Evolution of Human Consciousness -III

Role of Culture

Abstract: *Symbols played a very important part in evolving human consciousness as we have seen earlier. Culture, being dependent on symbols like language, also played an equally important part in shaping human consciousness along with the genetic and biological factors. Language mirrors culture and culture influences thought processes. Thinking has always been integral to consciousness. We are just trying to understand the relationship between language and thinking.*

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The word was -- civilization!

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Culture is dependent on symbols and symbolic systems often define a culture more than anything else. Language is a purely human characteristic woven from the fabric of arbitrary symbols and so are the norms and rituals followed in a human group. As already shown, these norms and rituals contributed not a little towards holding the human groups together by forging a common cultural and social identity for the group. Symbols were vehicles of cognition, memory and abstraction. Culture would not have been possible without the usage of symbols. Culture consists of a set of complex skills and knowledge disseminated in a group of humans through language and imitation. Evidence is now emerging that transmission of culture is a byproduct of the human brain – it may have been facilitated by the advent of a special class of neurons called the mirror neurons within the brain.

About 300000 years ago, the human brain may have reached the present size, but the major activities that made us human – tool making, use of fire, art, music and language appeared much later about 70000-80000 years ago, and almost all of them together in a 'great leap', as if some miracle had unlocked the immense human potential and creativity. Why did it take so long? Or was it merely a statistical illusion, spread gradually over some 10000 - 30000 years? The great leap may have been more a matter of cultural rather than biological evolution, taking place on "the platform of a previously established biological base. This is not to deny that cultural changes may have produced evolutionary pressure to select certain physiological changes …."[1]

In the 1990s, while experimenting with some macaque monkeys, Italian researcher Giacomo Rizzolatti and his colleagues from the University of Parma noticed that some neurons in the monkeys' brains fired not only when a monkey had performed some action, but also when it watched another monkey perform

[1]Canfield, John V, *Becoming Human: The Development of Language, Self and Self-Consciousness*, Palgrave Macmillan, New York, 2007, 60-61.

the same action, 'mirroring' its behaviour. These are called 'mirror neurons'. In humans, these neurons are now found to interpret very complex intentions of other individuals. Before, it was believed that the brain uses logical thought processes to interpret and predict other people's behaviour. Now, it seems that the mirror neurons simulate not only the actions of other, but also reciprocate the intentions and emotions behind those actions. Thus these neurons help us decode facial expressions of others, and activate the same regions of our brains whether we are making a specific expression or observing the same in others. Facial expression being the primary vehicle for communication of feelings, mirror neurons thus play a key role in our ability to empathize and socialize with others. A dysfunctional mirror neuron system has now been linked with autism. Rizzolatti also found that the major areas where these neurons abound in monkeys - the premotor cortex area – may be the precursor of Broca's area, the area associated with the expressive aspects of the human language. They not only allow one to guess intentions of others but also plays a role in abstraction, a specifically human characteristic. The area involved in abstraction is the inferior parietal lobe (IPL), an area most developed among the humans. The upper part of this area is the *supramarginal gyrus* we have discussed earlier; this is a structure unique to humans and is most vital for our empathy towards others.[2] We have seen earlier how the separation of this areas from the angular gyrus gave a fillip to development of mental abilities of humans.

Did these neurons have anything to do with 'the great leap' in human evolution some 70000 years ago? Did they speed up evolution by enhancing our ability to learn from each other by imitating and hence freeing our mind from the slow and gradual process of incremental learning, mediated through genetic changes within the brain, and ultimately after billions of years of struggle and restlessness, ultimately sowing the seeds of civilization? Even if they were not entirely responsible for the great leap, they certainly did play a very important role.

It seems logical to suggest that once humans have started using their hands more and more for the purpose of manufacturing increasingly sophisticated tools, and for other purposes like carrying foodstuffs and babies, communication gradually started shifting from the hand gestures to the mouth. Apart from gesturing through facial muscles, face can also express emotion necessary for bonding as also for following what other are trying to communicate verbally or non-verbally. When the burden of communication had shifted from the hand to the mouth, then at some point of time vocalization - the use of sounds for communication –was the most natural consequence; speech in any case is much less energy consuming than gesturing. By that time, the mirror neuron system had developed within the human brain in areas that would later specialize in production and comprehension of speech as well as abstraction of thoughts, which were the essential pre-requisites for development of language. In the non-human primates, however, vocalization did not get associated with the mirror neuron system in a similar manner.[3]

[2]Ramachandran, V S, *Unlocking the Mystery of Human Nature: The Tell-Tale Brain,* Random House, London, 2011, ebook, loc 2303-2479.

[3]Corballis, Michael C, "The Evolution of Language", in *The Year in Cognitive Neuroscience 2009*, Annals of the New York Academy of Sciences, Volume 1156,March 2009,26.

A tantalizing piece of evidence as when this might have happened has emerged in recent times from human genome studies. Three generations of a British family known as KE had persistent trouble with speech, grammar, writing and comprehension. In 2001, an Oxford team tracked the problem to a mutation in a gene that was named FOXP2. It was shown to cause the loss in vocal articulation and movement of facial muscles in humans. Since this was the first time that a specific gene was identified for causing speech and language disorder in humans, and expectedly the discovery had sparked a frenzy of research. Since it was involved with language, it was initially believed that the gene was specific to humans, but research showed that it had evolved well before the dinosaurs; it further showed that this gene was highly conserved between species from birds to bats to bees with very little changes over time.

A team led by Wolfgang Enard from the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany compared the gene FOXP2, which is actually a protein made up of amino acids, in different species and found that the human version differs from those of chimpanzees, gorillas and rhesus macaques by only two amino acids out of a total of 715, and from that of mice by three, indicating that the human version of FOXP2 evolved recently with a single amino acid having mutated in the 130 million years since the mouse lineage split from that of the primates.[4] There were only two further differences since humans split from chimps about 5 to 7 million years ago, the more recent of this having occurred around the time when *Homo sapiens* had emerged around 200000 years ago.[5] It can be assumed that this roughly coincides with time for explosive development of human brains we have discussed earlier.Fossil evidence also bears testimony to the fact that anatomical requirements for fully articulate speech could not have evolved till the emergence of *Homo sapiens*.

Research teams chose songbirds due to the similarities between their songs and human language, both of which are built into complex sequences from basic components such as syllables and riffs, and both forms of vocalisation are learned through imitation and practice. It was found that knocking down this gene in songbirds impaired their ability to imitate songs. In experiments with mice, it was seen that mutation of the gene affected the plasticity of their neural circuits within the cerebellum and basal ganglia, hindering their ability to develop the long-term changes crucial for memory and learning, besides making it difficult for them to acquire new motor skills.[6]

Different human populations show virtually no variation in their FOXP2 gene sequences.The fact that there has been only two stable mutations over the last 5-7 million years that had spread quickly and comprehensively through the population, there must have been some evolutionary advantage associated with the human form of FOXP2. The nature of this advantage and its relation to the evolution of language, however, are yet to be established. FOXP2 has been dubbed the 'language gene' by overzealous journalists, but this was obviously an oversimplification. Our knowledge about the role of genes in determining the growth and structure of brains is still rudimentary. Besides, the genetic basis for language will possibly involve many more genes that influence both cognitive and motor skills. As Simon Fisher,

[4]Wade, Nicolas, "Speech Gene Shows Its Bossy Nature", http://phenomena.nationalgeographic.com/2009/11/11/revisiting-foxp2-and-the-origins-of-language/accessed 07/07/2016

[5]To distinguish this human form from the corresponding primate gene, it is sometimes referred to as $FOXP2_{human}$.

[6]*Ibid*.

who was a part of the Oxford team said, “Speech and language didn’t just pop up out of nowhere. They’re built on very highly conserved and evolutionarily ancient pathways.”[7]

Transformation of gestural language to speech and development of these pathways in areas of the brain that would later become Broca’s and Wernicke’s areas were going on side by side, along with the evolution of human vocal tract. All these developments were taking place simultaneously, facilitating the development of human speech that was strongly being influenced by the prevailing cultures of human societies in different places. In the early stage of development, it would been used to identify objects and actions, and the need for a larger vocabulary would have led to ‘digitisation’ of sound signals, or discrete speech sounds in the form of consonants and vowels, to produce words. Thus a ‘protolanguage’ would come into existence, something like a ‘pidgin’ language that lacked the complexity of modern languages. Richness of structure, grammar and rules of syntax would automatically develop over the course of time. Development of articulate human speech thus would thus have taken millions of years through a succession of hominid lines, and various factors -culture, anatomy, genes – all would have played their parts in it.[8] Most linguists agree that before human migrations had started from Africa, some form of spoken language had already appeared, and this may have been a catalyst for their dispersion and subsequent migration.

Speech is what made us human. Despite significant strides made in our understanding of the of the evolutionary mechanisms that gave us our linguistic capacity as distinguished from the faculty for communication seen in animals, based on the current paleontological, biological and genetic evidence, many fundamental questions about the origin of language still remain shrouded in mystery with considerable uncertainty. There are many hypotheses floating around without any conclusive evidence in favour of any of them. There has been an explosion of publications on the subject with the past 50 years, thanks to path-breaking research and ideas of Chomsky, Lieberman, Bickerton, Pinker and Bloom, Jackendoff, Fitch, Hurford, Ramachandran and others, thanks to the emergence of advanced techniques and computational tools for mathematical modelling of evolutionary processes, complete mapping of human genomes, study of animal social behavior and discovery of new fossil records, but the mystery of the origin of language is still far from being solved.

One puzzle seems particularly intractable–and this is about the link between language and thinking. “We have to cease to think if we refuse to do it in the prison house of language”, wrote Friedrich Nietzsche. Ludwig Wittgenstein echoed this thought, “The limits of my language mean the limits of my world.”[9] Can we really think without language? What are the logical steps to sequential thinking we call reasoning? Do

[7]Another estimate claims that the last mutation had occurred around 45000 years ago, which lends support of Lieberman’s claim that “fully human speech anatomy first appears in the Upper Palaeolithic (about 50000 years ago) and is absent in both Neanderthals and earlier humans.” (Corballis, Michael C, “The Evolution of Language”, 28). However, in 2008, Enard’s colleague Svante Pääbo made the discovery that Neanderthals also had an identical gene, prompting questions over their linguistic abilities. Neanderthals almost certainly possessed language but their linguistic abilities were far inferior to those of modern humans who had exterminated them.

[8]Jackendoff, Ray, “How did language begin?”,www.linguisticsociety.org/sites/default/files/LanguageBegin.pdffor, accessed 07/07/2016.

[9] Quoted in Pinker, Steven, *The Blank Slate: The Modern Denial of Human Nature,* Penguin, 2003, 186.

we think by using language, or do we only use language to express thoughts already made? Does language determines thinking or is this the other way around? If language determines thinking, then it may be difficult to articulate new thoughts. If one can think without language, then clearly animals should be able to think. Darwin thought that as far as mental attributes were concerned, animals differed from humans only in degree, not kind. They also experience emotions like love, joy and grief, may be to a lesser degree than the humans, but there is no qualitative difference between animals and humans. Modern science tends to agree with Darwin.

Researches indicate that at least some animals, like primates, corvids (the crow family) and cetaceans (whales and dolphins) possess complex mental capacities. They can not only process information and express emotions through conscious ways, but they have something close to a culture, like distinct ways of doing things and sharing of this knowledge through imitation. While we are yet to find an animal with a human-like mind; almost all the attributes of human minds are found in some animal or the other. Mirror neurons we have discussed earlier are found to play a similar role in their brains as well, like producing empathy. Chimpanzee brain have areas corresponding to Broca's area and Wernicke's area associated with language and communication in humans. The ability to recognise oneself in mirror – a common test of self – awareness because it indicates the ability to view self as an individual distinct from the others, is passed by many animals - orangutans, chimpanzees, gorillas, elephants, dolphins and even magpies. As a group of neuroscientists reported in 2012, "Humans are not unique in possessing the neurological substrate that generate consciousness. Non –human animals, including all mammals and birds, and many other creatures… also possess these neurological substrates."[10]There is thus irrefutable evidence that they do think, but we do not yet know if they think exactly like humans, in a cognitive sense.

In his book, "The Tell Tale Brain", Ramachandran provides an interesting example of a spider that weaves its web. The web, being stable, must satisfy the Hooke's Law of physics defining the relationship between stress and strain, even though the spider may be blissfully unaware of any such law. It therefore cannot use the law for any other purpose, while humans can use the law 'open-endedly' and flexibly for an infinite number of applications. Most knowledge in this world, he says, lies between these two extremes – the mindless knowledge of the spider and abstract knowledge of the physicist. As regards our knowledge of the linkage between thinking and language, we have not yet advanced much beyond the spiderlike knowledge.

Language is the use of symbols and symbols are things that stand for something else. Words are symbols and so are gestures. But the gestures used by animals are instinctual while those used by humans may be cognitive, that is based on perception or intellectual reasoning, and not always based on instinct. Humans also has the capacity for abstraction – abstract symbols have no meaning unless people assign meanings to them. Human thinking is indeed open-ended engagement with symbols. But how neurons achieve this is a complete mystery. The relation between syntax and semantics is another mystery - how the neurons impart meaning unto speech and derive meaning from it. There is some evidence that

[10]"Animals Think, therefore…",*The Economist*, Dec 18 2015, http://www.economist.com/news/essays/21676961-inner-lives-animals-are-hard-study-there-evidence-they-may-be-lot-richer-science-once-thought, accessed 20/06/2016.

recursive embedding, which is regarded as a *sine qua non* of human language, is connected with the Wernicke's area, but it is still a long way for us to define the precise nature of such connections.

It was in the 1940s that the American linguist Benjamin Lee Whorf proposed his Linguistic Determinism Hypothesis, also known by 'Sapir-Whorf Hypothesis' after Edward Sapir, who was Whorf's teacher, suggesting that language determines the content of thought. Whorf noted that the Hopi – a Native American language spoken in northeastern Arizona- did not have past tense for verbs. Therefore, he presumed that the Hopi people could not think about the past. Based on his studies, Whorf claimed that speakers of Hopi and English see the world differently because of differences in their language.[11] While Hopis emphasise events and processes, on how an action is performed rather than when, the English speakers emphasise on things and relations. The strong version this hypothesis, called Linguistic Relativity, holds our thinking is conditioned and determined by the language we speak, implying that some thoughts may be easier for speakers of one language rather than another. As Sapir said: "Human beings...are very much at the mercy of the particular language which has become the medium of expression for their society. ...The fact of the matter is that the real world is to a large extent unconsciously built up on the language habits of the group."[12]An even stronger view was taken earlier by the German philosopher Wilhelm von Humboldt in 1835, when he wrote, "Language is the formative organ of thought."[13]

The Sapir-Whorf hypothesis is difficult to put to test, for which an experiment needs to be set up to isolate and measure what is due to language from what is due to thought, which is near-impossible, and many of its conclusions have been hotly contested and proven wrong.[14] There are examples similar to those observed in Hopi in many other cultures as well. For example, unlike English which has many past tenses, Turkish has only two past tenses, one to report direct experience and the other to report events learnt by inference or hearsay. Linguistic determinism holds that such differences arise from the different ways people think in disparate societies, reflecting the differences in the ways in which cultures are organized and discarding any theory that makes value judgments about speakers of any particular language or the other. Human thoughts and actions are determined by an array of causes –and structure of language may not even be assigned a major central role among these. Linguistic determinism thus represents only a very limited aspect of human experience, if at all. Language in any case is only one of the factors that influences cognition and behavior. Researches done by Stephen C. Levinson and others in the Max Planck Institute for Psycholinguistics in The Netherlands through cross-linguistic and cross-cultural studies have shown that language does influences behaviour, and 'languages differ in fundamental ways in both form and meaning, largely as a result of cultural evolution of societies'. If linguistic determinism was true, then learning a second language would have been much more difficult that it is - it would mean changing the way one has thought in his native tongue. Experience does not support this view.[15]

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[11]http://www.linguisticsociety.org/content/does-language-i-speak-influence-way-i-think, accessed 20/07/2016.

[12]Sapir, E. (1929) "The status of linguistics as a science", reprinted in *The selected writings of Edward Sapir in language, culture, and personality*, ed. by D. G. Mandelbaum, University of California Press, Berkeley, 1958, 162.

[13] Humboldt, Wilhelm von, *On Language, The Diversity of Human language – structure and its Influence on the Mental development of Mankind*, Cambridge University Press, Cambridge, 1835, 46.

[14] For example, Whorf claimed the Eskimos because of their familiarity with snow has many words for snow to describe the finer distinctions in the quality of snow, which was not found to be the case.

[15]http://www.linguisticsociety.org/resource/language-and-thought,accessed 20/07/2016.

In Pormpuraaw, a small Aboriginal community on the western edge of Cape York in northern Australia, people speak Kuuk Thaayorre language which does not have any words for relative directions like left, right, front or back, but only absolute cardinal directions of north, south, east, west, etc. Consequently even a child is able to identify these cardinal directions with absolute certainty, which many of us would not be able to do readily.[16]It would appear that while language may not be the determinant of thought, it indeed molds our thinking and world views in many ways and indeed plays a causal role in shaping our cognition, something that Whorf had proposed. But overall, modern research on cross-linguistic differences in cognition tend to point out that rather than differences in language create differences in thought or vice versa, the relationship operates in both ways. It is undeniable that culture, which represents a totality of traditions, lifestyles, habits, values and experiences of a society, exerts a major influence in determining the contents of our thoughts as well as in the language in which we express our thoughts.

According to Whorf, "We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way—an agreement that holds throughout our speech community and is codified in the patterns of our language." Thus according to him, English treats time as being broken up into chunks that can be counted in seconds, minutes and hours, and hence thinks about saving, using or wasting them, while the Hopi people think time as a continuous cycle. But this doesn't necessarily imply that language has forced a certain view of time on people who speak a certain language. It might be just as true that their view of time as taught by the culture is reflected in the language they speak. Perhaps language, thought and culture inextricably intertwined with each other to form an integral, consummate whole.[17]

They question probably goes deeper, what do we actually mean by thought? Psychology defines thinking as an activity that goes on in the brain while processing information received through senses and stimulus. Thinking involves memory but goes much beyond it – thinking is involved when we form concepts, engage in problem solving, reasoning and decision making. The brain processes information by grouping of similar objects, events, feelings, ideas or people into categories or hierarchies, by defining their relationships based on such organisation, and thus develops concepts on these objects, events, feelings, ideas or people. Problems are often solved by devising an algorithm, a set of rules specific to the nature of the problem, which are sometimes devised by applying heuristics 'which are strategies that allow us to make judgments' and solve problems efficiently, often using insight that humans undoubtedly possess.

Can we experience a feeling or a sensation without language? Probably we can, but can we separate the thought of the sensation from the concept of a sensation? Can we experience and identify pain without having a concept of pain in the language? Can there be thought without concept, or concept without language? To a large extent thinking may be language-based, but obviously we can think in images. Experimentally, it has been shown that imagining a physical activity stimulates the same regions in our brain that get activated when we actually perform the action. Rather than being unidirectional, traffic flows both-ways between language and thinking, both of which are again influenced strongly by culture.

[16]Boroditsky, Lera, "How Language Shapes Thought", *Scientific American*, February 2011, 63-65.
[17]http://www.linguisticsociety.org/content/does-language-i-speak-influence-way-i-think, accessed 20/07/2016.

As Lieberman says, "Finally, though biology and hence genetics determines baseline human cognitive capacities, there are intimate, complex relationships that hold between biology, culture, language, and thought. Biology sets limits on thought, but culture changes biology, language transmits culture, and culture influences language and thought."[18]

That language is a mirror of culture, and not something inherited by a child in the form of Chomskian Universal Grammar, has been convincingly demonstrated by Daniel Everett based on his study of the Piraha people who inhabit the extremely isolated Amazonian regions of Brazil. The language of the Pirahas does not exhibit one characteristic common to all languages, which is recursion – the embedding of clauses within clauses seen in very other known language and is regarded as the defining characteristic of any human language. Everett lived with them for 86 months and observed that they live a simple life, based on bounties on nature, and they live on 'here and now' without having any sense or need of the past or future, and recognizing 'the passage of time through wet and dry seasons' and using 'the full moon as a simple calendar'. Consequently their language has evolved to meet the needs of their values, lifestyle and culture. It has no words for numbers- only 'few' and 'many', no words for colours or for markers of time like a week, month or year – only seasons, wet or dry. Their language to them is only a tool to negotiate their life which is lived only in the present and without much complexity.[19]To quote Lieberman again, "virtually everything that characterizes the way we live is the product of human culture, transmitted from one generation to the next through the medium of language. But the form of language is culturally transmitted, again through the medium of language. And, in turn, culture shapes the human ecosystem and can lead to genetic evolution."[20]

Actually we are as yet far from understanding how the words that we hear or sentences that we read acquire meaning in our minds - how the brain's cells, the neurons, translate them into perception and thought. Given that neurons in our brain are responsible for everything we perceive, think or do, we cannot as yet answer how objects, events, ideas, sensations, or people are encoded in the hardware of the brain by the actions of the hundred billion neurons that are tightly packed inside it. We may have shaped our destiny through innovation and creativity, through the use of increasingly sophisticated tools and language that had set us apart from our primate cousins and given us cognitive flexibility far superior to every other animal, flexibility that has led to the astounding diversity of about 8000 languages around the globe, but still we are at the infancy of our understanding of the relationship between language and thinking.

We had started our quest into understanding the evolution of consciousness with the symbols used by ancient humans in the walls and ceilings of the caves they had dwelt in. But we are still at the beginning of our quest as far as the working of our conscious awareness is concerned. We have seen how language has shaped our destiny and made us recognizably human by imparting to us a sophisticated cognitive ability, which is a defining characteristic of humanity. Languages provide us the symbols with which we

[18]Lieberman, P., *The Unpredictable Species: What Makes Humans Unique*, Princeton University Press, Princeton, 2013,203.
[19]*Ibid*, 205-7.
[20]*Ibid*, 208.

can think, ideate, perceive, reflect and express, besides allowing us to engage in abstract reasoning, and each has its own toolkit for encapsulating the worldview of its speakers. It, in fact, brings us to the doorstep of conscious awareness of the reality that surrounds us.

As Alan Moore said in his Promethea, “The only reality we can ever truly know is that of our perceptions, our own consciousness, while that consciousness, and thus our entire reality, is made of nothing but signs and symbols. Nothing but language. Even God requires language before conceiving the Universe. See Genesis: “In the beginning was the Word.””