

**Biological Basis of Language Revisited:  
A Review of Steven Pinker's *The Language Instinct* (1994)  
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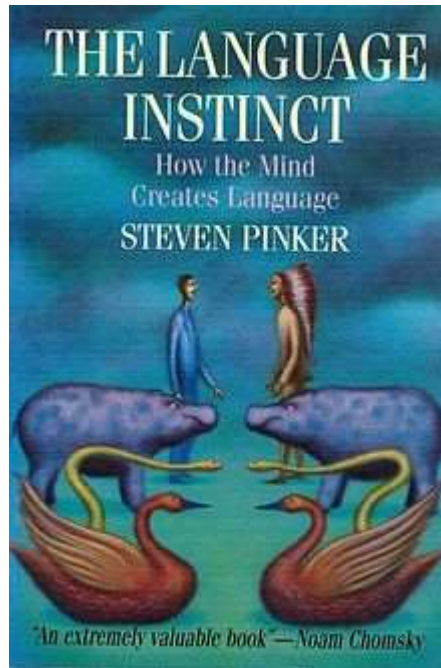
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**Abstract**

The processes of origin/ evolution of language have been a subject of debate for several decades. It has been with man long before the invention of writing though its importance has been widely underestimated. The article reviews Steven Pinker's "The Language Instinct" (1994) in light of the existing debate. Through his book Pinker tried to claim that if two people come in contact then language is bound to develop. The faculty of language is not just a product of cultural influence but it has a strong and verifiable biological basis. Sympathizing with the Chomskyan perspective of Universal Grammar Pinker claims that human mind has its own language 'mentalese' which acts as an interface between the spoken form of language and the mental lexicon. The book makes an interesting reading offering evidential support for the claims that Pinker makes in the book.

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## **The Faculty of Language**

The origin of the faculty of language in humans has always been a subject of great debate for centuries. The fact that it is unique to humans (not considering the communication system in primates, ants and honey bees to be equivalent to that of a human language) has always created a sense of awe and inquisitiveness around this subject. Various approaches have been modeled so far in an attempt to describe the acquisition of language which occurs so effortlessly in humans especially the first language (L1). The fact that there was language long before writing evolved is widely underestimated by literate investigators. Language was already high defined biological product, complete in all sense, long before writing was invented.

## **Biological Basis of Language**

The approach which has gained the maximum popularity and has been the subject of constant debate, discussion and research is the one propounding the biological basis of language. This approach refutes the claims made by the “Standard Social Science Model” (Barkow, Cosmides & Tooby 1992) which advocates the role of surrounding culture in the acquisition of language.

## ***The Language Instinct***



Courtesy: [http://en.wikipedia.org/wiki/Steven\\_Pinker](http://en.wikipedia.org/wiki/Steven_Pinker)

Steven Pinker is a linguistics professor at Harvard University and is known worldwide for his work with language. *The Language Instinct* offers Steven Pinker's thesis and research on how language and communication is an instinct native to all humans. The most interesting central topics discussed in this book are how language is an instinct and how children develop language and grammar skills, the idea of a "Universal Grammar" and what it says about language and the mind, and how language and thought are not the same. Pinker's book on how language is learned, how it works, changes and is ultimately a basic human instinct, is informative and interesting the whole way through.

### **Language – A Complex Specialized Skill**

Pinker believes that language is a complex, specialized skill which develops in children spontaneously and is evolutionary in nature. He introduces the topic aptly with the following lines:

“Imagine that you are watching a nature documentary. The video shows the usual gorgeous footage of animals in their natural habitats. But the voiceover reports some troubling facts. Dolphins do not execute their swimming strokes properly. White-crowned sparrows carelessly debase their calls. . . . Who is this announcer, anyway?” (p.370)

Pinker advocates the instinctive nature of language just like Darwin who was the first one to make a claim in this direction. (Darwin 1871, 1896)

### **We Just Cannot Help It**

Language is unique and innate to humans. Focusing on the universality of language he says the children learn the complex language without any formal education and they keep reinventing the language not because it is required but because they just cannot help it. The faculty of language is as innate as the process of sucking in the newborns. We humans are simply born with this. The children are capable of understanding the complexity of language and also to construct normal sentences without any effort.

### **Mental Faculty – Construct the Utterances in the Mind**

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In such a case language is then a mental faculty and one constructs the utterances in the mind. Now the question is whether language determines thought or thoughts determine the language or do we have a separate language to think altogether. Pinker calls such a language as “mentalese”. Discarding the linguistic determinism theories (Sapir 1921, Whorf 1956) Pinker argues that if languages determine our thoughts then why at times we feel that there is a difference between what we “wanted to say” and “what we actually said”, why at times we fail to get exact words to describe what goes exactly in our mind. Pinker points out the lack of objective evidence for such a belief.

In order to prove his point Pinker cites the examples of languageless adults and human babies. We should give a thought as to how they manage to think without any language. He argues saying: “infants come equipped with these skills; they do not learn them by listening to their parent’s speech” (pg. 267).

### **Physical Symbol System Hypothesis**

Pinker comes up with a theory of thinking called “the physical symbol system hypothesis” or the “computational” or the “representational” theory of mind. Cognitive scientists and psycholinguists are trying to figure out what kind of representations and processors are present in the brain. Any particular thought in our head embraces a vast amount of information but when it comes to communication attention spans are short and mouths are slow. Only a fraction of the message gets encoded in the form of words. Thus people do not seem to think in their respective language, they think in the language of thought. But in such a case mentalese must be richer than other languages in some ways and simpler in others. Knowing a language is nothing but to know how to translate mentalese into strings of words and vice-versa.

### **How Language Works**

After the first three introductory chapters Pinker in his fourth chapter “How Language Works” he focuses on the design features of language and language grammar. Differing from Chomsky’s deep and surface structures Pinker tries to establish his claims. The two most important design features of language are: it helps to convey a concept from mind to mind virtually spontaneously and it makes infinite use of finite medium. We use a code to translate

between orders of words and combinations of thought. This code or set of rules is called generative grammar (Chomsky 1957) The way language works is that each person's brain contains a lexicon of words and the concepts they stand for (a mental dictionary) and a set of rules that combine the words to convey relationships among concepts (a mental grammar). So then, what are the design features of grammar? Grammar is nothing but: the infinite use of finite medium (distinguishes human brain from other artificial language devices) and it is a code that is autonomous from cognition (grammar teaches us to arrange words in a sentence but at times we can understand even the ungrammatical sentences).

### **In Disagreement with the Chomskyan Position**

According to Chomsky (Chomsky 1957) words of a language are acquired in the form of categories and language is made up of phrase structures (PS). The insights behind the UG are much more interesting because they are about living minds and not dead tongues (Chomsky 1968). The principles and parameters of PS specify only what kinds of ingredients may go into a phrase in what order. They do not spell out any particular phrase. An auxiliary is a kind of function word that comes at the periphery of the sentence trees.

Pinker does not agree with Chomsky at the point that deep structure is obligatory and that it is universal across all human languages. Every structure indeed has two levels where the deep structure is defined by the super rules and it acts as the interface between the mental dictionary and phrase structure. In the surface structure, the position from which the phrase was moved contains an inaudible symbol that was left behind by the movement transformation called a "trace". Because of it, the surface structure contains the information needed to recover the meaning of the sentence; the original deep structure which was used only to plug in the right sets of words from the lexicon plays no role.

### **World of Words**

Taking the readers to the level of words Pinker correctly claims that the world of words is as fascinating as the world of syntax. People must have a mental rule for generating new words from the old words and this area is specifically an exhaustively dealt with in morphology. The output of one morphological rule can be the input for the other morphological rule. But such

rules are applied only in case of regular words whose origin and use is rule based. In case of irregular words which do not follow a set rule, they are stored on brain as mental lexicons and they act as stems and not roots for the morphological processes.

According to Pinker a word being a linguistic object built out of parts by the rules of morphology behaves as the indivisible, smallest unit with respect to the rules of syntax- a syntactic atom. Also words are a string of linguistic stuff that are arbitrarily associated with a particular meaning one item from the long list we call mental dictionary.

### **Shifting between Various Organizational Levels**

Pinker keeps the reader shifting between the various organizational levels of language. Immediately after discussing the words he starts discussing sounds which actually are the constituent elements of words. He says that phonetic perception is like a sixth sense which is actually manifested in the form of language and that speech is illusional because of the absence of any visible physical boundary. Thus speech perception is another biological miracle which makes the language instinct. It is possible because of the duality of patterning of language. (Hockett1968). The sound segments are processed in a way to produce a sequence which is both meaningful and can also be easily pronounced. Discussing about the biological basis of language Pinker gives an account of the organs involved in the process like: vocal cords, lungs, larynx, tongue, lips etc.

An inventory of phonemes is the thing that gives a language its characteristic sound pattern even in a speech stream that contains no real words. Phonemes are not assembled in a one dimensional pattern but like a tree. Onsets and rimes not only define the possible sounds of a language; they are pieces of word- sounds that are most salient to people. Onsets and rimes make syllables. Syllables are collected into rhythmic groups called feet and they are further classified as strong (s) and weak (w).

Phonological rules apply to the phonemes in a sequential manner. But the rules “see” features not phonemes and they adjust features not phonemes. If sound waves are at the bottom of the hierarchy from sound to phonemes to words and so on then we can say that human speech perception works from the top down rather than just from the bottom up direction.

## Talking Heads

The seventh chapter “Talking Heads” discusses the organization of sentence in a language. How do we understand a particular utterance in the form of a sentence? According to Pinker, the first step is to “parse” it. The mental program that analyzes sentence structure during language comprehension is called the parser. The parser analyzes each element of the construction and categorizes it into phrases or parts of phrases. This rule determines if a phrase is an NP or a VP or any other type of phrase and then accordingly the comprehension of the complete utterance occurs. A parser also enables the movement of phrases. Words can also help by suggesting to the parser exactly which other words they tend to appear with inside a given kind of phrase. During the span of words between the moved phrase and the trace people must hold the phrase in memory. Connecting phrases with traces is a hairy computational operation. The parser, while holding the phrase in mind, must constantly be checking for the trace. There is no way of predicting how far down in the sentence the trace will appear. In case of phrases which restricts the movement of elements the parser skips looking for a trace. Such restrictions can turn some phrases into “islands” from which no words can escape. Parsing is actually the first step in understanding a sentence. But there is much more to understanding a sentence than parsing it. The act of communicating actually relies on a mutual expectation of cooperation between speaker and listener.

## Sentence Order

Most languages have SVO or SOV order, fewer have VSO; VOS and OVS are rare and OSV may be non-existent. The largest number of universals involves implications: if a language has X it will also have Y. Universal implications are found in all aspects of language. When linguists talk about gadgets of language, they do not talk about the correlations among all linguistic items. Differences among languages, like differences among species, are the effects of three processes acting over the long span of time- mutation (linguistic innovation); genetic inheritance (the ability to learn) and isolation (migration or social barrier). Languages are spoken by the children who learn them. Languages disappear by the destruction of habitats of their speakers. Just as we cannot preserve every species on earth we cannot and should not preserve

language but then a language is a medium from which a culture's verse, literature and song can never be extricated.

### **The Baby Born Talking - Describes Heaven**

In the chapter "The Baby Born Talking - Describes Heaven" Pinker tries to draw attention on the systematic nature of errors that occur in a child's speech. Most children do not begin to talk until they are a year old, do not combine words until they are one and a half, and do not converse in fluent grammatical sentences until they are two or three. All infants come into the world with linguistic skills.

Babies continue to learn the sounds of their language throughout the first year. By six months, they are beginning to lump together the distinct sounds that their language collapses into a single phoneme. During the first year, babies also get their speech production system geared up. Shortly before their first birthday, babies begin to understand words and around that birthday they start to produce them. Words are usually produced in isolation; this one word stage can last from two months to a year. Around eighteen months, language takes off. Vocabulary growth jumps to the new-word-every-two-hours minimum rate that the child will maintain through adolescence. And syntax begins with strings of the minimum length that allows it: two.

### **Roles of Errors**

The errors children do make are rarely random garbage. Often the errors follow the logic of grammar so beautifully that the puzzle is not why the children make the errors, but why they sound like errors to adult ears at all. So why do children make this kind of errors? There is a simple explanation. Since irregular forms have to be memorized and memory is fallible. The three year old is a grammatical genius- master of most constructions, obeying rules far more often than flouting them, obeying language universals, erring in sensible adult like ways and avoiding many kinds of errors altogether.

### **Language Senescence**

Acquisition of language normally is guaranteed for children up to the age of six, is steadily compromised from then until shortly after puberty and is rare thereafter. Even if there is



some utility to our learning a second language as adults, the critical period for language acquisition may have evolved as part of a larger fact of life: the increasing feebleness and vulnerability that biologists call “senescence”.

So far Pinker has been trying to establish the biological basis of language drawing analogies from other biological processes. Now the big question that looms at this stage is that if language is a biological faculty then it must have a biological centre as well which can be physically perceived in the form of genes. Pinker tries to answer this question in the tenth chapter of his book “Language Organs and Grammar Genes”. He tries to put forward the evidences which could show that there are genes that build parts of brain that control grammar.

### **Lateralization, Neural Network**

Neuroscientists have actually seen language in action in the left hemisphere. Aphasic’s brain almost always show lesions in the left hemisphere. A patient with a sleeping right hemisphere can talk but a patient with a sleeping left hemisphere cannot. What exactly is engaging in the left hemisphere? Bellugi’s findings (Bellugi 1967) show that language whether by ear and mouth or by eye and hand is controlled by the left hemisphere. The left hemisphere must be handling the abstract rules and trees underlying language, the grammar and the dictionary and the anatomy of words. Gazzaniga’s coworkers found that all areas that have been implicated in language are adjacent in one continuous territory. This region of the cortex, the left perisylvian region can be considered to be the language organ. (Gazzaniga 1970)

Pinker himself talks about neural network or the neural gates which act in the same way as the logic gates- AND, OR and NOT. The neural networks are neural gates that compute the logical relations. All genes are made up of sequences of bases arranged in a DNA molecule and the structure of DNA is affected by proteins which are the transcription factors. So now we can define a grammar gene- “grammar genes would be stretches of DNA that code for proteins or trigger the transcription of proteins in certain times and places in the brain that guide, attract or glue neurons into networks that, in combination with the synaptic turning that takes place during learning are necessary to compute the solution to some grammatical problem.”

### **Genetic Variation**

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When we talk of genes, we must also pay some attention to genetic variation. No two human beings are genetically identical; after all, it is this genetic variation that has led to evolution. If this is the case and if there are language genes then normal human beings have to be innately different from each other and they should have different language instincts. But this is not the case actually. The differences are minor and quantitative without any major qualitative difference. The difference ranges within a narrow range. These variations are microscopic. This is governed by natural selection. That variation is there for a purpose: by shuffling the genes each generation, lineages of organisms can stay one step ahead of the microscopic, rapidly evolving disease parasites that fine-tune themselves to infiltrate the chemical environments of their hosts.

### **Human Language versus Animal Communication System**

Human language is different from other modes of animal communication system. Even the seat of human language in brain is special. Language could have arisen and probably did arise, in a similar way: by revamping of primate brain circuits that originally had no role in vocal communication and by the addition of some new ones. Chomsky, according to Pinker was too flip when he dismissed natural selection as having no substance, as nothing more than a belief that there is some naturalistic explanation for a trait. In fact it is not so easy to show that a trait is a product of selection. The trait has to be hereditary. It has to enhance the probability of reproduction of the organism relative to organisms without the trait, in an environment like the ones its ancestors lived in. There has to have been a sufficiently long lineage of similar organisms in the past. And because natural selection has no foresight, each intermediate stage in the evolution of an organ must have conferred some reproductive advantage on its possessor.

### **Environment – Not the Sole Governing Factor**

Pinker sums up his book by going back to the same claim that he made at the outset of the book that the environment should not be considered as the sole governing factor behind the development of language faculty. He, however, does not rule out its role completely but he tries to establish that heredity too has a major role in the development of language. We are endowed with a mental grammar which is highly complex. Learning would be impossible unless there is a

common underlying rule over which the language is built. That is the Universal Grammar. Pinker tries to sum up the claims of Evolutionary Psychology in the following points:

- Language has its own intricate mental software and there is a universal design to the rest of human minds,
- “Learning” cannot be possible without some innate mechanism,
- Learning is accomplished by different modules each keyed to the peculiar logic and laws of one domain,
- The biological systems have developed owing to natural selection and not by accidents and
- “Culture” too plays an important role whereby people get an access to shared knowledge.

### **Universal and Mental Computation**

Language instinct is universal. Languages can be mutually unintelligible but under the surface structure they have a common Universal Grammar. Children learn by generalized role models. They learn by drawing similarities. The sense of similarity must be innate. For language acquisition, what is the innate similarity space that allows children to generalize from sentences in their parents’ speech to the similar sentences that define the rest of English?

There must be some kind of mental computation that helps the child to draw similarities. This sense of similarity is computed by the Universal Grammar built into the learning mechanisms. According to language instinct a mind has adapted computational modules rather than the blank slate or the lump of wax. Language instinct takes into account the commonalities among all normal people. It does not think about the differences between them. So, environment is important. In the same way heredity too is important.

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### **References**

Barkow, J., Cosmides, L. & Tooby, J.(1992). *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*. Oxford: Oxford University Press.

Bellugi, Ursula. (1967). "Language, Modality and the Brain: Trends in Neuroscience" (Reprinted in M.H. Johnson (Ed.) *Brain Development and Cognition*. New York: Appleton- Century- Crofts.

Chomsky, Noam (1957). *Syntactic Structures*. The Hague: Mouton.

Chomsky, Noam (1968). *Language and Mind*. MIT Press.

Darwin, Charles (1871, 1896). *The Descent of Man, and Selection in Relation to Sex*. New York: D. Appleton Company.

Gazzaniga, Michael S. (1970) *The Bisected Brain*. New York: Appleton- Century- Crofts.

Hockett, Charles F. and Altman, Stuart (1968). "A note on design features" In Sebok, Thomas A. (ed.). *Animal Communication; techniques of study and results of research*. Bloomington: Indiana University Press.

Pinker, S. (1994). *The Language Instinct: How the Mind Creates Language*. New York: William Morrow and Co.

Sapir, E. (1921). *Language: An Introduction to the Study of Speech*. Harcourt: Brace.

Whorf, Benjamin (1956). In John Carrol (ed.). *Language, Thought and Reality: Selected Writings of Benjamin Lee Whorf*. MIT Press.

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