone's language capacities are located. Semantic memory is all over the brain. We all overuse the language area. If no cells are left in Js language cortex he has to find a new area. He has to relearn language through associative learning. We will experiment with muscular activity to find which part of the body communicates with the language centre: the mouth, eye, shoulder, and finger. Try the right shoulder. Search for the part of the brain closest to intact language. Try a sensor in the mouth. All sensory modalities must be searched. The object is to create a new associative halo constructed around letters and words. The only question is about the strategy. There is no question about the possibility. J excited, awed. Da woahs, da woahs. Nods vigorously when I ask why, if Birbaumer is so certain that language can be regained in this way, it is not routine practice. He says dryly that rehabilitation is not popular because there's no money in it.

The brain-wave training has an added benefit: it stimulates the whole brain; IQ is improved by 10-20 points. Not, as Birbaumer says, that IQ is john's problem. He is convinced that if his method is going to work for any aphasic it will work for John. Birbaumer is an optimistic as ever. He uses electrical waves called slow-cortical potentials that are not affected by lesions and can be found everywhere in the brain: 'The mechanism is universal. The electrical traces are caused by intra-cortical activity'. Patients cannot verbalise the experience of communicating with the computer via their brain waves because the electrodes are placed far from the language centre. Training is in the pre-frontal area. People with damaged pre-frontal lobes, e.g. schizophrenics, cannot do it. John, whose pre-frontal lobes are in mint condition, will be able do it.

9th August. Started the day in a bad mood. Monday blues. The friends are all away on holiday and I'm too busy to help John with his correspondence. When I got back from buying a new spare tyre I was furious to see that J had gone out without waiting for me to tie his laces. Then I found two notes in his handwriting on my disk. One was on a piece of scrap paper:

> Dear Caramagne,
> I will thank you for agreeing to advice Sheila to carre on.
> With best,
> John Hale

Next to the draft was one of his correspondence cards printed with Professor Sir John Hale. On this he had written:

> Dear Caramazza,
> I will thank you for agreeing to advise Sheila to carry on.
> With best,
> John Hale

John has reminded me, in his own way, by his own violation- in his own words- without instruction, prompting or guidance, that I owe it to him, to other aphasics and to all the people who have helped us to get on with telling the story of how John, seven years after he was silenced by a very bad stroke, began to write again (231).

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