PIAGET’S STRUCTURALISM AND LINGUISTICS

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Abstract

The paper looks at the importance of structuralism to understand and make order of the world around us, especially with respect to the language that we use. It presents a brief preview of the various schools of Linguistic structuralism and the theories they proposed. This paper focuses on the kind of structuralism as proposed by Piaget where he stresses that structures are self-sufficient, that they have certain common and necessary properties. He had a different epistemological approach towards structuralism. For him structure implies that (Piaget, 1973:6)

1. There exist laws of totality distinct from those of its elements.
2. Its properties as a whole are laws of transformation.
3. Every structure implies that its compositions do not go outside its own frontiers.

Piaget’s ideas of the three parameters of being a structure come from the diverse fields; wholeness comes from gestalt theories, and transformation and self-regulation come from mathematical structures. The structures are built up through active construction of objects by the subject. Now this action can be sensory motor in the initial stages and then turns to mental operations or internalized actions where linguistic structures aid for the intellectual development. Thus ‘Structure is simply a system of transformations but its roots are operational’ (Piaget, 1971: 141)

Finally the paper looks at the theory by Jean Petitot, who proposes a topological theory in linguistics based on the catastrophe theory of Rene Thom. It is a more mathematized account of linguistic structures.

Keywords: Concepts, Mathematics, Piaget, Semiotics, Structuralism.
INTRODUCTION

The study of structuralism has been explained through various perspectives and disciplines. It is considered important to study structuralism because

‘...in domains like anthropology or semio-linguistics one encounters abstract forms of organization which cannot be directly reduced to systems of components in interaction, thus we cannot regard the structures as empirically given, it is a theoretical description of formal dependence relations which organically connects the parts in a whole...’ (Petitot, 2004: 22)

Structuralists hold the conviction that there is a structure underlying all human behaviour and mental functioning and that it is possible to discover this through an orderly analysis. Also structures have a cohesiveness and generality.

Structuralism applied to linguistics treats language as structures which are connected wholes, i.e. they have an internal pattern of connection rather than being sets of isolated items. It is a system which has its own arrangements.

Linguistics as a structured notion is an accepted view now. Saussure wrote about language as a system which has a particular structure (though he never used the term structure; it was system for him). This system of language consists of elements which are related to one another forming the structure of the language. Saussure looks at language with a shift from diachronic to synchronic view, wherein one studies about its structures and forms. Language is a form and not a substance. It is composed of langue (the rules which form a language) and parole (the way it is spoken by the user). The structure of the language could be viewed from two perspectives:

Paradigmatically: would be relation *in absentia*. In a sentence like ‘this is a cat’, a paradigmatic view will show how a word can be replaced by other words which is based on the rules of that language, example like ‘mat’, ‘bat’ etc. this corresponds then to the langue

Syntagmatically: would be relation *in presentia*. In the same sentence as above, syntagmatic view will look at the linear combination of elements which constitute an utterance, thereby corresponding to the parole.

The elements are thus not only related to one another they are also dependent on one another.

There were four main schools of linguistic structuralism:

The American school- led by Leonard Bloomfield was of a descriptive kind. It was motivated by the urgency of studying and preserving the American Indian languages which were dying out fast. Bloomfield took a more behaviouristic stance towards language learning stating the stimulus response method in his 1933 book ‘Language’ he emphasises that meaning is a relationship between the stimulus and its verbal response. He gives a series as to how language works. There is a certain stimuli say (A) to which a person reacts by speaking his speech (B), this speech in turn stimulates his hearers to a certain reaction (C). He describes language as

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2 Gardner, (1973 : 10)
3 Benveniste (1962)
4 “An outline of the history of Linguistics”
“The totality of utterances that can be made in a speech-community” (Bloomfield, 1926: 26)

The Prague school- Linguistic structure of Prague was formed in 1926. The prominent advocates of this school were Nicholas Trubetskoy and Roman Jakobson. Their emphasis was on the phoneme as being the fundamental unit in linguistics. Jakobson developed the theory of binary distinctions. The school also did a lot of work on syntax especially about the relation between word order and discourse. They initiated the distinctive feature theory, which presented phonemes as points in a system rather than mental entities. Jakobson and Halle proposed 12 acoustic cues which helped in distinguishing the phonemes of a language, e.g. voiced vs. voiceless feature distinguishes between /p/ and /b/, both are bilabial consonants differentiated because the first is voiceless while the latter is voiced.

The Copenhagen school-founded on 1931. One of the founders of the Danish or Copenhagen school of structuralism was Louis Hjelmslev. He along with Hans Uldall developed a theory called ‘Glossematics’ which is based on the Saussurean view that it is the relation between entities that is important rather than just the entities. Instead of Saussurean notion of signifier and signified, Hjemslev gave the notion of expression plane and content plane. So that along with form and substance they gave four combinations, that of form of content (e.g. semantic structure), form of expression (e.g. formal syntactic structures), substance of content (e.g. subject matter) and substance of expression (e.g. recorded voice, written texts).

The French school-Prominent notions of French Structuralism can be seen in works of Levi Strauss and Roland Barthes. Levi Strauss’ work stressed that structural analysis of kinship depends on the human consciousness. Roland Barthes work was mainly concerned with analysing the structure of a sentence with respect to the larger narrative. His work ‘Introduction to structural Analysis of Narratives’ divided the analysis into three levels, that of ‘functions’, ‘actions’ and ‘narratives’. Functions are the basic units of the work like say a particular word related to a specific kind of character which lead to certain actions and thus the formation of a narrative.

Levi Strauss views language from an anthropological viewpoint. He says that man be studied in a cultural context. Studying and analysing the myths provide an insight into human mental level. He rejects Vladimir Propp’s approach of formalism and prefers structuralist approach. While formalists separate form and content as one being concrete and the other being abstract, for Levi Strauss it should not be so. From a structuralist perspective, both form and content are equally important and not to be seen as separate entities. The vocabulary used is as important as the function that occurs in analysing a myth. A word can be studied in a lexical system only when the structure of that system is studied. Levi Strauss was also against the functionalist approach. For example while the functionalist approach viewed society as being a complex system whose parts work together to provide stability, for Levi Strauss the world is conceived of as binary.

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5 ibid
6 ibid
7 “Semiotics for Beginners”
8 Wikipedia (Roland Barthes)
oppositions (an idea influenced by the Prague School of Linguistics) and that every culture can be understood in these opposites.9

This paper looks at the kind of structuralism as proposed by Piaget where he stresses that structures are self-sufficient, they have certain common and necessary properties. He had a different epistemological approach towards structuralism. For him structure implies that10

4. There exist laws of totality distinct from those of its elements.
5. Its properties as a whole are laws of transformation.
6. Every structure implies that its compositions do not go outside its own frontiers.

Piaget looks at structuralism as present in various disciplines like mathematics, psychology, physical sciences and linguistics, but there is a common component among these views regarding structuralism. The notion of structures as per him comprises of essentially three components. The first component is ‘wholeness’ which is different from aggregate. The latter is formed from elements which are independent from the complex group they enter. The former also consists of elements, but in this case the elements are subordinated to certain laws. It is through these laws that the structure gets defined and these laws apply on the whole and not to elements in a one to one correspondence. The second component is that all these structures are systems of transformation. It is important to note that the elements of this structure are what undergo transformation and not the laws themselves. The third says that structures are self-regulating, that is its compositions do not go outside its boundaries. The latter section tries to see the implication of this kind of a structure applied to linguistics and thus to the process of language acquisition and finally it will look at an attempt to mathematize the linguistic structures.

PIAGET'S STRUCTURALISM

Piaget’s ideas of the three parameters of being a structure come from the diverse fields; wholeness comes from gestalt theories, and transformation and self-regulation come from mathematical structures.

Piaget considers mathematical structures to have put a considerable influence on the linguistic and psychological structures.11 As per his definition of structures, the first known structures would be the mathematical ‘groups’. In fact, groups are used as basis in many areas of not only mathematics but also physics and biology. This is one of the reasons why Piaget looks at the structure of these groups so closely, as a prototype of structures. He connotes/assigns the primary reason for this wide range of applicability of groups to form the basis is because of the way it is abstracted, the term used by Piaget being “reflective abstraction”. The difference here lies in the fact that unlike abstraction which derives properties from things, reflective abstraction derives properties from the way we ‘act on things’12. Groups form a self-regulating system (they have

9 Wikipedia (Structural Anthropology)
10 Piaget (1973: 2)
11 Piaget (1971: 17)
12 Ibid (1971: 19)
the conditions of ‘associativity’ and ‘inverse operation’, i.e. they are governed by laws of internal logic. The group systems when undergoing transformations preserve their internal structure. Another important feature of groups is that the transformations can also occur within sub groups, e.g. when we talk about geometrical shapes, we can bring in change in either the angle without affecting the parallel and straight lines. But nevertheless, even changes in these subgroups will have some effect on the other components because components of the same structure are interdependent. Example, if there is a group of geometrical shapes of triangle, and the change is brought in only the angle but even then the dimension of sides will be affected. What is to be noted is that (as mentioned earlier) in these transformations the internal properties of this group like the ‘sum of all angles’ etc. stands intact.

Piaget was highly influenced by the Baurbaki circle. They are a group of French mathematicians who published work under that name. These mathematicians were not convinced by just subjecting algebra to group properties. They wanted to remove the traditional compartmentalization of mathematics and

‘…instead started a program of generalization whereby the group structure becomes only the one among a variety of basic structures…[and] by subjecting mathematical elements of every variety, regardless of the standard mathematical domain to a sort of reflective abstraction so as to arrive at maximum generality’

As a result he goes on to identify the three Baurbaki ‘parent’ structures, which are not further reducible and can be considered the ‘source’ of all other structures.

These are:

a) Algebraic structure- the prototype of this is the mathematical group with its characteristic being the operation of reversibility taking the form of inversion.

b) Order structure- the prototype of this is the network, where in the networks unite their elements by the predecessor and successor relation. Their main characteristic is the reversibility takes the form of reciprocity.

c) Topological structures where limits is the prototype.

Piaget moves on to compare these parent structures to the way the intellect of a human works. He states the example that positive whole numbers existed in the day to day matching activity of one to one correspondence as used by people in primitive societies or which can be seen till today in small children playing games. With this as basis he says that in the intellectual development of the child the earliest cognitive operations which are a result of the actions they perform on their surroundings

‘…can be divided into three large categories, according to whether reversibility takes the form of ‘inversion’, ‘reciprocity’ or of ‘continuity and separation’.

He thus concludes that these parent structures of Baurbaki correspond to the way intellectual activity develops. Thus he says that the early intellectual stages

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13 Ibid (1971: 23)
14 Ibid (1971: 24)
‘…grow out of the sensory motor coordination and that this cannot be understood as apart from structures.’ (1971)

It seems as a result of this, later in his work of cognitive constructivism he goes on to stress the importance of ‘action’ in the intellectual development of the child.

Piaget reflected upon the logical structures and says that unlike intuitive mathematics, natural logic which is essence a form cannot be extended to that level of formalization. He states Godels discovery, which stated that no there is no consistent formal system is capable of showing its own consistency and that any such system is not capable of representing mathematics completely\(^{15}\), as a turning point. The hierarchy, he says, which this system introduced in logic and mathematics was the beginning of the idea of construction. On the basis of this idea of construction he visualizes human knowledge as a spiral of increasing radius. He thus brings in a new perspective to structuralism where structure is a system of transformations of continuous construction. He cautions that

‘…though everything that has form can become a structured; structure in its technical sense of self-regulating system of transformations in not same as form’ (1971)

Moving on to the origin of psychological structures, Piaget refutes the possibility of a contingent emergence\(^ {16}\) as a solution by stating that it is incompatible with the idea of structure especially logico-mathematical structures since it is not derivable from physical world only. Among the other alternatives of ‘innate predetermination’ and ‘construction’ both seem acceptable at first glance but then again run into problems which he denotes using the example of logico-mathematical structures; if we say that child

‘Discovers them ready-made yet it is not the same as say learning the existence of colours’ (1971)

Similarly, if we say he constructs them then again the issue comes that

‘He is not free to draw them up at his pleasure (like the rules of a game)’ (1971)

Then he states that experiments have indeed shown that logical structures are in fact constructed and elaborated over the years\(^ {17}\). This also does not mean that all structures are constructed; he calls it a process of ‘passing from simple to a complex structure’ and that there are certain givens from where this passing starts from and that these initial structures are the “general coordinations of actions”. Again Piaget stresses on the importance of activity in the intellectual development. For him all behaviour that has innate root has same functional factors and structural elements, these functional factors are

‘Assimilation (action is actively reproduced and comes to incorporate new objects) and accommodation (whereby the schemes of assimilation are modified in being applied to a diversity of objects).’ (1971: 63)

\(^{15}\) Ibid (1971: 33) \\
\(^{16}\) Ibid (1971: 60) \\
\(^{17}\) Ibid (1971: 62)
To state an example differentiating both these processes is, suppose a child sees a tall four legged animal with a hump, and based on his previous knowledge of four legged creatures calls it a giraffe (assimilation), later he realizes that this animal is different from those he calls giraffe because of the hump and then he modifies his previous knowledge and forms a new category named camel to adjust this information (accommodation).

The structural elements are order relations, subordination schemes and correspondences. He explains that the first step is associated invariance where in the child searches for the object when it is removed from out of sight and can be traced back by reconstructing its displacement. Next is the activity concerned with the manipulating objects to complete tasks example, using a stick to reach out for a distant object. The intelligence at this stage is yet at the sensory motor level and does not involve representation.

With the onset of semiotic functions of speech, symbolic play and image and the ability to realize that things do exist even when not in sight that the process of reflective abstraction begins. Experiences from the sensory motor action stage are then projected on to the plane of thought. Thus along with this also rises the conceptual structures. The order relations which were up till now on the sensory motor plane are now separated from it and form an activity of ordering followed by the activity of categorizing. But still at this level the idea of reversibility is not there and thus one cannot yet speak about operations (since this term is to be used for procedures having inverse). As per Piaget it is only about age seven to ten that the child enters the stage where reversibility comes into action and that through by actively working upon things (the term he uses is ‘concrete operations’). Thus Piaget concludes from this that the complex proceed from the simpler as reflective abstractions and provide the structural basis for it. Next up is the reorganization of this classification by means of a combinatory activity.

Piaget clarifies the issue of when we say that a structure is self-regulating who exactly is providing these laws? He says it is not the theoretician for then the structure would be just a formality, instead he says that real structures are governed from inside. Now this raises the issue that if all structures are governed from within then what is the role of the subject? He gives a reply to this issue by saying that a subject is the one who actively constructs on the objects. There would be no structures if the subject would not be working on them.

‘Piaget reasoned that an organism’s intelligence was embodied in a series of structures with latent tendencies for development, which could be brought out by appropriate interaction with the environment’ (Gardner, 1973: 59)

Thus what was essential was action. All thinking performed by the subjects was, for Piaget, mental operations or internalized actions.

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18 Ibid (1971: 64)
PIaget AND LINGUISTIC STRUCTURES

Piaget says that one of the reasons why structuralism especially linguistic structuralism was independent of history was the arbitrariness of the verbal sign. Since it does not hold any direct relation to the meaning of what it stands for these were conventional. He further added that this shows

‘…relation between synchronic and diachronic must be different in linguistics from other domains, where structure belongs to the expressed rather than to the means of expression, to the signified rather than to the signifier’ (Piaget, (1971: 79))

From a synchronic structuralism there was a shift to generative structuralism where instead of the static laws, structures were governed by transformational laws, which also filtered out those structures which were ill formed\(^1\). Noam Chomsky is the one who is credited with this.

Instead of a step by step inductive procedure to collect the characteristics of a language, the generativists looked at those properties that would help describe the universal principles of language and the rules governing these principles. This generative view, where the grammars are restricted in the variations at the deeper levels, led Chomsky to the hypothesis that there are certain fixed schemas, which he called ‘kernal structures’ which are present innately in all human beings and that based on these the later language is developed. But Piaget raises the biological issue of whether these innate structures are being hereditary? He argues that

‘…if the genes transmit a fixed innate scheme that forms language from within then, the formative kernel is endowed with reason, so that reason itself must be regarded as hereditary?’

Piaget goes on to suggest an equilibration hypothesis\(^2\) over Chomksy’s innatism. It looks at acquisition of linguistic structures as a linguistic process where there is a layer by layer construction and not ‘a basis’ that contains everything in advance. In favour of this hypothesis he states the example of appearance of language only around the second year of life. Piaget is in not much favour of the existence of meaning of words before the prior to the formation of sensory motor operations.

But the question arises that even though the child does not articulate clearly the bi syllabic words do denote or refer to some things. It is true that the numbers of referents are more for a word but nevertheless they denote something for the child.

Not only does Piaget says that intelligence precedes language ontogenetically he also says that it does so phylogenetically as well and he states examples of intelligence of apes in favour of this.

Thus Piaget stressed that knowledge proceeds from actions; that a young child has to construct the world of objects, it is not apriori but instead something that develops over time. As per the role of language in this development of knowledge, Piaget does not give it much importance.

‘For Piaget language does not play a determining role in intellectual development. Knowledge which stems from language is never genuine knowledge, that words obfuscate the child’s

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\(^1\)Ibid (1971: 81)

\(^2\)Ibid (1971: 90)
understanding, and that it is the attainment of operations which determines change in linguistic capacity, rather than the reverse’. (Gardner, 1973: 5)

Piaget says that languages can be simply parroted from others but true understanding comes only when operations begin, that is, the child starts actively working on objects around her. For him, there is thought independent of language.

It seems here that Piaget is in fact undermining the role of language in the development of the intellect of the child. When he states the example of deaf children also showing the operational level without any language, he is restricting himself to the view of spoken language. Taking the view of Saussure here, language is a system. It helps in categorizing the world. Instead of operations helping to make sense of the world, it could also be said that language guides in ordering the world around. New schemas are formed and tagged under new names, that is, in language. It can be said that language development instead of just being dependent on the operations, also aids it. It is a relation of mutual interdependency. When a child calls a four legged animal ‘bow-wow’, she is not using the word without making meaning, she won’t use the same word for every other object but only those four legged animals which to her resemble a dog and fall into that schema. Later when she learns new words she accommodates new schemas. It cannot be said conclusively that after she has formed the distinction does she use a new word for it, or after learning the word is she categorizing it further. As the vocabulary increases the sophistication of categorization also increases. That is structures start moving from the simple to the complex.

To the issue of speech structuring intelligence Piaget has to offer two methods transformational analysis and operational analysis. These enable us to analyze the correlation between syntactic and operational structures, i.e. whether it is the linguistic structure which is prior or the logical one.

An important point that Piaget discusses is that of the role of the subject. He distinguishes between

‘...the individual subject and the epistemic subject (where cognitive nucleus is common to all subjects at the same level)...’ (1971: 139)

The subject is the one who constructs these structures layer by layer. The language and culture give this structure a common basis while the individual mind takes in and things with a perspective of its own.

Piaget states that

‘...the subject exists because the being of structures consists in being under construction’ (1971: 140)

He states in conclusion that there is no structure apart from construction, either abstract (moving to simple to complex) or genesis (transition from one structure to another).

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21Ibid (1971: 94)
As per Piaget there are three main trends that characterise the child’s mental development, first being the decline in egocentrism, next is the tendency towards internalization of thought and finally the child’s reliance upon symbols like words and signs\textsuperscript{22}.

As an opposing view Lev Vygotsky in his book ‘Thought and Language’ stresses the importance of speech, especially inner speech by which the child mediates and regulates her activities and take their thought to a much higher level of sophistication.

Roman Jakobson has written about the point of contact of the structural approach and the developmental approach with specific to language learning\textsuperscript{23}. Jakobson’s view of structuralism was based on the Prague school. His major proposal was of binary oppositions in a structure. He noted that in infancy infants babbled all kinds of sounds but then this random babbling stops and sounds will be produced as per these principle of maximal contrast working in that structure. He proposes the stages that acquisition of vowels starts with a wide vowel like ‘a’ and a bilabial consonant ‘p’ or ‘b’ the contrast being the least (vowel) and total (consonant) obstruction, so that the first disyllabic words would be ‘baba’ or ‘papa’.

Jakobson has not limited this analysis to the phonological realm; he also mentions the structures of language with respect to the functions of verbal communication, where he identifies six forms (conative, representative, emotive, phatic, metalingual and poetic). He says that even these forms unfold in a systematic and regular order, with the later forms dependent upon the stability of the earlier ones\textsuperscript{24}.

**MATHEMATICAL STRUCTURE APPLIED TO LINGUISTICS: A VIEW BEYOND PIAGET**

Though Piaget and Chomsky agreed on the fact that there was something innate about the structure, both differed in the way they approached this. To begin with Piaget firmly believed that functioning of intelligence is dependent on the actions performed on objects. He considers acquisition of language also under this activity of construction. For him innateness seems like a weaker view since in that case it could be traced back to the heredity and thus to an analysis of say bacteria or viruses. While Chomsky believes in the innatist approach where there are language universals which account for the complex rules of sentence production\textsuperscript{25}.

Jerry Fodor opposes strictly anything that deals with acquisition or a learning theory. The problem he sees with such theories is that they do not say anything about the origin of concepts and instead assume to agree to one hypothesis and see the means of how it is reached. For example he states the example where a child is provided with many objects of different colour and shape and he has to sort them out into two categories named miv and non-mivs (both are nonsense words and are used to test how child is acquiring language). Say the child sorts out the objects into the specified categories by trial and error and appropriate response from the experimenter, it nevertheless does not tell us how the concept of miv was acquired because the

\textsuperscript{22}Gardner (1973: 64)
\textsuperscript{23}Ibid (1973: 198)
\textsuperscript{24}Ibid (1973: 202)
\textsuperscript{25}Chomsky and Piaget (1979: 53)
concept of miv was already presupposed before and only because of that could the objects were sorted out. The theory that he feels is the only appropriate one is a function of maturation.\textsuperscript{26}

The issue that Chomsky raises against Piaget’s notion of constructivism is regarding the relationship between the things child is doing prior to development of language and the aspects of structure that develops.\textsuperscript{27} According to him there is no demonstrable relationship between intelligence and the constructions of sensorimotor actions. He states the cases of children with extreme physical defects and that in spite of that they have no problem in acquiring language.

One can say that though sensorimotor operations aid the child to maintain that they are necessary is a weak proposition.

Chomsky thus says that a more rational approach then would be to consider an innate model, where there are principles of organization which determine the structure of a language.

The transformations of syntactic structures as proposed by Chomsky are applied in a sequence. Jean Petitiot reasons that since this is the case, the acquisition of language will also follow certain stages and that each of this stage will be followed by a set of automatisms, which also leads to a stage where there will be automatisms which will be nondeducible, i.e there is no principle available in deducing the ‘kernel sentences’. Moreover natural language cannot be axiomatized.\textsuperscript{28} There is no grammar which can be applied to all languages in the world.

As an answer to this problem of formal universals proposed by Chomsky, Jean Petitot, inspired by Rene Thom’s Catastrophe theory gives substantive universals.\textsuperscript{29} These models are deduced a priori. It is based on the ‘localist’ hypothesis according to which-

“The positional relations between spatio-temporal actants operate as schemas for actantial relations” (Petitot, 2002: 45)

Catastrophe Theory originated in the works of French mathematician Rene Thom. It might be described as a “continuous topological unfolding of discontinuities in a continuous medium, realizing the final, topologically complex shape which in some sense is potentially present in it [the object]”\textsuperscript{30}. Thus the development could be described mathematically as the step by step unfolding of that singularity.

Jean Petitot in his book ‘Morphogenesis of Meaning’ uses catastrophe theory as the basis to explain the linguistic structures. It is a topological structure which characterizes a set and takes care of the properties such as connectedness and continuity in case of transformations.

For example, the case meanings are conceptualized in their positional views as per their space and continuity. Rene Thom gives an example of how the structure of case is explained in topological schemata for accusative case, wherein there are two parallel paths S1 and S2.

\textsuperscript{26}Fodor (1979: 146-149)
\textsuperscript{27}Piaget (1979: 168)
\textsuperscript{28}Petitot (1989)
\textsuperscript{29}Petitot (1979: 375)
\textsuperscript{30}Petitot (1989)
suddenly S2 intersects S1 and then ceases to exist\(^{31}\). This is a graph for a sentence like ‘Ram killed Ravana’ where S1 is Ram and S2 is Ravana.

CONCLUSION

Structuralism is an attempt to identify the underlying arrangements of elements of a system. The variations, interactions and interdependencies of these elements are noted and the laws which govern their transformations, for the structures are not static but evolving.

For Piaget these structures should have three components. One is that of wholeness in structure as opposed to aggregates which deal with separate elements. In structuralism these elements coexist together and are related to one another. A structure is always adhered to transformations and lastly these laws of transformation do not let the elements move beyond the boundary of that structure, thereby making these structures self-regulating and self-maintaining. The structures are built up through active construction of objects by the subject. Now this action can be sensory motor in the initial stages and then turns to mental operations or internalized actions where linguistic structures aid for the intellectual development.

Thus ‘Structure is simply a system of transformations but its roots are operational’ (Piaget, 1971: 141)

Both Piaget and Chomsky agree about the existence of some ‘fixed innate scheme’, the point of difference between them is regarding the nature of this. For Piaget it is all about cognitive construction in a stagewise manner while for Chomsky it is all about formal language universals.

Jean Petitot proposes a topological theory in linguistics based on the catastrophe theory of Rene Thom. It is a more mathematized account of linguistic structures.

REFERENCES


\(^{31}\)Petitot (2004: 5)