CHAPTER IV
MODERATELY MASSIVE MODULARITY OVER CENTRAL-PERIPHERAL MODULARITY

4.1. Folk Psychological Realism Implies Minimal Rationalism

While looking at the plausibility question, we have collected some evidences to prove that it is a mistake to club Carruthers phenomenal consciousness, with qualitative phenomenology that is generally safeguarded by non-reductionists. In other words, Carruthers continues to defend the physicalist option in the exact sense in which he wants to accomplish for folk psychological realism what is usually reserved for scientific theory. That is the intention of his so-called ‘integrationist view’, which appeals to qualia irrealism. In the present chapter we shall see how folk psychological realism appropriated in the above sense (qualia irrealism) leads him further on towards an extended form of naturalism and then forward to a consequent minimal rationalism.

This is sought to be achieved through the naturalization of semantics, even while approaching an integrationist line of thinking about science and phenomenal consciousness. The switch over of naturalism towards a more interesting post-naturalistic theory is sounded by the following words of suspicion about the independence of language and thought. He remarks that “no conclusive case has not yet been made out, in the domain of scientific theory, for the independence of thought and language”\(^1\). The semantic thesis is therefore relatively independent, but not absolutely independent from the other claims of metaphysics and epistemology. One interesting way in which success could be guaranteed is to naturalize content in Quinean way of bridging the gap between philosophy and science. This necessitate that some form philosophy of mind (Searlian) must be given commitment to some form of language (Fodorian) even while keeping realism in semantics
as an existing option. This is conveniently termed as Searle–Fodor marriage.

Carruthers has played a vital part in the cognitive revolution undergone in recent cognitive sciences. Carruthers’ focus of interest is mainly on philosophy of psychology, philosophy of mind etc. It is clear that the greater part of the philosophy of psychology occupying the philosophical aspects of the cognitive sciences. Cognitive revolution discarded simple empiricism and that leads the development of cognitive science as an interdisciplinary study of mind and consciousness, philosophy of psychology started to both drawing on and supplying data to scientific work. As psychology maintains the multifaceted behaviour of human beings (and other sophisticated creatures) is mediated by seemingly unobservable mental states playing a role in apparently secreted mental processes. Will psychology eventually be replaced by neuroscience? (Really, has it already been replaced by neuroscience?). Carruthers believes that folk-psychology has its own explanatory power and hence it can lie in close proximity to neuroscience, if certain architectural assumptions of the brain are in order.

Psychologist recognizes that the central enterprise of psychology is to provide adequate account of intentionally characterized cognitive capacities. The dichotomy between analytic truth and synthetic truth in philosophical literature pave the way for naturalism and psychology become more and more naturalistic. Philosophy of mind also took a naturalistic twist and assumes that advances in scientific psychology play an influential part in the attempt to unravel traditional philosophical problems such as; mind-body problem, the nature of intentional states and problem of innate knowledge. So the problems in philosophy of mind have become increasingly informed and influenced by work in scientific psychology and that work itself elevated new sequence of philosophical issues. Folk psychological realism must stipulate that psychological knowledge has both aspects: knowledge of one’s own and others; It is only in this sense the story of language is the story of
mind. It is obvious from the above that theory- theory is opposed to simulationism as it must be considered as progressive research program in Lakato’s sense.

Carruthers' earlier books; *Language Thought and Consciousness* (1996) contains the reflexive thinking theory of language and thought and the subsequent *The Philosophy of Psychology* (1999) deals with the philosophy of psychology with an appeal to independence language. The central claim of *language thought and consciousness* have been reviewed in the previous chapter, where we noted that there was certain ambivalence between language and innate theory of mind; seen from the central work on his naturalistic theory of phenomenal consciousness. Carruthers consolidates the gain by advancing a stronger claim about the best form of philosophy of psychology. Thus *The Philosophy of Psychology* (1999) reviews the traditional theories of mind such as dualism, behaviourism and identity theory, but more importantly it encounters the controversy between theory- theory and simulationism along with the more powerful arguments in the form of eliminativism (eliminativism now of Churchland and eliminativism in-prospects of Stephen Stich). In general it also reviews, the real opposition between realism and anti-realism (Davidson and Dennett) before taking folk psychology in the direction of minimal rationalism via naturalism (Chomsky) and modualrism (Fodor). Thus what is called the philosophy psychology stands for following claims:

a) Dualism must explore the causal interactionism between the mental and physical within physicalistic framework;

b) Behaviourism must be abandoned for both of its version (logical and philosophical), which stands for the reduction of :(i)our psychological knowledge of other minds to behavioural dispositions;(ii) Knowledge of one’s own mind to knowledge of behavioural dispositions;

c) Token identity must be combined with certain version of functionalism;
d) Theory- theory must involve recognitional application of a theoretical concept;

e) Realism about facts must entail realism of intention (the former cannot deny the later as eliminativist do);

f) We can accept folk psychology as interpretative (in Davidson’s anti-realist sense) only if it is also the reflection of the extent to which simulationism play a role in folk psychology (better to view Davidson's theory as a species of ascription of content (truth) to others than to one’s own;

g) Similarly Dennett’s anti-realism must accommodate ‘social role stance⁴ to go to other stances (intentional physical design stances);

A brief review of rationalistic tradition is given below:

1 Descartes: mind has innate ideas;

2 Chomsky: grammar (a set of intentionalised rules) is a psychological reality;

3 Fodor: mind is a code language called mentalese;

4 Carruthers: there are possible cycles of linguistic activity in inner speech;

Three topics within the philosophy of psychology that have dominated in the field over a couple of years are intentionality, cognitive architecture, and consciousness. Philosophy of psychology raises the question like whether human beings are actually rational creature or not? Moreover philosophy of psychology attempts to explore issues, which are the theoretical foundations of modern psychology; what is cognitive module? What is innateness? Etc. Today a majority of philosophers and cognitive psychologists share the functionalist view of mind, that mental phenomena can be broadly individuated by their functional role in the lives and behaviour
of people. The acceptance of shared conception of human mind is the upshot of cognitive revolution. Cognitive scientists share the views like; mental phenomena are intentional and they are neuro-physiologically realized and their function is to causally mediate the links between sensory stimulation and behaviour. So philosophy of mind and psychology are engaging in a genuinely mutual venture.

One of the important questions in philosophy of mind and philosophy of psychology is; what is the structural design of mind? There are different models of mind which tries to give answers to this fundamental question; such as computationism, connectionism etc. Modularity is some sort of computational model, which is the physicalist response to the question of cognitive architecture. The term ‘module’ is a much celebrated and discussed term in the recent cognitive science. What is the real sense of the term? Mainly, there are different notions of module; like Chomskian module, Computational module and Darwinian module. Thinkers differ on what type of mental structure the term module should be referred. It is noted that the term module is used to refer mental structures like mental representations and computational mechanism. If the term module is used to denote systems of mental representation it is called Chomskian module and in second case it is called Computational module. A Chomskian module is domain specific body of mentally represented knowledge or information that accounts for a cognitive capacity. This particular notion of module is owing to Chomsky, who claims that our linguistic competence consists in the possession of an internally represented grammar of our natural language (Chomsky 1998).

Computational modules are also domain- specific. More accurately for instance, one specific module will only provide solutions to ascribe to it only. In effect, computational modules are regarded as moderately independent mechanism of mind that the internal information processing of computational modules is untroubled by the external input system. The difference between
Chomskian module and Computational module is that, the former only eventuate in behaviour when controlled by diverse cognitive devices, while Computational modules are processing machines or devices that is responsible for manipulations of symbols or representation. So the point is that they differ in their functional role. *It is noted that Chomskian Modules are often manipulated by computational module.* Computational module uses the contents of Chomskian Module for its function. Fodor’s version implies computational module. But evolutionary psychologists reject the particular view defended by Fodor that central cognition is informationally unencapsulated and they hold that central cognitive capacity like mind-reading need to be informationally encapsulated. The notion of massive modularity has its genesis here.

The notion of Darwinian module is supported by the evolutionary psychologists. The features of this special type of module are as follows. They are domain-specific computational mechanism. Even though Darwinian modules are computational modules; they use the domain-specific knowledge (Chomskian modules) for their process (for example, theory of mind module). So in the point of view of evolutionary psychologists, Chomskian module and Computational module are different in their functional role. *Computational module can co-exists with Chomskian module.* But it is careful here that the existence of Chomskian module does not entail the existence of computational module. *Darwinian modules are inborn or (genetic) natural cognitive constitutions*, whose distinctive features are decided by inherited factors. These modules are in general are results of natural selection.

Fodor’s modularity thesis deals with the structural design of mind. Modularity thesis may differ on the question of number and identity and nature of mental module. The proposed specialized modular systems are remarkably diverse. They include expert modules for ‘mind-reading’, grammar and biology etc. According to some thinkers, even inference is
modularized and our cognitive architecture is ‘densely populated with a large number of evolved, content-specific, domain-specific inference engines’.

Here we are going to analyze different models of structure of mind. The special focus is to counterpose Carruthers to Fodor on the thesis of modularity from the evolutionary theorist’s point of view of massive modularity. There are several problems related with the modularity thesis; such as; 1) whether modularity is restricted to perceptual process or affects reasoning process also? 2) whether modularity is innate or constructed? Let us analyze these problems in connection with Carruthers and Fodor.

Mind is somehow composed of arrangements of physical stuff. Empiricist and rationalist hold different views of structure of mind and knowledge. Empiricists suggest that cognition is process, which is just an elaboration of process of perception; they differ in degree not in kind. Empiricist consider mind as domain general device. Jerry Fodor\(^6\) claims that linguistic knowledge and principles are innate and so are not learned. His nativism is the outcome of rationalistic thinking. According to him, rationalist considered mind as domain specific device as one made up of systems whose governing principles are very different. It is interesting that the historical debate between rationalist and empiricist are revisited in contemporary discussion of innateness of language, the modularity of mind and connectionism.

According to Chomsky\(^7\), mind consists of separate systems like language faculty, visual system, facial recognition module etc. these modules have their own properties. He argues that child’s mastery over language cannot be accounted for in terms of empiricist learning mechanisms. His hypothesis is that language learners have innately specified information that is specifically about the nature of human knowledge (Universal grammar). The child comes to the language learning task with a head start. This nativism is supported by the findings in cognitive ethology. Rats are born with a grasp of their nutritional needs and the ants
need not to be taught the system of dead reckoning. They use in foraging expeditions. The nativist extended this findings to the higher cognitive functions found in humans. The new field of evolutionary psychology, which adopts a thoroughgoing nativist perspective, focuses on especially on the sorts of cognitive and motivational structures that might have developed as adaptation in the original ancestral settings in which human evolved.

Chomsky’s focus is on language or syntax or universal language. Chomsky put forward a poverty of stimulus argument in order to defend his claim. He maintains that language acquisition is not possible without a rich store of innate linguistic knowledge. Fodor extended modularity thesis to other cognitive systems also. He distinguished central logical process and perceptual systems. For him, modules are innately specified systems that take in sensory inputs and yields necessary representation of them. According to the classic account of concept acquisition, learning occurs when new complex concepts are constructed from more primitive concepts and which suggest that there must bet a prior store of basic acquisition. For Carruthers, our mind-reading capacity is a product of maturation. Our mind reading faculty functions via a central module of theory-of-mind module which is an innate module. The nativist version of modularism is the correct version according to Carruthers. A main issue at stake is the degree to which cognitive development, everyday cognition, and cultural knowledge are based on dedicated domain-specific mechanisms, as opposed to a domain-general intelligence and learning capacity. The issue of domain-specificity –which, of course, Chomsky had been the first to raise – was becoming a central one in cognitive psychology. Evolutionary psychologist like, Leda Cosmides and John Tooby, was putting forward new arguments for seeing human cognition as involving mostly domain- or task-specific evolved adaptations. Taking for granted that domain-specific dispositions are an important feature of human cognition three questions related to modularity of mental architecture arise:

174
1. To what extent are these domain-specific dispositions based on truly autonomous mental mechanisms or “modules”, as opposed to being domain-specific articulations and deployments of more domain-general abilities?

2. What is the degree of specialization of these dispositions, or equivalently what is the size of the relevant domains? Are we just talking of very general domains such as naïve psychology and naïve physics, or also of much more specialized dispositions such as cheater-detection or fear-of-snakes?

3. Assuming that there are mental modules, how much of the mind, and which aspects of it, are domain-specific and modular? There are three possible answers here:\n
   a) Minimal peripheral-systems modularity
   b) Massive modularity
   c) Moderately massive modularity

At one extreme, there is the Fodorian modularity, which is less supported from both biological and evolutionary stand points. According to Fodor, central cognition is a- modualar. The second extreme is that Sperbian modularity, which is adaptive and biologically more supported. It is full-blown massive view of modularity. The third moderate view of massive modularity is supported by Carruthers. It is biologically more supported at the architecturally level. Carruthers is passing from module of elegantly engineered processing modules(simple and streamlined internal structures, and which exist independently of other such systems) to kludgy, (recruiting and cobbling together in quite inelegant ways resources which existed antecedently) messy quirk and dirty inter- modular decision rules.

4.2 Carruthers’ Earlier Typology of Language-Thought Relation

According to Fodor, there is no possible way to learn a language except by translating it into an already existent language. To learn our first
natural language we should translate it into previously existing language. It is not natural language; a computational representational system or mental language is responsible for acquisition of language. For example, learning a word ‘flower’ involves constructing and confirming hypothesis of the form ‘x is a ‘flower’ if and only if x is R. Our representational system helps us to form such a hypothesis. These representations are the non-natural language at our disposal in order to learn natural language\textsuperscript{11}. It is obvious that language requires thought and according to Carruthers at least our propositional thought requires language. The choice before Carruthers is mentalese or natural language. Carruthers stands for natural language. The correlation between sentences and thoughts are the foundation of language-thought hypothesis. This hypothesis takes mental representation seriously and maintains that mental representation has a constitutive role in thought which will help demystifying the notion of thought. It is argued by some thinkers, Like all the best debates, in philosophy of psychology the argument over whether thought controls language or language controls thought is ultimately unprovable. What are the ways in which natural language might be occupied with human cognition? To what extent is human thinking dependent upon possession of one or another natural language? There may be three possible positions

1. The first view defends some sort of conceptual necessity thesis that that all thought is dependent upon language. While the strongest thesis that thought (or all propositionally-structured forms of thought) is conceptually dependent upon language (Davidson, 1973, 1975; Dummett, 1981, 1989; McDowell, 1994). These views are not accepted by recent cognitive scientist because carefully considered attributions of thought to non-linguistic creatures widespread within cognitive science. But it is taken for granted that for any given type of thought, it will be an open empirical question whether such thoughts might be entertained by a creature that lacks a natural language.
2. The second view holds other extreme that thought not only conceptually, but also metaphysically and causally, independent of natural language.

3. The third view stand in between above two views and a multitude of possible claims that most, some, or specific types of thought are dependent upon natural language, where the dependence in question can be conceptual, or Metaphysical (that is, constitutive), or causal.

The other major account of language-thought hypothesis argues that thinker’s thoughts are sentences of natural language. It is criticized that some thoughts are not expressed any sentence in any natural language of the speaker. According to Carruthers, there are certain thoughts which are purely imagistic and independent of language. Carruthers’ argument is as follows:

1. We can consciously access or think about our occurring thoughts and it is uniquely diverse from our access to the thoughts of other people.

2. There are two possibilities that occurrent propositional thoughts either be given articulation in inner speech, or they do not; and if they are happenings in inner speech there are again two possible ways: the cognitive and communicative conceptions of language.

Figure: 4.1. Communicative/Cognitive Distinction of Language.
3. If the manipulation of natural language sentences in imagination (in ‘inner speech) is not constitutive of propositional thinking, then our access to those of our thoughts which receive expression in inner speech is interpretative, and similar to the sort of access which we have to the thoughts of other people, when they speak; and hence such thoughts of ours do not count as conscious (by 1).

4. The form of access which we have to those of our occurrent propositional thoughts which do not receive expression in inner speech also involves self-interpretation, and hence such thoughts, too, fail to count as conscious (by 1).

5. So if we engage in conscious propositional thinking at all, then natural language sentences must be constitutively involved in such thinking (from 1, 2, 3, and 4).


7. So natural language is constitutively involved in conscious thought (from 5 and 6)

The main criticisms to Carruthers’ natural language thesis are as follows:

One of strongest criticisms is from argument apparent semantic underdetermination of natural languages. For this argument, cognition requires a semantically precise and compositional instrument or medium. As natural languages are mainly semantically undetermined, they cannot be a vehicle of cognition. Steven Pinker (1994) and Jerry Fodor (2001) have developed two entirely diverse accounts of the argument. Steven Pinker (1994) argues against the cognitive use of language. He tries to prove that language is not compulsory for cognition. He says, that the human mind/brain works like a Turing machine, and that no natural language can function as a language for the use of a Turing machine. Identical line of argument is presented by Fodor and he argues that intentional contents
are unambiguous content but natural language possesses highly ambiguous content. For example, the sentence ‘dog chased runner with a stick’ could mean either that dog has stick or runner has stick. So we need a highly regimented, unambiguous and compositional language in order to determinate content of uttered sentences. This is the essence of mental language theories. Fodor\textsuperscript{14} conceives of thoughts as being composed of conceptual atoms and these ultimate components of Mentalese, unlike natural language words, are context-independent.

According to Fodor, scientific study of language, like the study of vision, is an investigation into the arrangement one of the marginal modules of mind, not an examination into the nature of thought itself. It is not clear that whether anyone has ever actually sanctioned the thesis of the independence of thought from language in its most extreme form. Because even thinkers like Fodor (1975), claims natural language as both input-output system for central cognitive processes of thinking and reasoning will permit that there are a lot of thoughts (both tokens and types) that we would never have entertained in the absence of language. The declaration of other people can have a significant impact on the thoughts that occur to us at any given moment. Hence there are some thought tokens that we would never have entertained in the absence of language. And everyone allows that the testimony of other people is the source of many of our beliefs, as well. Hence there are some thought types that we would never have entertained if we had been incapable of comprehending what people say to us.

Some thinkers maintain that language is remarkably implicated in thought as well as being used for purposes of communication. This is the so-called cognitive conception of language. Dennett observes language as a virtual structural devise on which conceptual thought runs\textsuperscript{15}, Bickerton argues that evolution of language is the precondition for conscious, abstract thought\textsuperscript{16}; Elizabeth Spelke\textsuperscript{17} has offered another strong view to support natural language; that our mothertongue maybe acting as an intermodular
lingua franca; evidences from archeology persuade Stephen Mithen\textsuperscript{18} to endorse an analogous proposal. But the strongest devotee is Carruthers\textsuperscript{19}. Following Bickerton\textsuperscript{20}, Carruthers offers an additional argument and he says that it is consistent with a broadly modularist conception of language and mind. Bickerton’s argument is nativist but not modularist. The center of attention of the supporters of the “language is an adaptation”-paradigm is essentially on the question of what language evolved for, the most popular answer being, that it evolved for communication\textsuperscript{21}.

The defenders of the communicative conception of language maintain that language is not essentially implicated in thinking, but rather serves only to facilitate the communication of thought. As communicative conception maintains, the only purpose of natural language is to make possible communication. It is considered that only through this medium communication take place. This view imply that language is largely isolated, module of the mind, which is both innately structured and specialized for the interpretation and construction of natural language sentences. Language is not the medium of thinking rather, it is system to communicate our intentional states to others or represent our intentional states ourselves. Spoken language thus serves only as the medium, through which thoughts may be conveyed from mind to mind, rather than being involved in the process of thought itself. Carruthers’ intention is to defend a relatively weak form of cognitive conception of language. Carruthers supports only natural necessity in week form but reject conceptual necessity. There are thinkers who support the conceptual necessity. For example, Davidson and Dummett stand for such a thesis. For Carruthers, conceptually thought is independent from language and he rejects the conceptual necessity thesis of the relation between language and thought. The thesis that language is involved in human thought is not here maintained universally, but is restricted to specific kinds of thought; particularly to conscious propositional thoughts. Carruthers’ view implies that only some thoughts involve language. So language is not an isolated module of the mind, but is directly implicated in central cognitive
processes of believing, desiring, and reasoning. The role that language might play in unifying and combining the outputs of different central / conceptual “modules” (Hermer-Vazquez et al., 1999; Carruthers, 2002). Carruthers uses the argument from introspection to argue that at least some of our conscious propositional thinking is conducted in imaged either spoken or heard natural language sentences. The systematic introspection-sampling study by Russ Hurlburt, proved that individuals have inner speech. The conflict between cognitive conception and the communicative conception is that, while the former considers inner speech is partly constitutive of thinking; the latter considers inner speech is merely expressive of thought, is the medium through which we gain access to our thoughts.

For a defender of the cognitive conception, Carruthers can permit that there are some chains of reasoning which cannot occur in the absence of an imaged natural language sentence. If it is, for example, by virtue of our thoughts causing the production of imaged natural language sentences that we gain access to their contents and occurrences, then any chain of reasoning which requires us to have such access will constitutively involve an imaged sentence. But, by hypothesis, the imaged sentence is not itself the thought, but is merely what gives us access to the thought. So more needs to be done to get at the intended idea behind (this version of) the cognitive conception of language.

Carruthers’ cognitive conception of language is modularist version of language. It is relatively weak version because; it only claims it to be naturally necessary that some of our thoughts should constitutively involve natural language. The so-called problem of cognitive conception of language is due to unnecessary concentration on universal or conceptual version of it. Caruuthers proposes both evolutionary and modularist possibility to support the claim that thinking (propositional thinking) takes place in language. He elaborates how children acquire language and accepts language as an innate faculty of mind. It is criticized that most sentences of a natural
language lack a definite semantic interpretation. This thesis supports an argument against the use of natural language as an instrument of thought. Hence it in turn troubles Carruthers’ cognitive view of natural language. For obtaining semantically determinate or definite meaning, natural language sentences should consider pragmatic factors. In other words, in order to attribute a definite meaning to a sentence, contextual factors should be considered.

Clark (1998) suggests that we use natural language as a way to approach our thoughts in a reflexive way, to ‘contemplate’ our own thoughts, so to speak draws attention to the many ways in which language is used to support human cognition, ranging from shopping lists and post-it notes, to the mental rehearsal of remembered instructions and mnemonics, to the performance of complex arithmetic calculations on pieces of paper. The idea is that language gets used, not just for communication, but also to enhance human cognitive powers. Andy Clark has helpfully designed six essential ways in which language can play the role of cognitive tool; which enhancing, extending and facilitating thought and cognition.

1. **Memory augmentation**: the acquisition of a public language offers us powerful means of systematically storing data (not simply in written language, but also in communicated oral traditions).

2. **Environmental simplification**: Applying linguistic labels is one way in which the perceived environment can be broken down into persisting objects and properties.

3. **Coordination**: Language permits the mutual control of attention and resource allocation in coordinated activities.

4. **Transcending path-dependent learning**: The learning patterns of linguistic creatures are not constrained by the particular cognitive paths they have followed since linguistic communication allows ordinary learning patterns to be circumvented and short-circuited.
(5) **Control loops**: Language allows us to create control loops for our future behaviour (by writing down plans that might be too complicated to keep in one’s head, for example) as well as to register and respond to the instruction and regulation of others.

(6) **Data manipulation and representation**: “Extended intellectual arguments and theses are almost always the products of brains acting in concert with multiple external resources. These resources enable us to pursue manipulations and juxtapositions of ideas and data which would quickly baffle the un-augmented brain.”

There are two thinkers made influential work on this area of philosophy are Whorf(1956) and Vygotsky(1961). What Whorf’s social realativist view anticipated is that divergences in culture, different grammatical forms and different modes of conceptualization of natural languages have significant consequences on the cognitive processes of the people in question, leading them to apprehend the world quite differently. Whorf’s proposal about the ways in which natural language serves to structure and shape human cognition becomes disrepute due to the development in cognitive science. For example, an experimental study of color naming and color memory in speakers of English (which has eleven basic color terms) and Dani (which has just two) suggested to disprove Whorfian account of the relationship between language and thought. It turned out, as expected, that English speakers use a far greater variety of color terms when asked to name a set of color chips; but there were no distinctions between the two groups in their ability to remember and re-identify a color chip over a 30 second interval.27

Vygotsky was developing his ideas on the interrelations between language and thought, both in the course of child development and in mature human cognition. One of Vygostky’s ideas concerned the ways in which language installed by adults can *scaffold* children’s development, yielding what he called a “zone of proximal development”28. Overt speech of
children, arguing that it plays an important role in problem solving, partly by serving to focus their attention, and partly through repetition and rehearsal of adult guidance. Vygotsky argued that in older children and adults’ inner (sub-vocal) speech serves many of the same functions. It is proved that the self-directed verbalizations of young children are more when the tasks were more difficult, and that children who verbalized more often were more successful in their problem solving.

4.3. From Minimal Peripheral –Systems Modularity to Massive Modularity.

The minimal peripheral –systems modularity is the category of modularity endorsed by Jerry Fodor (1983, 2000). He claims that mind is not a single homogeneous, general-purpose processing system but a somewhat complex or heterogeneous system of both input and output modular systems. According to Fodor’s classic version, only input and output systems are modular. He defines modules as domain-specific innately-specified processing systems. These modules include vision, audition, face-recognition, language-processing, and various motor-control systems. So modules, on Fodor’s view, are special purpose mechanisms that are situated at the front-end of perception. These modular “input systems” situate in remarkable disparity to more central cognitive processes concerned with such things as reasoning, analogy, and even perceptual judgment.

As Fodor suggests, there are three functionally dissimilar types of mental mechanism; they are transducers, input and output systems and central systems. Transducers are positioned at the crossing point between mind and the world. There are two basic types of transducers.

1. **Input transducers**: It take physical, non-symbolic input and produce symbols as output. For example, retina is an input transducer.
2. **Output transducers**: It takes symbolic outputs and produce non-symbolic outputs. For example, neural firing causes muscle contraction and bodily movements.

Transducers are mediators between world and mind. Transducers as the subsystems of mind functions automatically rather than computational function. But input systems function is computational function and it represents the world as to make it accessible to thought. But inner cognition or the central cognition where process of belief formation, decision making, reasoning, problem solving constructing scientific explanation etc is taking place is non-modular and in effect, Fodor denies modularity to central cognition where the concepts are deployed, beliefs are formed, inferences drawn and decisions are made. Even though Fodor admits that belief-fixation is global process, he is not optimistic about the explanatory power of cognitive science in explaining the central cognitive system. Fodor further adds that, no one has any idea how such factors could possibly have their effects. So Fodor’s view is that the process of central cognition is a forbidden fruit to cognitive science or it is mysterious what process are taking place there in central system or it is informationally unencapsulated. Peripheral process are local, in the sense that they only require to reflect on a limited range of inputs, and can only be influenced in a limited way (if at all) by background knowledge. But central processes are holistic, or non-local in nature. Because; what you believe on one topic can depend upon what you think about some seemingly-disparate subject. As Fodor (1983) remarked in principle, our botany constrains our astronomy, if only we could think of ways to make them connect. Or, what you believe on one issue is said to depend upon everything else that you believe. And no one has the least idea how this kind of holistic process could be modeled computationally. This holistic nature of central cognition is regarded as the evidence to support the pessimistic view that computational psychology is unlikely to make progress in understanding central cognitive processes in the foreseeable future.
Fodor’s characterization of properties of a module or the nine features of modules are as follows.\textsuperscript{31}

1. **Domain Specificity**

This means that modules operate within their proprietary domain in other words, modular system are controlled in terms of the range of information it can access. A module will be limited in the kinds of content that it can take as input. It is restricted to those contents that constitute its domain, indeed. So the visual system is restricted to visual inputs; the auditory system is restricted to auditory inputs; and so on. Furthermore, Fodor claims that each module should have its own transducers: the rods and cones of the retina for the visual system; the eardrum for the auditory system; and so forth. Domain specialty means input modular systems have very specific subject matter, which means modules are sensitive to very specific input systems or stimulation. The domain specificity has to do “with the range of questions for which a device provides answers”\textsuperscript{32}.

2. **Mandatory Processing**

Fodor’s –modularity also supposed to be mandatory and swift in their processing. That means no voluntary control over whether relevant input is processed (one can't turn them off)\textsuperscript{33}. That means the processes of modular systems are out of control; their process is automatic; in other words, process of modules are like reflex actions. That means when a modular process taking place we have no power to ‘switch off’ of that process. If they were not to so function then there is no way that transducer outputs can get in touch with the central process in charge of integration of outputs of different modules and fixation of beliefs. They generate their outputs extremely quickly by comparison with other (non-modular) systems.

3. **Limited Central Access to Intermediate Representations**

Information is not available to conscious awareness. E.g., auditory characteristics of speech sounds, or precise syntactic form of an utterance
are difficult or impossible to report, even though the utterance containing these was understood there is only a limited central access to the mental representation that input systems compute\textsuperscript{34}. According to Fodor, the process internal to modules is limitedly accessible to central process. Intermediary representations are not accessible to central process or they are concealed from central processing. That means that the lowest level representations are least accessible to central systems. That is processing from bottom up access is from top down\textsuperscript{35}.

4 \textit{Speed}

Complex information processing takes place remarkably quickly. Input systems are fast comparing to central system. This speed of modular process are related to the mandatory nature of (of process executed by input) systems.

5 \textit{Information Encapsulation}

The information from higher levels is not fed back to lower ones (e.g., no top down processing occurs)\textsuperscript{36}. The information stored in input computational systems are informationally encapsulated. It means that proprietary information of a module can neither be made available to other modules nor can be shared with central systems. As evidence Fodor suggests familiar example of Muller Lyer illusion of size which leads us to see a tailed line is longer than an arrow headed line even though we know rely there is no difference. This perceptual illusion test shows that persistence of illusion even when one is aware that is illusion. Another illusion of size is from changing size of the moon when it moves upwards from horizon are example to such perceptual illusions. Even though we know they are illusions or we may try to convince ourselves about the illusory nature of perception; our perceptual mechanism is not affected by our beliefs and it gives outputs in usual way. Fodor suggest this as the evidence of and the important role of non-modular systems in our cognition.
6  **Shallow Outputs**

Modular systems computes only a very limited range of representations that means input systems are limited in terms of the information that they deliver as outputs. The outputs of a module are shallow in the sense of being non-conceptual. So modules generate information of various sorts, but they don’t issue in thoughts or beliefs. For example, according to Fodor, it is not part of the language system (which is an input system) to determine communicative intentions of speakers, rather it is determined by central system. Judgments made by central system go beyond output of the language system. Belief-fixation is argued by Fodor to be the very archetype of a non-modular (or holistic) process. Hence the visual module might deliver a representation of surfaces and edges in the perceived scene, say, but it wouldn’t as such issue in recognition of the object as a chair, nor in the belief that a chair is present. This would require the cooperation of some other (non-modular) system or systems.

7  **Fixed Neural Architecture**

Fodor’s modules are supposed to be innate, in some sense of that term, and to be localized to specific structures in the brain (although these structures might not, themselves, be local ones, but could rather be distributed across a set of dispersed neural systems). Modules are handled by a circumscribed and dedicated brain region, that is input system related with restricted configurations in the brain.

8  **Characteristic Breakdown Patterns**

Growth and development of modules would be under significant genetic control, therefore, and might be liable to distinctive patterns of breakdown, either genetic or developmental. So it is argued that associated with selective deficits in one area of functioning that cannot be explained in terms of some general loss of capacity. For example, the agnosias and
aphasias are result of specific breakdown of specific region of brain. This functioning problem may be result of brain damage or genetic impairment.

9. **Characteristic Pace and Sequencing in Development**

Developmental course of a modular function is highly dependent on maturation of endogenous systems, and insensitive to environmental influences. Developments of input systems are determined genetically and these systems stay apart from experiences and general intelligence of individual. And one would expect their growth to unfold according to a genetically guided developmental timetable, buffered against the vagaries of the environment and the individual’s learning opportunities. Thus Fodor’s modularity is nativist version.

**Figure: 4.2. Minimal Peripheral –Systems Modularity**

Carruthers criticizes some of features of Fodarian modularity. Carruthers says that some of the following features of Fodor’s modularity will
need to get struck out as soon as we move to endorse any sort of central-systems modularity. Carruthers’ remarks are given as follows.37

1. Conceptual modules cannot have their own prosperity transducers

2. They cannot have shallow outputs. On the contrary, their outputs will be fully-conceptual thoughts or beliefs

3. Carruthers accepts domain specificity of modules and reconceptualised in terms of functional rather than content domains. For him, although it may well be the case that many modules are domain specific, it can’t be the case that all. For example, practical reasoning plainly can’t be domain specific, since in order to do its job it will have to be capable of receiving any belief, and any desire, as input.

4. Swiftness of processing also needs to go, in the context of massive modularity. Fodor’s modules were characterized as swift when compared to central processes; but a massive modularist adds modularity to the latter, Carruthers argues that conscious thought process are realized in cycles of modular activity,

5. Carruthers retain mandatory operation of modules. Each component system of the mind can be such that it automatically processes any input that it receives. And certainly it seems that some of the alleged central modules, at least, have such a property.

6. Carruthers says it is wisest to drop the innateness-constraint from our definition of what modules. Even though carruthers sympathize with nativist end of the spectrum, he suspect that much of the structure, and many of the contents, of the human mind are innate or innately channeled.

We have seen that how Carruthers discarded features of classical modularity such as, the properties of having proprietary transducers, shallow
outputs, domain specificity, comparatively fast processing, and significant innateness or innate channeling. So according to Carruthers, modules might be isolable function-specific processing systems, whose operations are mandatory, which are associated with specific neural structures, and whose internal operations may be both encapsulated from the remainder of cognition and inaccessible to it.

Fodor's argument for the global and holistic nature of central system has received considerably less sympathy than his argument for the modularity of input systems. According to Fodor, the domain of reasoning and belief fixation, (central system) is non-modular in character. But according to Carruthers, central system is also posses the characteristics of modularity. The main arguments against the modularity of central system are as follows.

1. The Central system is not domain-specific because central processing involves taking input from a variety of distinct sources and integrating it.

2. The Central systems are informationally unencapsulated because belief fixation is typically a process of non-demonstrative inference and such process involves framing hypothesis and confirm them by considering data that bear upon their truth value. Fodor compares our belief fixation to scientific verification and for him, the procedure involves not simply considering a restricted body of information delivered by our input systems but entire of scientists commitments. The central process is responsible for this formation of scientific belief. Fodor said that if scientific belief is non-encapsulate so as to central process which is responsible for the fixing or formation of scientific belief. If fixing of scientific belief is a form non-demonstrative inference, then Fodor argues that non-demonstrative inference in general is non-encapsulated. But science is, in fact, a bad model for the ordinary cognition or cognition in general. In short,
then, the holism of science fails to establish the holism of central cognition in general. Carruthers' criticism to this argument is as follows.  

1. It is a highly misleading notion that scientist is a lone investigator, gathering all data and constructing and testing hypotheses by him- or her-self and science is, actually a social activity, involving considerable external support. But common thinking takes place inside the head of an individual thinker, with little external support, and within the comparatively short time-frames. There is certainly nothing here to suggest that ordinary belief-formation routinely requires some sort of survey of the totality of the subject’s beliefs like a scientists’ cognition.

2. Much scientific reasoning is both conscious and verbal in character, being supported by natural language representations (whether internal or external). But Carruthers argues that linguistically formulated thought can be partially holistic in nature and he provides a *moderately massively modular* account of natural-language-mediated cognition which explains the partly-holistic character of such conscious thinking in modular terms.

It is argued that (Currie and Sterelny, 1999; 1999; Fodor, 2000) the exclusive feature of modules are its encapsulation. Encapsulation of modules was never really about limitations on modular input, however (that was rather supposed to be handled by them having proprietary transducers, in Fodor’s 1983 account). Rather, encapsulation relates to the processing data-base of the modular system in question. According to Carruthers, since the supposed duty of central modules is taking inputs and generating outputs of conceptual in nature we cannot argue for the claim that all modules have proprietary transducers, deliver shallow outputs, or that
modules are wholly inaccessible from the rest of cognition. Carruthers’s notion of modularity can be summarized as follows;

1. Since central modules are committed to a particular duty and drawing on only a limited variety of information, their interior processes cannot be *computationally tractable*. Thus Carruthers undermines the argument from computational tractability in two ways:

   i) The first is that its algorithm might require it to consult too much information to reach a solution in real time.(that is cognitive system needs to be realized in informational frugal system if it is to be tractable).

   ii) The second is that algorithm is too complex to be feasibly executed in real time. This entails processing frugality.

2. Carruthers adds that since central modules are supposed to control on beliefs to produce other beliefs, for example, it seems implausible that they can be completely encapsulated – at least *some* of the subject’s existing beliefs can be accessed during processing by a central module.

3. Language is the medium of inter-modular integration supported by empirical investigation into natural language syntax. According to this evidence, natural language syntax is crucially necessary for inter-modular integration. Thus language provides the medium for inter-modular communication. This entails non-domain thinking.(also non-encapsulated cannot draw any information held outside the system).

4. If cognitive processes are to be tractably realized, then the mind must be constructed out of systems whose operations are both *information-frugal* and *processing-frugal*; and this means that those systems must only access a small sub-set of the total available information while executing their tasks.
5. So ‘module’ is a distinct task-specific processing system whose operations are both information-frugal and processing-frugal (and hence which is wide-scope encapsulated)\(^{40}\).

The information contained in a given ‘frame’ can change with time, however (e.g. case of irregular verbs). This necessitates us to make a distinction between \emph{weakly modal} and \emph{strongly modal} understandings of encapsulation. In the strong sense a given system cannot access any other information at \emph{any} time during its existence. In a weaker sense a system is can only access whatever information is contained it its own data-base at \emph{that} time. We can say that the idea of an encapsulated system is the idea of a system whose operations \emph{can’t} be affected by \emph{most or all} of the information held elsewhere in the mind. But there is a scope ambiguity here\(^{41}\):

\begin{itemize}
  \item a) \emph{Narrow-scope encapsulation}: relating to most of the information held in the mind, the system in question \emph{can’t} be affected by \emph{that} information in the course of its processing
  
  \item b) \emph{Wide-scope encapsulation}: The system is such that it \emph{can’t} be affected by most of the information held in the mind in the course of its processing\(^{42}\).
\end{itemize}

From this, Carruthers conclude that the argument which holds that cognition must be modular in order that it should be realized in a computationally tractable form collapses. This simple heuristic program undermine one of the argument in support of massive modularity.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{massive_modularity.png}
\caption{4.3. Massive Modularity.}
\end{figure}
4.3. The Massive View of Modularity and Dual System Theory

The pessimistic view of Fodor that central cognition is mysterious and intractability has been criticized by the evidences from different studies. For example, it is possible to study the structure and functioning of the central-process working-memory system and structure of central executive.\textsuperscript{43} A number of investigations argued that central cognition itself may be quasi-modular in structure\textsuperscript{44}. Quasi-modules would differ from full modules in having conceptual (rather than perceptual or motor) inputs and outputs. And they may differ markedly in the degree to which their processes, and principles of operation, are accessible to the rest of the system. But they would still be relatively fast, special-purpose processors, resulting from substantial genetic channeling in development, and operating on principles which are largely unique to them and at least partly impervious to changes in background belief. If computational psychology is to be comprehensible, Carruthers (2003b) argues that each cognitive module must contain distinctive inferential processors. Notice that both of these arguments are essentially the opposite of Fodor’s (1983) pessimism concerning the prospects of computational psychology. Carruthers defines modules as distinct task specific processing system whose operations are both \textit{information frugal} and \textit{process frugal}. We have seen that it is the general view in recent cognitive science that human mind is modular even though they are opposed to on the issue of what extent we can accept modularity. Moderate View of Modularity argues for the existence of both conceptual as well as peripheral modules. On this conception, then, the degree of modularity exhibited by the human mind is, not massive, but moderately massive.
Carruthers\textsuperscript{45} offers a more extreme version of this argument, claiming that holistic computation is not merely inefficient but impossible. Carruthers endorses a neutral position between peripheral modules and conceptual modules and defend a moderately massive modularity. This view is massively modular because, the main non-modular central processing area is constructed out of resources of different modules including peripheral and central modules. For example, natural language module acts both as output as well as input module. More specifically, it will be held that it is the natural-language module which serves to integrate the outputs of the various central–conceptual modules, and which subserves conscious belief-formation and decision-making. According to Carruthers a large part of mind’s structure is modular in character. But he denies the wholeness.
Carruthers moderately massive modularity comes along with his dual system theory. Like Fodor, Carruthers also accepts dual systems account. But difference is that, for Carruthers both central and peripheral systems are modular and he provides a quasi-executive or decision making position to language in his dual system theory. According to dual system theory, there exist two levels or layers of cognitive processes, with one dependent upon the operations of the other, rather than being wholly distinct. The distinctions between two systems are captured in the chart below.
According to Carruthers, System 1 displays a belief / desire / decision-making architecture. This System 1 architecture is depicted in the following figure. Which implies the dual visual systems hypothesis of Milner and Goodale (1995), that the ventral / temporal-lobe system makes its outputs available for belief-formation and planning, while the dorsal / parietal-lobe system is concerned with the on-line guidance of movement. He maintains that, System 1 can be identified with conceptual or central modules. Hence Carruthers' notion of modularity is posed as sharp contrast to Fodor because in Fodor swiftness of process is the peculiar feature of peripheral module (dorsal system?). But Carruthers claims that it is the distinctive feature of central conceptual module. Carruthers (2005) describes Milner and Goodale's (1995) now well-supported hypothesis that two functionally and anatomically distinct visual pathways are at work in the human brain. After traveling through the optic nerve, the lateral geniculate nucleus (LGN), and the primary visual cortex (V1), optic information branches into two functionally distinguishable visual systems. Information in the dorsal
system is used in the coordination and execution of movements after an agent decides on a course of action, whereas information in the ventral system produces beliefs about the environment and grounds desires for perceived items. Carruthers claims, that the activities of the ventral system are unconscious while those of the dorsal system are not. After finishing his description, Carruthers (2005) states that ‘the dual visual systems hypothesis provides the grounds for one of the main arguments against first-order accounts of phenomenal consciousnesses.

**Figure:4.7. The System 1 Architecture**

**System 2 has three distinct sub-components:**

1. One charged with conscious, reflective, belief-fixation;
2. One subserving conscious, reflective, goal adoption;
3. One of which takes conscious decisions (thereby forming new intentions) in the light of one’s conscious beliefs and goals.
There is in fact just a single system constituting System 2, which can however function in diverse ‘modes’ matching to belief, desire, and decision-making. The relationship between S1 and S2 is one of the dilemma before Carruthers. He says that S2 is realized in sequences of functions in S1. Activated motor schema provides motor instructions to our muscles to start a movement and at the same time an ‘efferent copy’ of those commands are formed and compared with the original purpose motor schema inorder to permit a quick self modification before the movement it has even started. But the ‘efferent copy’ is also transformed through ‘emulator systems’ that model the kinematics of the body so as to match the incoming proprioceptive and other (visual) perceptual representations of action as it is executed., again allowing fast on line correction. This is the main role of dorsal parietal system . Carruthers says that ‘efferent copies’ are not restricted to dorsal system but also used to make visual imagery within ventral system. Images of ventral system interact with inferential system that normally operates on the basis of ventral input in order to formulate predictions of the likely results of the movement. Motor and pre-motor cortex is accountable for generation and transformation of conscious visual images situated in the temporal cortex. And according to Carruthers this happens via an area of ventro-dorso cortex that is assumed as common functional component of two primary visual systems .(This common functional section is the superior temporal salcus and area of folk psychology in the rostral part of the inferior parietal lobule).
The addition of language modules to the mix of modules that make up the human mind that is responsible for much of the latter's flexibility. It is argued that a natural language play an important role in the distinctive flexibility of human thinking. Natural language is what enables us to solve the problem of content flexibility. Carruthers claims that new form of language based thinking well suited with the weak notion of modularity defended by him. Mental rehearsal of action makes possible language based thinking and reasoning, realized in the operation of underlying set of conceptual modules. Natural language occupies an undeniable role in the flexibility of modular mind. The problem before cognitive scientist is to show how the flexibility and modularity of mind go hand by hand.

Massive modualrist must meet challenges from context-flexibility, stimulus-independence, content-flexibility, and from the flexibility of human reasoning processes. Carruthers discusses different kinds of flexibility like flexibility of action and context sensitivity. Human mind possess flexibility of
action, facilitated by the mental rehearsal and subsequent global broadcasting action schema. Feedback loops are responsible for the creativity and flexibility of mind. There are two different types of content flexibility. As first views, different organism with the same goals in the same circumstances should behave similarly. The second form is that different individuals are apt to pick up on and respond to different aspect of the context and behave differently in same context. If mind contains a general purpose cognitive or conceptual system, it can pick up only one items of information at particular time and is inflexible in relation to the features of context. But if mind contains modular central system it can solve this problem of context sensitivity. Context sensitive of flexibility of can be answered in three ways from the perspective of massive modularity:

a) Sperberian model of competitive modules
b) The encyme account of modularity
c) Moderate view of Carruthers.

Sperber (2005) claims that the peculiar feature of mental process are various kinds of competition amongst modules that means all activated modules try to win the battle by capturing the recourses and to acquire their outputs entry into downstream inferential and decision-making system. But this perspective leaves out the question of context sensitivity. The second proposal is due to Barrett (2005). His account is known as 'the encyme account' of modularity. The idea is that all multiple modules are focused on a common 'bulletin board' of representations. Whenever a module comes across a representation that 'fits' its input condition it gets turned on, and it then performs some set of transformations on that representation before placing the results back on the bulletin board for other devices to pick up upon. This is similar to Baars' 'global broadcasting' model. Carruthers agrees that this model is primarily an account of 1) How the different conceptual modules frequently inspect the contents of globally broadcast states, probing for ones that activate their input conditions.2) How
perception gets conceptualized by modular processes. But it cannot explain the process of more abstract modules like theory of mind. Carruthers argues that massive modularist can predict overall flexibility of behaviour—both in response to variations in the natural and social environment, and co-varying with the different learning histories of different individuals. Flexibility of mind is possible through language (as the content combiner).

4.4. Homo- Ergaster View: Language as Intra-modular Executive System

According to homo-ergaster view, human beings are the only creature endowed with linguistic capacities. So any effort to construct a pure theory of phenomenal consciousness cannot afford to disregard the role of language in cognition. So Carruthers amends his earlier cognition-language parallelism into one where greater emphasis is laid on language where the very question of consciousness transformed into one about thinking in language (that of course does not rule out thinking without language). This necessitates an extensive exploration of the role of language in post-2002 writings where he almost comes to terms with the prevailing view of language as involving production and comprehension systems. This means that he should play Chomsky and previous developments in cognitive grammar against the linguistic paradigm of language of thought (Jerry Fodor). Natural language is involved in human conscious thinking is an undeniable fact.

Carruthers distinguishes some ‘uninteresting weak’ claims from some ‘implausibly strong’ views of cognitive conception of language which is different from communicative conception language (natural language is only an input output module to central cognition). Different cognitive conception of language is stated and examined as follows.
A) Weak claims

a) Language as the medium of belief: Language is the conduit through which we acquire many of our beliefs and concepts. For example, language is the only medium for acquiring concepts like electron, neutrons, and DNA. These concepts are inaccessible to someone deprived of language, showing that language is required for certain kinds of thought; but not that language is actually involved in or is the representational vehicle of those thoughts. Carruthers argues that data from deaf people and wolf children really show that language is a necessary condition for certain kinds of thought and types of cognitive process; not that it is actually implicated in those forms of thinking. It shows that cognitive and linguistic development should proceed in parallel. The cognitive conception proposed here is developmental rather than synchronic, that implies that language is largely important for normal cognitive development. It does not follow that language is itself actually used in children’s central cognition.

b) Language as molding cognition: Process of language acquisition and enculturation actually sculpts our cognitive processes to some degree (Bowerman & Levinson 2001; Lucy 1992a, 1992b; Nelson 1996). As in the above case, present view is also merely developmental rather than synchronic, that implies that language is largely important for normal cognitive development. According to Carruthers, The fact that acquiring one language as opposed to another causes subjects to attend to different things and to reason somewhat differently doesn’t show that language itself is actually involved in people’s thinking.

constitutively involve natural language and as cognitive tool it enhancing the range and complexity of our reasoning process. Inner speech facilitates complex trains of reasoning (Varley 1998). According to this view language is involved in thinking and reasoning extended over time. Carruthers argues that this account is closely related with input-output concept. It maintains that there exists a neural episode which causes the production of natural language representation.

**B) Strong claims**

**a) Language as necessarily required for thought:** This thesis entails anti-realism about mind. As this view entails, it is conceptually necessary that all thought requires language. (This is the view defended by thinkers like Davidson 1975, 1982; Dummett 1981, 1989; McDowell 1994; and Wittgenstein 1921; 1953). Davidson claims that we cannot interpret any one as entertaining fine-grained thought in absence of linguistic behaviour and such thought cannot be independent of linguistic behaviour. This notion both objects commonsense notion and animal cognition. Dummett (1994) introduces the distinction between concept involving thought and proto thoughts to solve this problem. He says the former is language based thoughts and the latter is non-linguistic thoughts of animals. Proto-thoughts are possible when attached to current circumstances and behaviour. Carruthers rejects this view because; this conception undervalues the cognitive capacities of animals. According to Carruthers, thoughts of many types can really happen in the absence of natural language. But Carruthers says that the thesis that some thought might actually involve language is not a closed chapter (NNw).

**b) The Joycean machine:** maintains that language is, as a matter of fact, the medium of all human conceptual thinking. Dennett argues that human cognitive powers were completely transformed following the appearance of natural language, as the mind became colonized by memes (ideas or concepts, which are transmitted, retained, and selected in a manner.
The arrival of language then meant that a whole new—serial and compositionally structured—cognitive architecture could be programmed into the system. The idea of *Joycean machine* is that there is a highest-level processor which runs on a stream of natural-language representations, utilizing learned connections between ideas, and patterns of reasoning acquired in and through the acquisition of linguistic memes. According to this account, then, the concept-wielding mind is a kind of social construction, brought into existence through the absorption of memes from the surrounding culture. And as this view suggests, the conceptual mind is both dependent upon, and constitutively involves, natural language. According to Bickerton before the evolution of language human cognition is limited in its powers. Carruthers rejects this strong view firstly because they undervalue the cognitive powers of pre-linguistic children, animals, and earlier forms of hominid. Thus *Homo erectus* and archaic forms of *Homo sapiens*, for example, were able to survive in extremely difficult environments, presumably without language. Second, the views of Dennett and Bickerton are inconsistent with the sort of central-process modularism which has been gaining increasing support in recent decades.

Let us see what is Carruthers' latest position on the role of natural language in cognition. There is general agreement that conceptual modules will have restricted connectivity with each other. It will often be the case that two or more modules routinely pass their outputs to a third, “downstream”, module, which may then be able to unite those outputs into a single thought. But for systematic modularists, only the language is capable of receiving output from all conceptual modules, the evolutionary function of which is receiving, conjoining, and reporting information deriving from any conceptual module. Language is thus said to strengthen the *flexibility* and *conjoinability* of content that is distinctive of human thought processes. Carruthers views that the role of language in cognition isn’t to unify the outputs of some otherwise unconnected modules, rather, language has a quasi-executive role to play serving to manipulate the subject’s attention and on-line goals.
Carruthers argues, representations of natural language sentences have an important role to play in certain aspects of distinctively human thinking and reasoning and he maintain that, the role of language is to unifying and combining the outputs of different central / conceptual “modules” (Hermer-Vazquez et al., 1999; Carruthers, 2002). So for him, language is not only a vehicle but also a content combiner\textsuperscript{55}.

Carruthers here plays Chomsky against Fodor. Chomsky’s (1995) logical form” (LF) is a stage of linguistic representation, where the language ability interfaces with central cognitive systems. New natural language hypothesis is that all such cross-modular thinking operates by accessing and manipulating the representations of the language faculty. Carruthers argues that, the language faculty can build LF representations which unite information across domains and access to the outputs of the various central-process modules. When LF representations built by the production subsystem are used to generate a phonological representation, in “inner speech,” that representation will be consumed by the comprehension subsystem and made available to central systems. One of these systems is the theory of mind module. So Carruthers maintains that language is the vehicle of non-modular, non-domain-specific, conceptual thinking which integrates the results of modular thinking. According to Carruthers’s perspective of natural language not just that our conscious propositional thinking involves language but that \textit{all} non-domain-specific reasoning of a non-practical sort (whether conscious or non-conscious) is carried out in language\textsuperscript{56}.

Carruthers (2006, 2008) expands and broadens his picture by arguing that System 2 begins with the custom of mental rehearsal of action schemata. This utilizes back-projecting pathways from motor cortex to the various perceptual systems, which evolved in the first instance for the swift on-line fine tuning of action (Wolpert and Ghahramani, 2000; Wolpert and Flanagan, 2001; Wolpert et al.,2003).On this account, some other species of
animal already possess the beginnings of System 2 (although it is perhaps rarely used). But in the course of human evolution the addition of a number of other systems—for language production and comprehension, for mind-reading and higher-order thinking, and for normative reasoning and motivation—together with a disposition to engage in creative activation and rehearsal of action schemata (Carruthers, 2007) led to a transformation in the character of System 2. On this account, then, natural language plays an important constitutive role in distinctively human (S2) thought processes. This not only language plays such a role but also visual and other forms of imagery play such a role, in turn issue in decision-making.

Figure 4.9. The Mental Rehearsal of Speech

It seems Carruthers defends here a Vygoskian stand on inner speech. For example, Vygotsky (1934/1986), who argues that language and speech serve to scaffold the development of cognitive capacities in the growing child. According to Vygotsky Overt speech of children, plays an important role in problem solving, partly by serving to focus their attention, and partly through repetition and rehearsal of adult guidance. It is argued
that they have found that children tend to verbalize more when task
demands are greater, and that those who verbalize most tend to be more
successful in problem-solving. Earlier Carruthers follows a Vygotskian stand,
but now a combination of Vygotsky and Whorf can be seen, that means he
accepts a combination of strong and weak view.

To conclude that, two crucial developments in his post-2000 writings
assisted his protracted march towards naturalism and it is not easy to
comprehend his standpoint without them. One is the realization of the role of
language in cognition within the dispositional variety of higher-order theory of
consciousness and second is the introduction of dual system hypothesis
(System 1 and System 2 account) to account for dual architecture of what is
called ‘distinctively human reasoning’. The former hypothesis enables him to
reintroduce language for intra-modular integration while the latter claims to
close the explanatory gap by introducing mirror neurons as an important
step, thus taking the earlier default theory in the path of extended naturalism.
The resultant dual architecture of brain provides the gist for this. In the
developments after 2002, Carruthers went on to absorb all these later
developments before defending a weak folk psychological realism as form of
interactive dualism or minimal rationalism.

In this chapter, we have contrasted Carruthers earlier philosophy of
psychology with new ‘moderately massive modularity and his modified stand
on the role of natural language in cognition in the in the light dual system
theory. In case of modularity of mind ,Carruthers defends Chomsky against
Fodor which seems to be disguised criticism against modularity itself.
Massive modularity thesis modifies the nature of modules in related to
central modules. Its encapsulation requires a new base where rules become
frugal. This gets explained in terms of wide ambiguity (wide and narrow).

This account is still to be completed by an account of innate
knowledge in his use or what he calls as the culminating point of Cartesian
epistemology. The theory- of- mind is innately endowed and in turn in our
belief in self transparency of mind is innate or embedded in theory of mind module. But although moderate, it is pitched towards the massively modular end of the spectrum, which strikes a balance between two extremes of peripheral-systems modularity and massive modularity. It is exactly here that Carruthers argues that language becomes intra-modular in that it proves the study of mind is study of language or that some of our conscious thinking takes place in natural language sentence. Carruthers’ view is that the role of language in cognition isn’t to unify the outputs of some otherwise unconnected modules. Rather, language is playing a quasi-executive function, serving to manipulate the subject’s attention and on-line goals. Vygotsky argues that language and speech serve to scaffold the development of cognitive capacities in the growing child. Carruthers in the final run takes a blend of Vygotskian and Whorfian (which he have not fully accepted earlier) stand in this regard because now he accepts rehearsals of inner speech which depend on the dual system theory.

If dual system hypothesis survives Carruthers’ stand is vindicated. But dual system is subjected to more and more criticism today in the light of new experiments. The question before us is to see whether Carruthers supports a Cartesian interactive dualism. This is advanced as new theory-of-mind module that keeps a distance from both simulationism (Goldman, Gordon etc) and a TOMM version of it defended by Stich and Nicholas and he develops a modified form of Cartesian epistemology, which is the content of the final chapter.
REFERENCES


30. Ibid. p.73


33. Ibid.p. 52.

34. Ibid. p. 55.

35. Ibid .p. 56.

36. Ibid .p.64.


41. Ibid.


49. Ibid. p. 254.


51. Ibid.


54. Ibid .p. 218.


4 Carruthers, Peter. (1999). PP. pp 45


6 Fodor, Jerry (1975) The Language Thought Hypothesis. Thomas Y. Crowell Company


26 Ibid. pp. 173


28 Vygotsky, L. (1961). Thought and Language. MIT Press. (First published in Russian in 1934; republished and translated, with portions that were omitted from the first English translation restored, in 1986 by MIT Press.)


30 Ibid. pp. 73


33 Ibid. pp 52

34 Ibid. pp 55

35 Ibid. pp 56

36 Ibid. pp 64


