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Merge, Operation and Space

Sanjaya Kumar Lenka [1*]
[1] *Indian Institute of Technology (BHU),Varanasi, Uttar Pradesh, India*

Abstract. This paper studies merge as a syntactic process of combining syntactic objects and argues that this combining process is always associated with a syntactic operation. This syntactic operation always follows an action operated by the syntactic objects on the basis of their grammatical properties. This action creates semantic space in which the derivation of a sentence takes place. This space has existence and it can be drawn from the structure of the sentence. There are different arguments and explanations about number of working space in which derivation of sentences takes place. But this paper argues that the derivation of a sentence takes place in the semantic space of this sentence itself and following this fact this paper argues that each sentence has specific semantic space. It means there is more than one semantic space seen in the derivation of different sentences. This paper follows the theoretical assumption of minimalist program given by Hornstein; 2017, Chomsky; 1995. This paper applies this theory in analysis of syntactic structure of an Indian language like Odia.

Keyword: Semantic Field, Abelian Group, Semantic Space, Axioms, Syntactic Operation

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1 Introduction

Merge is a syntactic process combining syntactic categories in derivation of a sentence. It is based on an operation in which a particular action of syntactic constraints is involved. Therefore, merge is defined as a syntactic architecture, a basic structure building operation which creates multi-dominant structures of sentence (Chomsky;1995, Hornstien;2017).A syntactic merge is not a completely free process, it is governed by syntactic operation (action) which is grammar of language. There is a very small difference between merge and syntactic operation. A syntactic operation is based on different maxims and these maxims and logic are grammar of language. The merge process is simply a process of combination creating phrase category.it partially ignores semantic of sentence. When syntactic merge occurs following a syntactic operation, the whole process formulates a semantic space of a

* Corresponding author at: Indian Institute of Technology (BHU), Varanasi, Uttar Pradesh, India

E-mail address: sanjaya.lenka@gmail.com

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simple process and it is implemented in syntactic operation which can be many and constrained by grammatical rules of the language. This study also argues that semantic space is an interpretation of a sentence and it emerges when merge is implemented in correct syntactic operation. Semantic space is both the internal and external interfaces of a sentence. The space as internal derives the structure of sentence and as external appeared after spelling out of the sentence. Finally, this study tries to find out how syntactic merge, syntactic operation and semantic space are common building blocks of a sentence which can give a very necessary explanation about structure of sentence.

Merge as process of combination always takes two root elements like X and Y and makes them to be root of another form (Hornstein; 2017,2005,Chomsky;1995).Chomsky says merge operates over syntactic objects placed in a workspace: the merge-mates X and Y are either taken from the lexicon or were assembled previously within the same workspace. All syntactic objects in the lexicon and in the workspace are accessible to merge; there is no need for a selection operation (as in, e.g., Chomsky 1995). Work Space represents the stage of the derivation at any given point. It means merge is a generative process of syntactic structure.

Every sentence has structure. Structure means a derived syntactic Object formulated by merge. Any kind of structure generated by merge may not exist in a language. But the existence of a structure is concerned with the world of thought. The essence of structure is the merge that regulates structure connect the structure with a context and real world on the basis of universal thought. If it fails to do it then structure is not grammatical. The important fact is merge should formulate grammatical and meaningful structure in derivation It is also seen that merge always creates a new rooted syntactic object and it is able to generate unbounded syntactic structure (Chomsky; 1995, Hornstain; 2017, 2005, 1999, 2001 Citko and Yuksek; 2020).For example,

(A){α, {β, {γ, δ}}}

(B){{α, β}, {γ, δ}}

(C){{{α, β}, γ}, δ}

It is the hierarchical structure that merge can deliver.

2 Result and Discussion

2.1 Merge

2.1.1 Merge in the syntactic structure of Odia

This Study applies merge in Odia as one of Classical Languages of India and official language of Odisha. For example:

1.*[madhu [sidhuisikubhalapae[boli[kahilaa]]]]*.
madhu-sidhu-isi-to-loves-that-tell-past
Madhu told that sidhuloves Isi.

2.[*Champaa[phuspuskalaa[saaantaNi[aasileNi]]]]*.
Champa –whispered–madam come-past
Champa whispered madam came.

3. *[Maa [citkaarkalaa[trainaasuchi]]]*.
Mother-shouted –train- come-pre-progressive
Mother shouted a train is coming.

4.*raamamobahichiridelaaebaumadhupodidelelaa*.
Ram- my book-acc-turn-past and-madhu-burn-past
Ram turned my book and Madhu burnt.

5.*muMadhukujanejahakusujan Madhya janeebausaadhupasandakare*.
I madhu-acc-know whomsujan too know and Sadhu like-pre-simple
I know Mdhu whom sujanalso knows and sadhu likes.

6.*eagotebahijaahaaku Mu padhinahikintubahutapraadyapakankadwaraanumoditahoethila.*
This book which I not- read-pre-perfect but many professors recommend-pre-perfect
This book which I have not read but many professors have recommended.

In these sentences of Odia, we can see that merge can generate different types of grammatical structure of sentence and all these denote particular sense. The important observations in these sentences as follows: merge is not followed in a single application In some sentences only either internal merge or external merge is applied, in some sentence both internal and external merge are applied, in some sentence parallel merge is applied and in some sentences both internal ,external and parallel merge are

applied. There is an interaction between internal and external merge and internal and parallel merge. This interaction renders certain constraints which is called grammar.

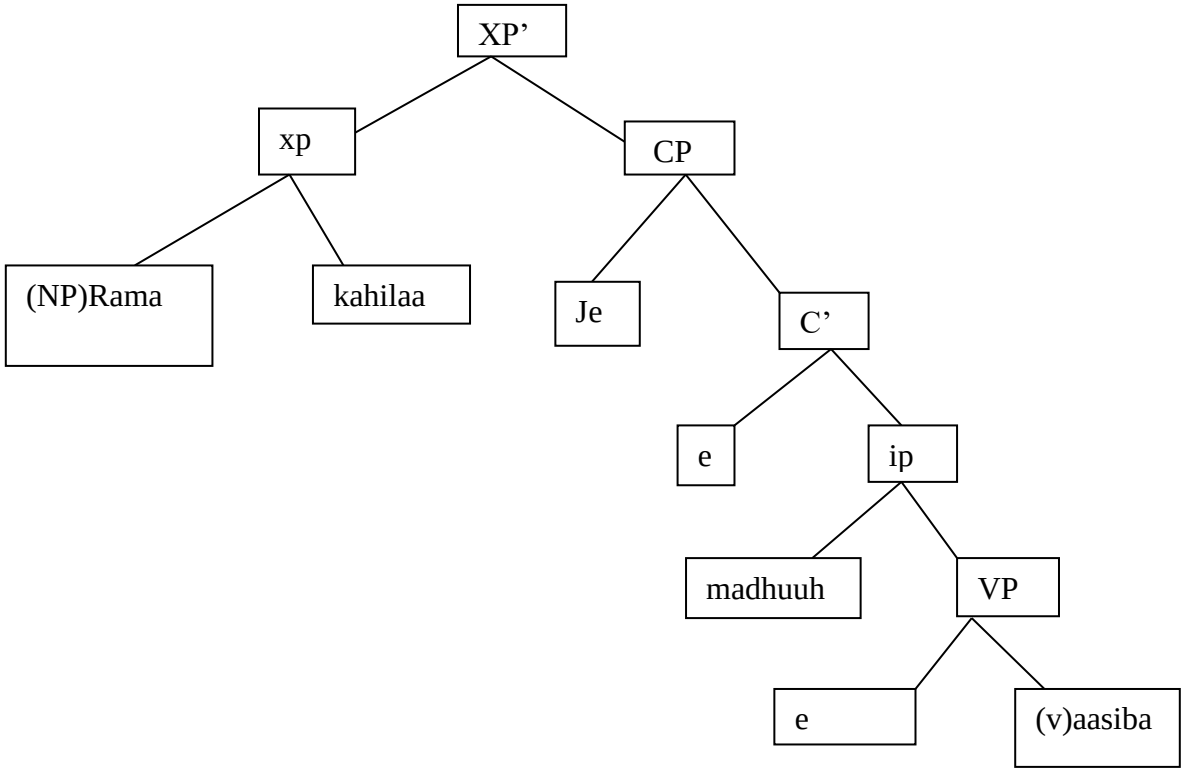
2.1.2 Merge as process of combination

Merge does not combine more than two syntactic positions but it combines more than two syntactic objects at a stage. For example,

7..*Ramakahilaa je Madhuaasiba*.

Ram tell-past thatmadhu come-future

Ram told that madhu will come.



In sentence 7, there are many sets of syntactic object. These sets are combined by merge in binary way. First two sets are merge to create a phase marker and then this phase is merged with another phase to create a higher structure. The important fact is each phase in this structure is a new derivation. In a new derivation the number of set can be increased or parallel.

2.1.3 Applications of Merge

Merge has three applications; namely external merge, internal merge and parallel merge.

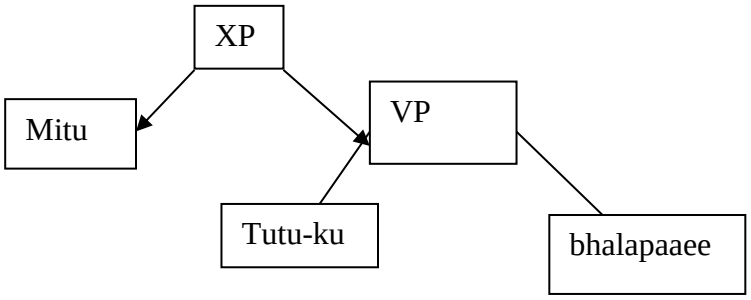
1. External merge

External merge (E-Merge) takes two disjoint syntactic objects and combines them to form a large syntactic object. This merge encodes the theta assignment from verb to its arguments. The thematic dependency between the predicate and its internal argument is syntactically established under E-Merge (Hornstein:2017;10). For example,

8.*Mitututukubhalapaae*.

mitu tutu-acc love-pre-simple

mitu loves tutu.



In this structure, the internal argument *tutu* functions as object gets its thematic relation of patient from verb and it is also subcategorized by the same verb. Therefore, it is internal argument of verb and since it codes the theta dependency it is externally merged in the structure. The appearance of *Mitu* is also related to verb. It fulfils the thematic dependence of agent of verb and it functions as subject of the sentence (VP internal hypothesis). It is also combined in structure by E-Merge.

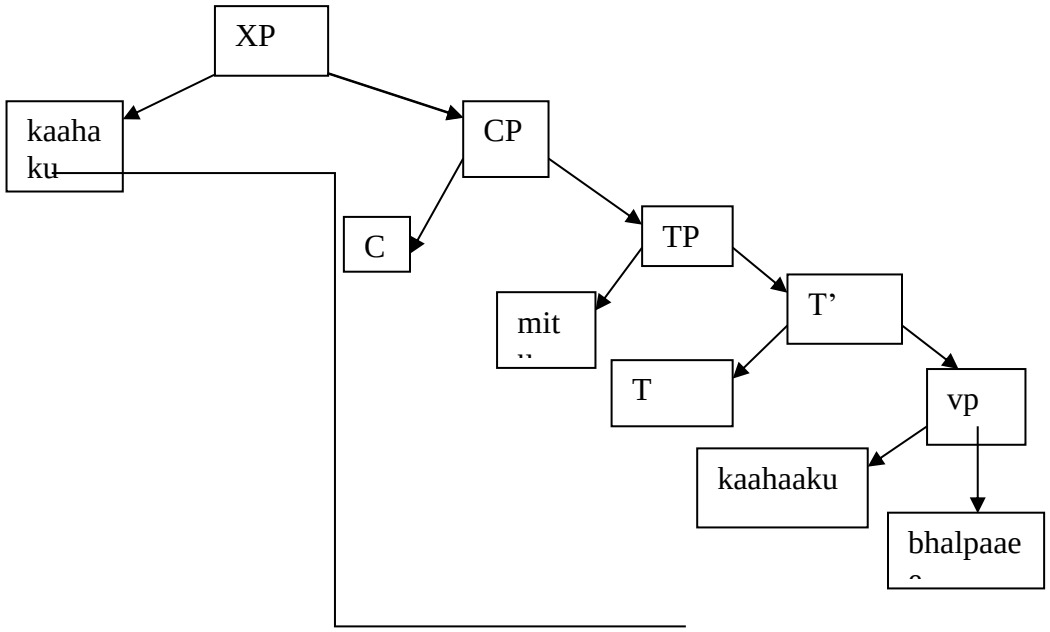
2. Internal Merge

Internal merge (I-Merge) often takes two objects and combines them into one bigger object but one of these two objects is a part of the other syntactic object it involves merging syntactic objects one of which is contained in the other. I-Merge results in displacement structures that are able to support the scope properties of sentences (Hornstein:2017;10).It is seen when an argument of the verb moves to another position in the same sentence ,It takes responsibility of displacement in the grammar. For example

9.*Kahakumitubhalapae?*

Who mitu love-pre-simple

Who does mitu love?



The structure of this interrogative sentence is formulated by movement of internal argument to complementizer position. The object first appears in the internal argument position of the verb where it gets the thematic role of patient and fulfils the thematic dependency of the verb. But when an interrogative sentence of this structure is formulated the object moves to the higher position. This movement is defined as I-Merge. From this analysis it emerges that merge has movement properties.

3. Parallel merge

Parallel merge formulates multi dominant structure where a syntactic object appears in two places simultaneously .It combines an object that has already undergone merge with something other than the root that dominates it (Citko and Yuksek; 2020).The nature of parallel merge is it always formulates new derivation in which number of set is increased. For example,

10..*Rammobahichiridelaaebausyampodidelaa*.

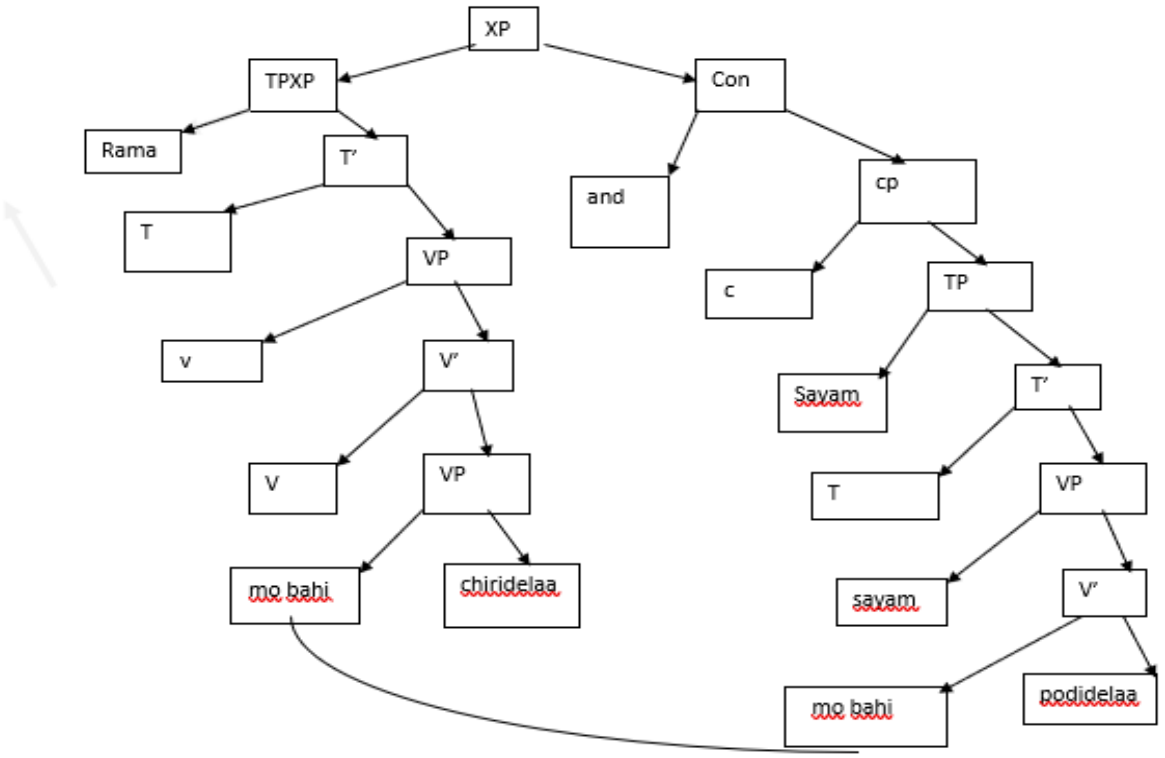
Ram my book turn-ed and syam burn-ed

Ram turned my book and syam burned.

11.*ehisabuausadhagudikajaahakusarakarpaibenahikintubahutadarakari.*

These medicines which government not find -out but very need

These medicines which the government does not find but it is needed.



In this sentence the object *mobahi* appears in two sets and both of them are theta position of patient. The essence about this object is it merges in two places simultaneously and these are two derivations combined in a sentential derivation.

From this analysis it emerges that merge as process which can build unbounded multi dominant structures and it can support displacement. Merge operation can serve to structurally code the two basic kinds of information relevant for semantic interpretation namely thematic role and scope.

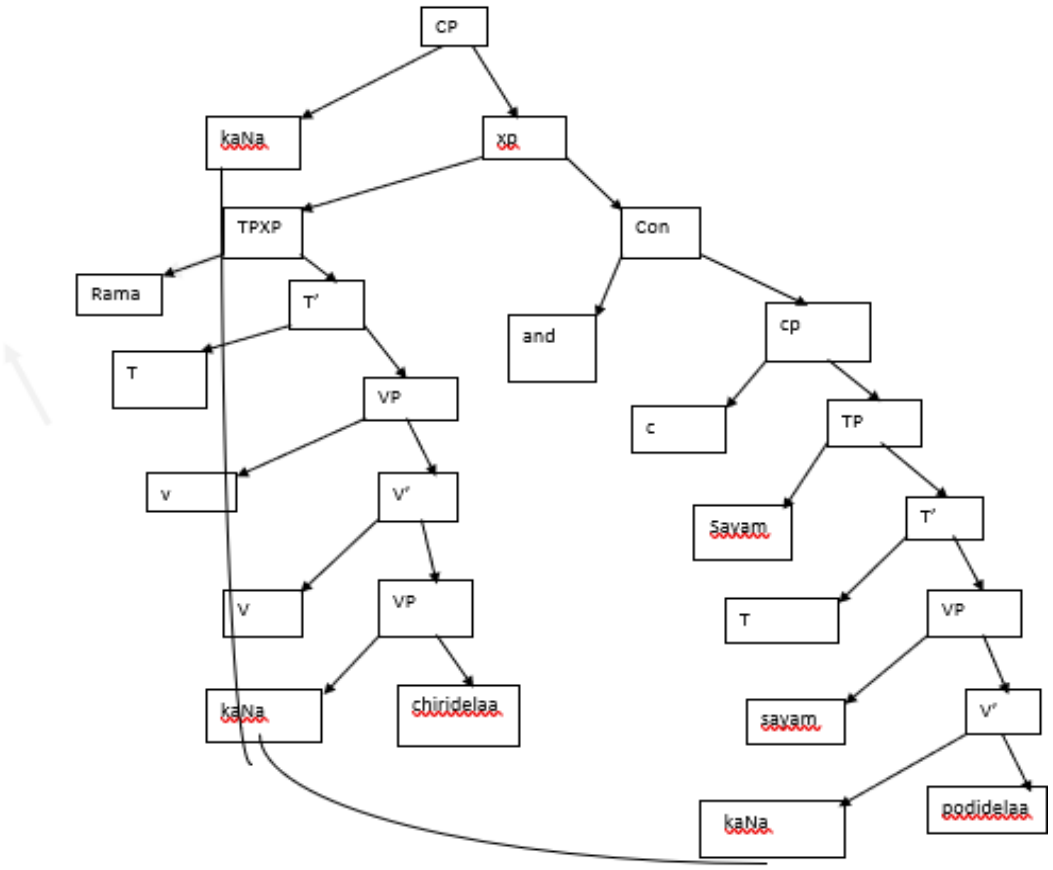
2.1.4 Merge delivers grammar

The underling and unchanging rule of a language is its grammar. Merge delivers grammar of the language. It provides explanations about both semantic and syntactic structure of any sentence in two ways. First it showcases that there is compact relationship between syntactic positions that merge combines and syntactic objects that appear in these positions. For example,

12.*KaNaramachiridelaebausyampodidelaa?*

What ram turn-ed and syam burn-ed

What ram turned and sayam burned?



The most important grammatical constraints emerge from this relationship between syntactic position and syntactic objects the theta position of verb is satisfied by appropriate syntactic object and this matching dispenses agreement relationship between verb and subject. This also generates explanation about derivation of this sentence. The mismatching of these two also creates ungrammatical. For example,

13**Mu jaNelokakujaNejahakuMadhuvetithilaaebausyamakupasandakalaa*.

I one man know who madhu meet-past and like-edsyam-acc

*I know a man who Madhu met and liked syam.

In the above sentence, the relative pronoun *jaahaaku has* patient theta role and accusative case relation but it is placed in an agent theta role position where the nominal form gets nominative case in embedded clause. Since the position of merge and syntactic category do not map with each other the sentence becomes ungrammatical.

Another way in which merge dispenses grammar is the interaction between different types of merge in a single structure of sentence. In many sentences of a language there must be an interaction either between internal merge and external merge or between internal merge and parallel merge. For example,

14.*ehisabuausadhagudikajaahakusarakarpaibenahikintubahutadarakari*.

These medicines which government find –future but very necessary.

These medicines which the government will not find but these are very necessary.

In the above sentence, internal merge and parallel merge can be seen in single sentence and there is a grammatical interaction between both. The interaction is seen in derivation of the sentence in a derivation of complex sentence, merge shows the order of syntactic derivation. And on the basis of semantic values of syntactic object and place value of its occurrence merge takes a particular action to combine these syntactic objects.

From this analysis it is generalized that merge provides an explanation about semantics and syntactic structure of a sentence. It also emerges that merge is not a simple combination of syntactic object rather it specify a particular action(operation)For example, merge generates multi dominant structure of complex sentence and interrogative sentences but processes of combination of syntactic object is not same in every type of sentence. The combinational action in simple sentence is different from that of matrix sentence for which the meaning of matrix sentence is different from meaning of simple sentence. Merge can explain about syntactic and semantic enter faces of sentence but there are some sentences which merge cannot explain about. For example,

15.Motebhokaheuchi

Me- hungry-becom-ing

I feel hungry

16.Motejaraheichi.

Me fever becom-ing

I am suffering of fever.

In these sentences an object becomes subject of the sentence. But it is not passive sentence. Merge as process of combination of syntactic category can generate this sentence but it cannot explain how it is possibly generated by grammar of language. This is experiencer subject which does not have agreement with verb. The real subject is *jara*which behaves as an object of verb. This problem is related to semantic aspect of language. So merge is partially incapable of providing explanation about some specific structure of sentence in specific language like Odia and some Indian languages. This

study tries to provide an explanation about all types of sentence and establishes a theory of operation that merge follows in derivation of sentence.

2.2 Operation

Merge is realized in different structure building operations (actions).These actions are logical applications of grammatical rules applied in formulation of syntactic structure. Here merge seems to be different from syntactic operation. The differences are concerned with semantic concept of sentence and rule of the language (grammar).Any type of operation fulfils two maxims; formulating an abelian group of syntactic unit and giving unique result. For example,

17. John(x) likes mango(y).

18. Mango(y) john likes(x).

15.Motebhokaheuchi

Me- hungry-becom-ing

I feel hungry

16.Motejaraheichi.

Me fiver becom-ing

I am suffering of fiver.

The sentences,17 and 18 permitted in English have same meaning (unique result) and different operations but same merge process .The syntactic categories in this sentence (17) are an abelian group because operation can change the order of the structure but that change gives same meaning as unique result .Merge as process of combination of syntactic category explains how *mango* as object of the verb is merged with the verb *likes* in sentences 17,but it cannot explain how *mango* merges with *john* in sentence 18.The similar situation occurs in sentence 15 and 16 Merge cannot explain how *Mote b*ecomes subject in sentences 15 and 16 on the basis of syntactic properties of syntactic categories. The syntactic operation as action taking place in the structure can explain it clearly. For example, it can be formalized in a mathematical equation. For example,

(1) $x + y = y + x,\ where\ \forall x, y \in F$

In equation 1, F is deep structure and semantic base of the sentence. It formalizes that all the syntactic elements of a sentence are an abelian group and particular operation can interchange them and that interchange can give same semantic space. A syntactic structure can be differently designed for same semantic space or different semantic space following different operation but merge as a process of combining may be same. For example,

19. John who likes Mary is son of Bill.

20. John is son of Bill who likes Mary.

The sentences 9 and 10 have different operations and the same space and syntactic categories are an abelian group in that space so that syntactic operation can change the structure. But in these sentences merge as process of combination is same. The Operation can be formalized in mathematical equation. For example,

(2)$x + (y + z) = (x + y) + z, where\ \forall x, y, z \in F$

In this equation, relative clause is differently designed. In conclusion it is submitted that an operation is different from Syntactic merge on two different properties namely ,abelian group in which a commutative order of syntactic category can be possible and unique meaning meant commutative order of syntactic categories give same meaning. In literature Merge is described as an Operation itself and it formulates grammatical relationships and output of it is to create a module on syntactic objects. The grammatical relationship may be local and long distance but it is created by a way of combination of syntactic object. But this paper does not believe it and finds there is a difference between merge and operation. An operation is rules of the language and merge is governed by these operation-rules of the language.

In the above formalization we can see that there is a particular action in every structure and generated structure is a module or architecture of rule of grammar. The element *x,y,zare* like syntactic objects and F is like a whole semantic space of sentence. Each element has a semantic value as numerical value and place value and they are combined by a particular action. In 1, merge appeared in commutative operation and in 2 associative action in every structure there is an underlying relationship between syntactic objects and this relationship is dependency relationship. This dependency relation seen in the structure is either local dependency or long distance dependency of syntactic object.

The important observation is this syntactic operation is described differently like feature checking operation, copy theory and movement operation in grammatical operation like relativisation, nominalization and complementation in generative grammar (Chomsky; 1995, hornstein; 2017). But theory of copy and movement cannot completely deal with the problem of experiencer subject in sentence.

Syntactic operation can be many types seen in different types of sentences and the differences are concerned with different grammatical processes applied in derivation of different sentences. For example a syntactic operation in compound sentence is different from syntactic operation of complex sentence (complementation and relativization).It also explains about occurrences of particular syntactic category in structure of sentence. Specific In derivation of sentence the syntactic operation

on the basis of semantic value of syntactic category decides which category should occur and should not in the structure of sentence. As it happens in Odia and other Indian languages. For example,

21.*MadhupelidelaaebaupaahadataLakukhasipadile CDS army bardire*.

Madhu push-ed and hill down roll-ed CDS army uniform in.

Madhu pushed and down the hill roll-ed the CDS in army uniform.

22.[*Champaa[phuspuskalaa je [saaantaNi[aasileNi]]]]*.

Champa –whispered – that madam come-past

Champawhispered that madam came.

23. [*Maa [citkaarkalaa[trainaasuchi]]]*.

Mother-shouted –train- come-pre-progressive

Mother shouted a train is coming.

24.**KaNamaachitkaarakalaa?*

What mother shout-ed?

What mother shouted?

25.*RamamobahichiridelaaebauMadhupodidelelaa*.

Ram- my book-acc-split -past and-madhu-burn-past

Ram split-up my book and Madhu burned.

26.*kaNaramachiridelaaebaumadhupodidelaa*?

What Ram split-past-up andmadhu burn-ed

What did Ram split-up and mudhu burn?

In sentence 21 the merge operation takes place in a different way in which the object CDS is subcategorized by fist verb and does not appear in the local domain of the verb. It appears in second clause but it creates a long distance dependency in this stance. The important observation is its semantic space completely signifies the incident, rather than the CDS. In this operation the space value of CDS has been changed. It is overtly seen in only coordinating sentence but it covertly exists in previous sentence as object. This action of merge creates a different semantic space. Similarly in sentence 22 and 23 the objects of main verbs are not subcategorized by the verbs but they are merged with verb. The important fact is in this operation the objects are not interrogated so that 22 is

ungrammatical. In sentence 25a single object *mobahi* is merged two times but semantic value of it in second compound sentence is not overt where the operation of merge is also different.

From this analysis itis realized that syntactic operation is applied differently in different sentences and that different actions of merge generate different semantic spaces. It means operation is an action for creating sematic space of sentence. Therefore Syntactic Merge is not simple combination of syntactic object but it is based on a particular action generating particular meaning and this meaning creates semantic space in derivation of a sentence.

2.3 Space

Every sentence has a semantico-syntactic space in which the derivation of a sentence hypothetically takes place. It is the aspect of sentence made by mind. In literature its definition is very ambiguous. In minimalist syntax, it is defined as work space, syntactic objects and transformation (Chomsky; 1995, collines; 2002).But all these definitions have failed to describe how and where work space exists in mind where derivation takes place in mind. Even there is a great debate about the number of spaces existing and whether it is semantic space or syntactic space. Citiko and Yuksek; 2020say that there is only one working space from which the derivation of any sentence starts. But Jayaseelan; 2017, Nunes and Uriagereaka; 2000, Collins; 2002, Nunes; 2004, Stroik; 2009 argue that there can be a single space for each derivation. It means there are many spaces.

This paper does not believe there is a work space in mind for derivation of sentence. This paper defines what syntactic space is and try to establish the common properties of the space. This paper argues that there can be a semantico—syntactic space for derivation of sentence and it has certain properties which define the scope of the space. It argues that it has both overt and covert interfaces but starting is from overt to covert. It is like a mathematical space. It has certain properties namely syntactic categories and a necessary conations this necessary conditions fulfil three axioms namely abelian group, unique result and particular direction. It means any semantico-syntactic space is established when the syntactic categories in sentence become an abelian group and the syntactic operation in the group gives unique result. And the utterance of this sentence is interpreted in different ways which are directions of the meaning interpretation.it means derivational space of a sentence is not an abstract idea. It is very clear and logically established. Some examples from Odia.

27.Mugharakugali

Mu home to go-past

I went to home

28.Motegharakuniaagalaa.

Me home to was take-PP

I was taken to home

These sentences have same propositional meaning but different interpretations when they are uttered. The different interpretations of these sentences occur by dint of syntactic operation. These two sentences have very different syntactic operations. And each sentence is an abelian group and it has unique semantic result. Since each sentence has different interpretations as directions and the interpretation is different from the interpretation of other sentence, they have different spaces not same space. Therefore, space of a sentence is concerned with syntactic category and their place value, syntactic operation and interpretation of utterance of the sentence.

It implies that each space has specific operation and algorithm so that space can be many on the basis of type of actions (operation), place value and semantic values of the merged elements. Space is important because there is a linear correspondence between condition of sematico-syntactic space and structure of sentence. We can draw a sematico-syntactic space of every sentence on the basis of logic and mind imagines about that space before it is expressed through the sentence. All the derivations of a sentence take place in space. This paper also argues that there is more than one space rather than one workspace for derivation of different sentences.

3 Conclusion

This study concludes that syntactic merge is a process of combination in which different operations (action) take place. Every operation is a specific way of combining syntactic objects in which semantic value and place value of syntactic category play very important role. A phrase or clause formulated by merge can be some time unacceptable in grammar but any sentence formulated by syntactic operation can be always acceptable in grammar. In this sense there is a very nuance difference between merge and syntactic operation. The output of syntactic operation is a sematico-syntactic space which is semantic domain of the sentence. The important finding about syntactic space is it has certain conditions and properties that are satisfied by syntactic operation. This paper completely discarded the merge as syntactic structure builder, but finds that merge is an outcome of syntactic operation. This study finds that every sentence has specific space as semantic domain in which the sentence is interpreted. Therefore, the essence of a sentence is its derivation and interpretation in which merge plays very important role following an operation and this operation creates semantic space. Finally, it finds that there is a space for each derivation rather than a single space for derivation of all sentences.

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