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Labeling by selection: A psychologically realistic procedure for determining labels

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Linguistic expressions are composed of smaller units such as words and phrases. The single most important operation in narrow syntax is, therefore, Merge: Merge applies to two syntactic objects α and β, and forms a new object γ = {α, β}. The syntactic object γ must be given a label for it to be interpreted. Given that γ consists of two terms, α and β, which is chosen, α or β, to project itself to give the label for γ? The present study proposes that labels are uniformly determined by selectional requirements, that is, if α selects β, β must be immediately dominated by (a node labeled as) α, which may be called Labeling by Selection. Possible psycholinguistic experiments are also suggested for evaluating the Labeling by Selection approach.

Key words: label, merge, projection, selection, structural priming

Introduction

This paper proposes a general principle for determining the label of syntactic objects, called Labeling by Selection (LbS), which solves, in a principled way, various problems of projection (POP) discussed in Chomsky (2013; 2015) and beyond. Chomsky's (2013, 2015) proposal is outlined in the next section. Following this, an alternative analysis is proposed and a number of advantages of the latter over the former are discussed. Finally, a possible way of evaluating the two alternatives will be suggested using a psycholinguistic experiment.

POP

Chomsky (2013; 2015) lay out a theory of how structures are built in a narrow syntax and, in particular, how each structure solves POP to get its labeling.

The single most important operation in narrow syntax is Merge:

(1) Merge (α, β) = {α, β}

Merge applies to two objects, α and β, and forms a new object γ = {α, β}. α and β are existing objects available to the operation of Merge, whereas γ is a new construct. The syntactic object γ must be given a label for it to be interpreted (Chomsky 2013:43). Given that γ consists of two terms, α and β, which is chosen, α or β, to project itself to give the label for γ? There are three possible configurations that result from Merge.

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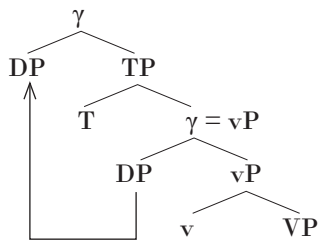
(2) a. $\gamma = \{H, \alpha P\}$
b. $\gamma = \{\alpha P, \beta P\}$
c. $\gamma = \{H_1, H_2\}$

In (2a), Merge has combined a head (H) and an XP; in (2b) two XPs have been combined; and in (2c) two heads have been combined. To find a label for γ, the labeling algorithm LA undertakes a search within the local domain of γ, which is the binary structure that it directly dominates, and picks one of the pairs to project to furnish the label for γ. In (2a), this search results in a unique choice because the members of the pair, {H, αP}, are distinct, and H is the closest target of the search. In contrast, neither of the remaining two configurations results in a unique search because the two members are XPs [(2b)], or they are both heads [(2c)]: minimal structural distance does not distinguish αP from βP or H_1 from H_2. Unless they were altered in some fashion, neither of these merged structures would be labeled.

Chomsky identifies two ways to solve POP: (i) movement, which is a form of Merge (Internal Merge), and (ii) agreement. Let us consider the derivation in (3), in which DP is the external argument.

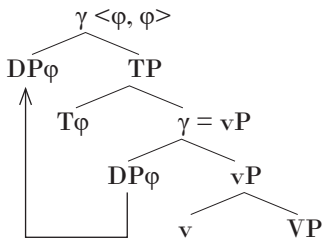
(3)



There are two POPs that arise in this structure, both of the form in (2b) above, in which Merge has paired two XPs. The first of these is the pair {DP, vP}. A way to provide a unique label for γ is to have one of the members move out of the structure, leaving just one member of the pair for γ. This is what we see in (3); having the DP vacate its original position leaves vP as the sole member, allowing it to project and giving γ an appropriate label. Here, it is assumed that the lower copy of DP is invisible for the labeling algorithm LA because it is a part of a discontinuous element.

While movement of the EA allows labeling of the lower γ, it leads to a second POP at the landing site of this movement, {DP, TP}. To avoid a POP, there is an additional element in this pair that makes labeling of γ possible, namely, agreement. As a result of the agreement between DP and T, the two members of the pair {DP, TP}, despite being distinct, nevertheless share the same feature φ. Searching {DP, TP}, then, the labeling algorithm LA finds the same most prominent element φ in both terms and can take that as the label of γ.

(4)



Proposal

Extending Chomsky's general approach outlined above, I propose a new solution to the issue of POPs such as those mentioned in the previous section as well as some others that fall outside of Chomsky's original proposal. The basic idea of my proposal is that labels are uniformly determined by selectional requirements. More concretely, I propose the following:

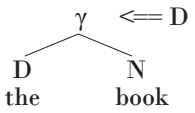
(5) LbS
If α selects β, β must be immediately dominated by (a node labeled as) α.

Let us see how this works using the English sentence in (6) as an example.

(6) The boy read the book.

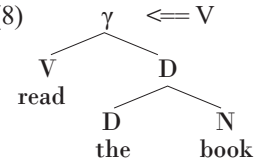
An application of Merge to *the* (D) and *book* (N) forms a new syntactic object γ = {the, book}, as schematically shown in (7).

(7)



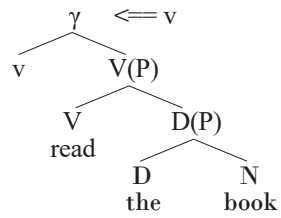
Because D selects N, N must be immediately dominated by (a node labeled as) D, according to LbS in (5). It follows, then, that γ must be labeled as D rather than as N. Similarly, when *the book* (D) is Merged with *read* (V), as in (8), the newly created syntactic object must be labeled as V because V (*read*) selects D.

(8)



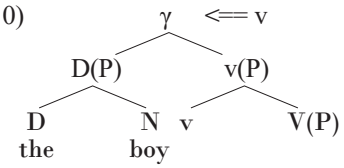
If the structure in (8) is further combined with v, the resultant structure (9) will be labeled as v because v selects V.

(9)



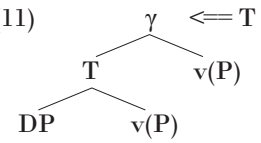
Now, suppose that (9) is Merged with the DP *the boy* to form (10). Because this DP is the external argument selected by v, v, rather than D, is chosen as the label of γ by LbS.

(10)



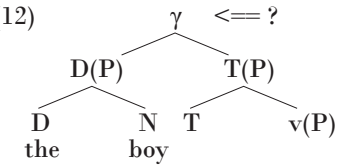
When this v(P) is combined with T as in (11), γ will be labeled as T because T selects v.

(11)



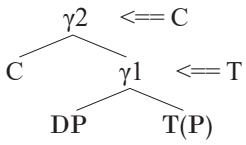
What will happen if the subject *the boy* is Internal Merged with T(P) is shown in (12).

(12)



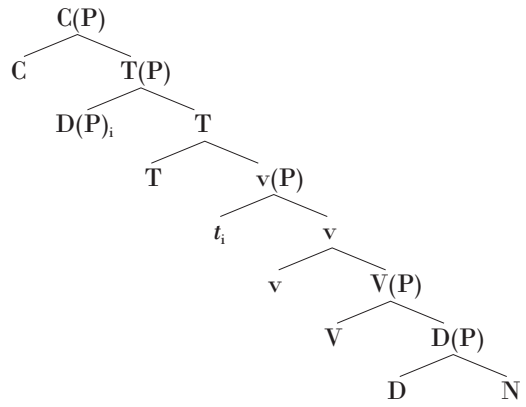
In (12), neither D(P) nor T(P) selects the other. The label of γ, therefore, cannot be determined at this point. However, when the structure in (12) is combined with C as in (13), LbS requires that γ1 and γ2 be labeled as T and C, respectively. This is because C selects T, so T must be immediately dominated by C.

(13)



To summarize, given LbS in (5), the example in (6) will have the labeled structure shown in (14).

(14)



Advantages

The LbS approach to POPs discussed in the previous section is an extension of Chomsky's (2013; 2015) original ideas and has at least four advantages over the latter. First, in Chomsky (2013; 2015), POPs are solved in three different ways by appealing to three different mechanisms, depending on the case: (i) projecting head (2a), (ii) movement [lower γ in (4)], and (iii) agreement/feature matching [higher γ in (4)]. The LbS approach, meanwhile, offers a uniform solution for all cases, as we have seen in the previous section. The LbS approach is more principled and parsimonious and hence is preferred on conceptual grounds.

A second advantage of LbS is related to the subject in SpecTP. Chomsky (2013) suggests that when the subject is Merged with TP forming γ = {DP, TP}, the label of γ is determined as <φ, φ> through agreement/feature matching [(4)]. We can see the function of φ-feature agreement in a language such as English as a mechanism to avoid a POP via feature matching. However, what about a language such as Japanese, which does not have this kind of φ-feature agreement with arguments such as the subject? Miyagawa (2001) has argued convincingly that Japanese has EPP effects: in transitive sentences, either the subject or the object moves to SpecTP, as schematically shown in (15) (see also Koizumi and Tamaoka 2010).[2]

(15) Japanese
a. [[γ Subject$_i$ [$_{TP}$ t$_i$ Object V v T]] C]
b. [[γ Object$_i$ [$_{TP}$ Subject t$_i$ V v T]] C]

Because neither the subject nor the object undergoes φ-feature agreement with T in Japanese, it is not clear how γ is labeled in (15). This poses a puzzle for the approach based on φ-feature agreement.[3] The same problem arises even in English. It is generally assumed that the subject

2. For the purpose of this paper, we assume that something like Richards' (2016) contiguity theory dictates when movement must occur, including the movements in (15).
3. For a proposal to solve this POP in Japanese, see Saito (2016), which does not extend to *for-to* infinitives in English.

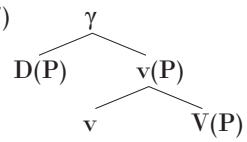
of *for-to* infinitives such as (16) occupies SpecTP, but there is no agreement relation between the subject and infinitival T.

(16) [For [γ John to arrive today]], it must stop snowing in Boston.

The POP exemplified in (15) and (16) is readily solved if we adopt LbS as a general requirement for labeling: because T is selected by C, T must be immediately dominated by C; hence, of the two terms of γ, T, rather than D, is chosen as the label of γ.

A third improvement of LbS over Chomsky's original proposal has to do with the structure in (10), repeated here as (17) with slight modifications.

(17)



This structure is formed when the external argument is Merged with v(P). According to Chomsky (2013), the γ in this structure cannot be labeled, as mentioned above in the section of POP. Thus, for γ to get labeled, the subject must move away, leaving v(P) as the only term included in γ. A crucial assumption here is that the structure in (17) is illicit as is, so it must be repaired somehow. This assumption, however, cannot be maintained because there are languages in which this structure occurs as part of grammatical sentences. Richards (2016) suggests that this is the case in many verb-initial languages with a tense morpheme that is either a prefix or freestanding. Miyagawa (2001) also argues that (18) is a possible structure of Japanese OSV sentences, which contain (17) as a part of the sentence.

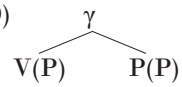
(18) $[[_{TP}$ Object$_i$ [[γ Subject $[_{vP}$ $[_{VP}$ t$_i$ V] v]] T]] C]

It is thus clear that the structure in (17) is grammatical at least in some languages, and possibly in all languages. This conclusion is expected under the LbS approach. As we have seen above with reference to (10), because DP in (17) is selected by v, it must be immediately dominated by a node labeled as v. v is therefore chosen as the label of γ.

Finally, a fourth attractive aspect of LbS is that it can readily accommodate structures with adjuncts without any additional stipulation. Suppose that during the course of the derivation of (19), VP *read the book* and PP *in the attic* are Merged, and (20) is formed.

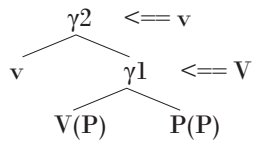
(19) The boy read the book in the attic.

(20)



In (20), neither V(P) nor P(P) is a head nor is there agreement between them. This is a typical POP that cannot be handled by Chomsky's (2013; 2015) original proposal unless some additional assumptions are made. Under the LbS approach, the structure in (20) is also cannot be labelled when it stands alone. However, its label is determined when it is Merged with v, as in (21). Because v selects V, LbS requires that V be immediately dominated by a node labeled as v. Thus, V and v are chosen as the labels of γ1 [= γ in (20)] and γ2, respectively.

(21)



This account can be extended to all structures with an adjunct as a term.

Psychological Validity

Another possible testing ground for the two approaches in question is concerned with structural priming, a tendency to repeat or better process a current sentence because of its structural similarity to a previously experienced sentence. In her pioneering work, Bock (1986) had people alternate between repeating sentences and describing pictures. If they had just repeated an active sentence, they tended to describe the picture using an active sentence, but if they had just repeated a passive sentence, they tended to describe the picture using a passive sentence. Similar effects have been found in many subsequent studies for many different constructions. Significantly, structural priming has been observed between the two languages of bilingual speakers. Hartsuiker, Pickering, and Vellkamp (2004), for example, showed evidence of cross-linguistic structural priming for Spanish-English bilinguals, that is, an increased likelihood of producing passive sentences in English after hearing a description in a passive form in Spanish. Bilingual studies of structural priming thus far have all targeted cross-linguistic priming between two languages that are historically related and/or typologically similar to each other. Spanish and English, for instance, are both Indo-European languages with φ-feature agreement.

The LbS approach and Chomsky's original proposal make different predictions for cross-linguistic structural priming. According to Chomsky's analysis, what has been called TP is <φ, φ> in φ-feature agreement languages such as English, whereas it is something else in languages without φ-feature agreement such as Japanese. It follows therefore that structural priming should not occur between a language with φ-feature agreement (e.g., English) and a language without φ-feature agreement (e.g., Japanese) because structures and categorial status of clauses in these two types of languages are fundamentally different to each other. In contrast, in LbS, TP is TP regardless of whether the language in question has φ-feature agreement or not. It is therefore predicted that cross-linguistic structural priming should be observed

between English and Japanese, for example. These predictions need to be tested in the future.

Conclusion

In the Minimalist Program, Merge is taken to be the single most important operation: if it were not for Merge, no linguistic representation could be constructed. Merge on its own, however, over-generates. Selection plays an important role in delimiting the possible range of linguistic representations. The present study proposed a particular implementation of this general idea (i.e., LbS), which states that if α selects β, β must be immediately dominated by (a node labeled as) α. Evidently, Merge+LbS alone still over-generates. Future research should elucidate how LbS would interact with other components of grammar to properly characterize the human language faculty.

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References

Bock, J. K. (1986). Syntactic persistence in language production. *Cognitive Psychology, 18*, 355-387.

Chomsky, N. (2013). Problems of projection. *Lingua, 130*, 33-49.

Chomsky, N. (2015). Problems of projection: Extensions. In *Structures, Strategies and Beyond: Studies in Honour of Adriana Belletti*, ed. by Elisa Di Domenico, Cornelia Hamann, and Simona Matteini, 3-16. Amsterdam/Philadelphia: John Benjamins.

Hartsuiker, R. J., Pickering, M. J. & Veltkamp, E. (2004). Is syntax separate or shared between languages? Cross-linguistic syntactic priming in Spanish-English bilinguals. *Psychological Science, 15*, 409-414.

Koizumi, M., & Tamaoka, K. (2010). Psycholinguistic evidence for the VP-internal subject position in Japanese. *Linguistic Inquiry, 41*, 663-680.

Miyagawa, S. (2001). EPP, scrambling, and wh-in-situ. In *Ken Hale: A Life in Language*, ed. by Michael Kenstowicz, 293-338. Cambridge, MA: MIT Press.

Richards, N. (2016). *Contiguity Theory*. Cambridge, MA: MIT Press.

Saito, M. (2016). (A) Case for labeling: Labeling in languages without phi-feature agreement. *The Linguistic Review, 33*, 129-175.

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