Mereological Syntax

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1. Introduction. The idea that syntactic objects are best modelled set-theoretically has a long pedigree, stretching back to their treatment as sets of strings in Chomsky 1955. The most recent incarnation of the idea takes the operation Merge to recursively produce set theoretic objects. However, I will argue that set theoretic ideas are both too expressive, and not expressive enough, for syntax, which is better modelled via mereological objects. I propose replacing Merge with an alternative, Subjoin, which creates such objects, and show how the new system both avoids the problems Merge raises, and, when coupled with a simple theory of locality, derives successive cyclicity of non-local dependencies without appeal to phases, labels or special features.

2. Syntactic objects are not sets.

2.1. Set theoretic objects require an independent theory of labeling. Chomsky's earliest definition of Merge (1994) explicitly represented the label syntactically (Merge(α,β) = $\{\gamma, \{\alpha,\beta\}\}$). This is problematic, both because of the redundancy it introduces, and because of the inactivity of γ as a syntactic object. The simplified version now adopted (Merge(α,β) = $\{\alpha,\beta\}$, e.g. Collins 2002; Chomsky 2013) requires a separate theory to label the object, but all extant theories of labelling are problematic. Ideally, we'd like labelling to be emergent, not stipulated.

2.2. Syntactic objects. Syntactic objects in current theory are of two types: lexical items and sets. Given that A $\neq \{A\}$, one might expect to see a lexical item behaving differently from a set containing just that lexical item (formed, perhaps, by Self-Merge, Guimaraes 2000, Kayne 2010, Adger 2013). But, beyond some technical fixes to the LCA, this doesn't appear to be the case, so the distinction given by set-theory is redundant in the syntax. **2.3. Term problems.** The core notion of *term* is required (to provide one of the arguments of Internal Merge), but *term* is not given by set-theory. It has to be defined as an extra (the transitive closure of member) because, although we want our theory to model the transitivity of constituency, it doesn't, without this extra stipulation. **2.4. Copy Problems.** A well known side effect of the Merge system is that in a structure {b, {a, b}}, it is impossible to tell from the representation alone whether the higher b is independent of, or a 'copy' of, the lower b: the representation is deficient given the distinct interpretations needed. Solutions to this involve enrichment of the theory with indices, memory stores, occurrences, Form Copy operations, etc., but it would be better if the system generated distinct representations for the relevant distinct interpretations.

3. Subjoin and Mereological Objects. I suggest an alternative: Subjoin(α,β) advances the derivation to a new state where α is part of β, where 'part of' ($<$) is to be understood as the irreflexive transitive (asymmetric) relation of mereology (Coitnoir and Varzi 2022). The resulting mereological object is compositionally built up, so that later subjunction of β to, say, δ, results in an object where δ has β as a part, and hence, by transitivity, α as a part. I follow Fine 2010 in taking there to be different 'ways', or dimensions, of being a part, and propose a syntactic interpretation for the objects Subjoin builds. The derivational step is what determines the 'way' that something is a part: the first subjunction to α gives the extended projection complement relation of Grimshaw 1992, while the second gives something akin to the standard specifier relation, except transitive. Using lines and the vertical dimension of the page, we can represent $<$ as we usually represent dominance, and using the horizontal direction of the page, we can slope the line that represents parthood in the first dimension (1-parthood/extended projection complementation) to the right, and parthood in the second dimension (2-parthood/specifierhood) to the left, so an unergative vP complement of T can be represented as in **Fig. 1**. $\sqrt{}$jump subjoins to V, which subjoins to v, each as 1-parts, and N subjoins to D as a 1-part. D then subjoins to v as a 2-part, followed by subjunction of v to T as a 1-part, derivationally constructing a structure similar to the telescoped trees of Brody's 2000 Mirror Theory.

Fig. 1

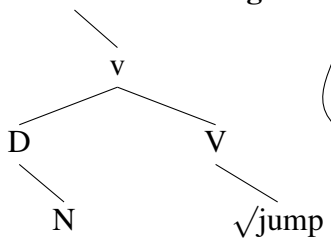


Fig. 2

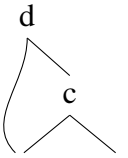


Fig. 3

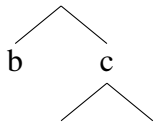
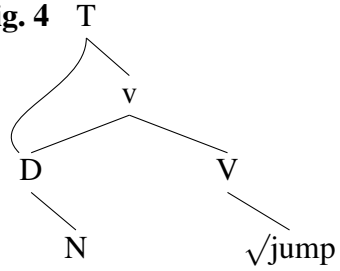


Fig. 4



The system adopts the interface view of head-movement phenomena entailed by telescoping. It differs from Mirror Theory in its derivationality, its single $<$ relation holding in different dimensions (as opposed to uniform dominance), the transitivity of that relation (unlike, e.g., the standard notion of specifier), and its syntax-first view of morphology.

4. Advantages. Like Merge, Subjoin takes two pre-existing objects and combines them in a linearly unordered structure. Subjoin is certainly no more complex an operation than binary-set formation (and it is simpler in its ontology as there is only one kind of syntactic object). **4.1. Labeling.** In Mereological Syntax, objects are distinguished from other objects by their formal properties (V is formally distinct from v, etc.), and there are no labels beyond this. After Subjoin(V,v), the object in the next derivational stage is just v: no labelling issue arises (beyond extended projection itself). **4.2. Number of types of syntactic objects:** There is only one type of object. **4.3. Terms.** No notion of *term* is necessary: because $<$ is transitive, only the notion of object is required. **4.4. Copy Problems.** Assume a structure where first *a*, then *b* have subjoined to *c*, so *a* is a 1-part (extended projection complement) and *b* a 2-part (specifier) of *c*. Subjoin(*c*, *d*), so *c* is *d*'s 1-part. It is now possible to subjoin *b* to *d*, analogously to Internal Merge, as in **Fig. 2**. However, all this does is make *b* a (2-)part of *d*, as well as a (2-)part of *c*: the structure is a kind of multi-dominance structure with dimensionally restricted parthood instead of dominance. There is no copy, and no way to make a copy. Another instance of *b* subjoined to *d* as in **Fig. 3** gives a formally different structure: the representation encodes whether an object is a copy, or a repetition, as required and no extra rules, annotations, or definitions are needed.

5. Locality. I propose that Locality is a geometrical filter, allowing a single angle in structure:

(1) a 2-part of β can subjoin to γ only if β is a 1-part of γ

In **Fig. 4**, D can subjoin to T (since D is 2-part of v which is a 1-part of T), but N, for example, cannot (2 angles). This theory of Locality excludes the mereological equivalent of sidewards/parallel movement, since the relevant geometry is absent. However, it also seems too strict, since it will rule out non-local dependencies from inside a specifier to outside that specifier, blocking long distance movement (since objects and CP complements are specifiers in the system). However, the transitivity of $<$ in the second dimension provides a loophole. If an object δ is inside an object α and α is a 2-part of γ, then if δ subjoins to α, the transitivity of 2-parthood means it too will be a 2-part of γ, and hence then can be a 2-part of anything γ is a 1-part of. The upshot is that subjunction out of a specifier, requires prior subjunction to it, deriving, without phases etc., successive cyclicity of non-local 'movement' dependencies.

6. Further Consequences. There are effects that show unexpected transitivity of specifierhood, dealt with by stipulation, or ignored, in current theory. One is inverse linking: in *A worker from (a farm in) every city went*, wide scope of *every city* should be, but isn't, blocked. However, if it subjoins to the subject, it can, by transitivity, subjoin to a clausal scope position; impossibility of high scope of a universal in a relative clause follows, as subjunction from the island is blocked. A second effect is comparative subdeletion inside a possessor of a possessor (Taraldsen 1978). Such 'specifier transitivity' is exceptional in the Merge system but expected given Subjoin.