Two proposals for restricting externalization

Aidan Malanoski
CUNY Graduate Center

November 22, 2024

1 Introduction

- I argue for changing two common assumptions about the externalization of syntactic structure[1]:

  i. Linear order is antisymmetric, not asymmetric.
  ii. Vocabulary Insertion is many-to-many, not one-to-one.

- With these changes, we eliminate the need for several morphological operations, simplifying the process of externalization.

- I provide parsimonious accounts of simultaneity phenomena (e.g., grammatical tone), multiple exponence, and portmanteaux.

2 Theoretical motivation

2.1 Motivating antisymmetry

- Following Kayne (1994), it is common to model word order as a binary relation (a set of ordered pairs).

- Kayne argues that for this relation—henceforth, the **precedence relation**—to be well-formed, it must be a **(strict) linear order**.

- This means that a precedence relation must be **transitive**, **total**, and **asymmetric**:

  (1) Let R be a binary relation over a set S. Then R is **transitive** iff for all $x, y, z \in S$, if $\langle x, y\rangle \in R$ and $\langle y, z\rangle \in R$ then $\langle x, z\rangle \in R$. Informally, if R relates x to y, and R relates y to z, then R also relates x to z.

  (2) Let R be a binary relation over a set S. Then R is **total** (or **connected**) iff for all $x, y \in S$ such that $x \neq y$, either $\langle x, y\rangle \in R$ or $\langle y, x\rangle \in R$. Informally, if x and y are distinct, then R relates x to y or R relates y to x.

  (3) Let R be a binary relation over a set S. Then R is **asymmetric** iff for all $x, y \in S$, if $\langle x, y\rangle \in R$ then $\langle y, x\rangle \notin R$. Informally, if R relates x to y, then R does not relate y to x.

- In discussing linear order, linguists often refer to asymmetry as *antisymmetry*.

[1] This handout reports on joint work with Jason Kandybowicz.

- As these terms are typically used elsewhere, asymmetry and antisymmetry differ in that asymmetry entails **irreflexivity**.

(4) Let R be a binary relation over a set S. Then R is **antisymmetric** iff for all $x, y \in S$, if $\langle x, y \rangle \in R$ and $\langle y, x \rangle \in R$, then $x = y$. Informally, if R relates x to y and y to x, then x and y are the same entity.

(5) Let R be a binary relation over a set S. Then R is **irreflexive** iff for all $x \in S$, $\langle x, x \rangle \notin R$. Informally, R does not relate x to itself.

- I argue that the precedence relation is better modeled as antisymmetric than asymmetric.
- This is ultimately motivated by the reframing of movement as (re-)Merge.
- After a constituent has moved, it c-commands its base position and therefore itself (reflexive c-command).
- After a constituent has moved, it both c-commands and is c-commanded by any constituent it crossed over (symmetric c-command).
- Under many approaches to externalization, this leads to corresponding symmetry and reflexivity—failures of asymmetry—during linearization (see Nunes, 2004 for discussion).
- However, reflexivity is trivial to resolve.
  - Under a copy deletion approach (e.g., Nunes, 2004), we simply delete all but one copy of a constituent. For the purposes of avoiding reflexivity, it does not matter which copies we delete.
  - Under an approach where we delete ordered pairs from the precedence relation (e.g., Malanoski, 2024), we simply delete the reflexive ordered pair.
- If reflexivity is both ubiquitous and trivial to resolve, why bother resolving it? In other words, why not define linear order as antisymmetric, so that reflexivity is no longer a problem to begin with?

2.2 Motivating many-to-many Vocabulary Insertion

- Contemporary theories of morphology often assume that Vocabulary Insertion—the mapping of syntactic units onto their phonological exponents—is one-to-one: each syntactic unit has exactly one exponent, and each exponent realizes exactly one syntactic unit.
- Such theories directly encode the **principle of biuniqueness**, "an idealized approach to the structure of words in which one form corresponds to one meaning" (Harris, 2016, 3).
- However, the principle of biuniqueness is routinely violated in natural language:
  - Portmanteaux are single exponents that encode multiple categories (many-to-one relationship).
  - In multiple exponence, multiple exponents encode the same grammatical category (one-to-many relationship). An example is given in (6), which shows multiple exponence of the class marker *y-* in Batsbi (Nakh-Daghestanian: Georgia; Harris, 2016, 2).

(6) y-ox-y-o-y-an^{w} k'ab
CM-rip-CM-PRES-CM-EVID dress.ABS
'Evidently she is ripping the dress.'

- Theories that assume the principle of biuniqueness typically require additional tools to accommodate mappings that are not one-to-one.

Distributed Morphology

- Distributed Morphology (Halle & Marantz, 1993) assumes a one-to-one mapping between terminal nodes and exponents.
- Therefore, Distributed Morphology requires morphological operations to handle mappings that are not one-to-one.
  - Fusion combines two terminal nodes into one, allowing for the insertion of portmanteaux.
  - Fission allows multiple exponents to be inserted for a single terminal node, allowing certain types of multiple exponence.
- The morphological operations that Distributed Morphology adopts are conceptually undesirable.
  - These operations are theoretical primitives, constituting an arguably undesirable complication of the theory of Language.
  - Treating these operations as primitive raises the question of why they exist in Language and how they arose.
  - Although these operations manipulate syntactic structures, they are not constrained by syntactic principles such as the No-Tampering Condition (Chomsky, 2008), creating an unconstrained "second syntax" (Collins & Kayne, 2023).

Nanosyntax

- Nanosyntax (Caha, 2009; Starke, 2009) rejects most of the postsyntactic operations of Distributed Morphology.
- Researchers in the Nanosyntax framework typically adopt either non-terminal spell-out or spanning (Taraldsen, 2018).
  - Non-terminal spell-out: Vocabulary Insertion can target phrasal nodes as well as terminal nodes.
  - Spanning: Vocabulary Insertion targets sequences of heads.
- Because the target of Vocabulary Insertion is larger than a single terminal, portmanteaux can be inserted without adopting any additional operations.
- However, Nanosyntax also faces conceptual problems.
  - Non-terminal spell-out requires "spell-out driven movement" to derive the structural configurations for Vocabulary Insertion (Baunaz & Lander, 2018). This movement cannot be syntactic, as it does not obey syntactic principles: it is not feature-driven and does not leave traces. Nevertheless , it takes syntactic representations as input and produces syntactic representations as output, so it constitutes a "second syntax" in the sense of Collins & Kayne (2023).
  - Spanning is a new theoretical primitive: outside of its role in Vocabulary Insertion, "the notion of span has no status in current theory" (Svenonius, 2016, 204).
  - It is not obvious how to account for multiple exponence under Nanosyntax. One solution is to treat multiple exponence as involving multiple functional projections (e.g., Wyngaerd et al., 2021), but it's not clear that this generalizes to all cases. Examples such as (6), with multiple identical, non-adjacent exponents seem particularly challenging.

Diagnosis

- I argue that the conceptual issues faced by Distributed Morphology and Nanosyntax arise in part from their commitment to the principle of biuniqueness.
- I show below that by abandoning this principle as a definitional trait of Vocabulary Insertion, we can generate multiple exponence and portmanteaux without a “second syntax” or a proliferation of theoretical primitives.

3 Theoretical framework

- I assume that linearization is post-syntactic (Chomsky, 1995).
- I adopt late insertion of lexical items (Halle & Marantz, 1993).
  - I refer to this process as *Vocabulary Insertion*, as above.
  - I use the terms *Vocabulary Item* and *exponent* interchangeably.
- I assume that this follows linearization (Arregi & Nevins, 2012; Ostrove, 2018).
  - Since linearization precedes Vocabulary Insertion, it generates a binary relation over syntactic nodes (terminal nodes, by assumption), which I call the **u(nderlying)-precedence relation**.
- Vocabulary Insertion maps the u-precedence relation onto the **s(urface)-precedence relation**, a binary relation over Vocabulary Items.
  - For all $\langle X, Y \rangle$ in the u-precedence relation, Vocabulary Insertion adds $\langle x, y \rangle$ to the s-precedence relation, where x is the Vocabulary Item selected to realize node X and y is the Vocabulary Item selected to realize node Y (this will be amended slightly in section 4.2).
    - It is possible that $x = y$. This is the case for a portmanteau that realizes both X and Y.
  - We say that the s-precedence relation **realizes** the u-precedence relation, and that $\langle x, y \rangle$ **realizes** $\langle X, Y \rangle$.
- The requirement that a precedence relation be a linear order (i.e., transitive, total, and antisymmetric) is an output condition, so they need only hold of the s-precedence relation, not the phonologically contentless u-precedence relation.
- For expositional purposes, I assume where necessary that asymmetric c-command maps onto precedence (i.e., membership in the u-precedence relation). Elsewhere, I abstract away from the algorithm generating the u-precedence relation.
- For expositional purposes, I assume that ordering conflicts are repaired by deleting ordered pairs from the s-precedence relation (Malanoski, 2024).
  - The u-precedence relation never needs to be repaired, since it does not need to be a linear order. Only the s-precedence relation needs to be repaired.
- Repair is constrained by the *Principle of Maximality* (7), named after Optimality Theory’s Max (Prince & Smolensky, 2004). This principle only allows deletions that are required to repair violations of antisymmetry.[2]

[2] Just as we have a Principle of Maximality, we could propose a Principle of Dependence that forbids the addition of ordered pairs to the s-precedence relation that do not correspond to ordered pairs in the u-precedence relation. However, the current framework provides no mechanism for such additions in the first place, so such a constraint is unnecessary.

(7) Principle of Maximality: Let P_u be a u-precedence relation that is mapped onto an s-precedence relation P_s. Then for all $\langle X, Y\rangle \in P_u$ such that $\langle Y, X\rangle \notin P_u$, there exists $\langle x, y\rangle \in P_s$ such that x is an exponent of X and y is an exponent of Y.[3]

- To illustrate:
  - Suppose we have a u-precedence relation P_u with $\langle X, Y\rangle, \langle Y, X\rangle \in P_u$.
  - Suppose that Vocabulary Insertion inserts some Vocabulary Item x for X and some Vocabulary Item y for Y, where $x \neq y$.
  - This gives an s-precedence relation $P_s = \{\langle x, y\rangle, \langle y, x\rangle\}$, which is not antisymmetric.
  - We can repair this by deleting $\langle x, y\rangle$: $\langle x, y\rangle$ realizes $\langle X, Y\rangle$, but $\langle Y, X\rangle \in P_u$, so the Principle of Maximality does not protect $\langle x, y\rangle$. (Likewise, we could delete $\langle y, x\rangle$ instead.)
- In addition to the Principle of Maximality, which governs the relationship between the u-precedence and s-precedence relations, I propose a Precedence Mapping Principle (8), which governs the relationship between the s-precedence relation and the output string.

(8) *Precedence Mapping Principle*: Let P_s be an s-precedence relation. For all Vocabulary Items x, y, if $\langle x, y\rangle \in P_s$, then x precedes y.

- The Precedence Mapping Principle satisfies a a conceptual necessity: the s-precedence relation needs to be mapped onto precedence in order to produce a string.
- Because we allow reflexivity in the s-precedence relation (recall that this is the consequence of adopting antisymmetry rather than asymmetry; see section 2.1), precedence must be defined in a way that allows reflexivity, as in (9).
- On analogy with the distinction between subsethood and proper subsethood, I refer to the more traditional notion of precedence as *proper precedence* (10).

(9) Given lexical items x, y, x **precedes** y ($x \leq y$) if x is pronounced before or at the same time as y.[4]

(10) Given lexical items x, y, x **properly precedes** y ($x < y$) if x is pronounced before y.

- Crucially, the Precedence Mapping Principle is a material implication, not a biconditional: it is not the case that if an occurrence of x precedes an occurrence of y, then $\langle x, y\rangle \in P_s$. This is necessary because any Vocabulary Item (improperly) precedes itself: a word is pronounced at the same time as itself.[5]
- To illustrate:
  - Suppose we have an s-precedence relation $P_s = \{\langle x, y\rangle\}$.
  - By the Precedence Mapping Principle, this maps onto the string $x\, y$.
  - In this string, x (improperly) precedes itself, but $\langle x, x\rangle \notin P_s$, so the converse of the Precedence Mapping Principle does not hold for this example.
  - To the extent that such cases are typical, this indicates that the Precedence Mapping Principle must be a material implication rather than a biconditional: the converse does not hold.[6]

[3] If we adopt an approach to linearization that does not require repair, then the we can drop the condition "such that $\langle Y, X\rangle \notin P_u$."

[4] Note that I intend an inclusive interpretation of *or*; this will be relevant to the discussion of autosegmental phenomena in section 4.1.

[5] My use of *improper* here invokes set theoretic terminology, where the term *improper subset* is sometimes used to characterize a subset that is equal to (rather than a proper subset of) its superset.

[6] In general, the converse would only hold if for every Vocabulary Item x inserted, there exists $\langle x, x\rangle \in P_s$. If precedence is read from the syntactic structure, this means that every terminal node would have to be in a reflexive relationship with itself.

4 Empirical evidence

- I present three classes of empirical arguments in favor of the proposals.
  - In section 4.1, I show that by adopting an antisymmetric conception of linear order, we can allow straightforwardly for the linearization of simultaneous grammatical content that occupies different autosegmental tiers.
  - In section 4.2, I show that by abandoning the principle of biuniqueness as a property of Vocabulary Insertion, we can account for multiple exponence without proposing additional primitives.
  - In section 4.3 and section 4.4, I show that these proposals together allow for the insertion of portmanteaux without additional primitives and for attested patterns of multiple exponence involving portmanteaux.

4.1 Simultaneity

- By treating linear order as antisymmetric rather than asymmetric, the present proposal can account for simultaneity between content on different autosegmental tiers.

Grammatical tone

- Grammatical tone challenges the asymmetry approach to linear precedence.
- In Ekhwa Adara (Niger-Congo: Nigeria; based on fieldnotes), plural number is typically marked by a high tone /H/ associated with the first syllable, as in (11).

(11)

Singular	Plural	Gloss
enéŋine	*énéŋine*	‘woman’
ete	*éte*	‘father’
ɛwɛ́	*ɛ́wɛ́*	‘child’
avò-ŋ́	*ávò-ŋ́*	‘goat’

- Asymmetry entails irreflexivity, and thus the irreflexive notion of proper precedence.
- In the examples in (11), there is not a relationship of proper precedence between the plural marker /H/ and the nouns. For example, neither /H/ nor /enéŋine/ properly precedes the other—they are pronounced at the same time.
- Consequently, if we adopt asymmetry (and thus proper precedence), we end up with a failure of totality: a floating morpheme is not ordered with respect to its “host” (see Kremers, 2012, 2013).
- Such examples do not pose a problem under an antisymmetry approach.
  - Suppose that we have a u-precedence relation P_u with $\langle \text{Num}, \text{N} \rangle \in P_u$.
  - If we insert /H/ for Num and /enéŋine/ for N, this gives an s-precedence relation P_s with $\langle$/H/, /enéŋine/$\rangle \in P_s$.
  - This can then be realized as [énéŋine] without problem: /H/ (improperly) precedes /enéŋine/ by virtue of being pronounced at the same time as /enéŋine/.[7]
  - Because the relevant notion of precedence allows simultaneity, there is no failure of totality.

[7] Other principles will be responsible for determining exactly where /H/ is realized in /enéŋine/. The crucial point is that these principles can be incorporated into the linearization algorithm, rather than requiring a separate operation.

Tone spreading

- Tone spreading is similarly challenging for asymmetry.
- For example, in Aghem (Niger-Congo: Cameroon), /fú kɨ̀a/ 'your (sg.) rat' is realized as [fú kɨ̂a]: the high tone of /fú/ 'rat' spreads onto /kɨ̀a/ 'your (sg.)', leading it to be realized with a falling tone (Hyman, 2011).
- Neither /fú/ nor /kɨ̀a/ properly precedes the other: part of /fú/ (its tone) is realized at the same time as part of /kɨ̀a/ (its segments).
- Given that neither /fú/ nor /kɨ̀a/ properly precedes the other, we once again have a failure of totality under asymmetry.
- However, tone spreading does not pose a problem under an antisymmetry approach.
  - Suppose we have a u-precedence relation P_u with $\langle \mathrm{N}, \mathrm{D} \rangle \in P_u$.
  - If we insert /fú/ for N and /kɨ̀a/ for D, this gives an s-precedence relation P_s with ⟨/fú/, /kɨ̀a/⟩ $\in P_s$.
  - This can then be realized as [fú kɨ̂a] without issue.
    * Recall the definition of precedence (9), repeated below.
    * Part of /fú/ (its segments) is pronounced before /kɨ̀a/, and part of /fú/ (its tone) is pronounced at the same time as part of /kɨ̀a/ (some of its segments).
    * However, because the *or* in (9) is inclusive, it is unproblematic of /fú/ is pronounced both before and at the same time as /kɨ̀a/.
    * In other words, the relationship between /fú/ and /kɨ̀a/ is one of precedence—/fú/ precedes /kɨ̀a/—so the Precedence Mapping Principle is satisfied by the tone spreading realization as [fú kɨ̂a].

(9) Given lexical items x, y, *x precedes y* ($x \leq y$) if x is pronounced before or at the same time as y.

Non-manual gestures

- The present proposal also allows a Vocabulary Item to overlap with multiple other Vocabulary Items (unlike the previous examples, where we have overlap between only two Vocabulary Items).
- Such examples occur in signed languages. For example, in (12) from German Sign Language, the non-manual negation marker is signed at the same time as two other manual markers, FLOWER and BUY.

(12) MOTHER $\overline{\text{FLOWER BUY}}^{\text{neg}}$

'Mother does not buy a flower' (Pfau & Quer, 2002; in Kremers, 2012, 985)

- Such examples pose the same challenge for asymmetry as the tone examples: the non-manual marker neither properly precedes nor is properly preceded by FLOWER and BUY, so there is a failure of totality under asymmetry.
- This is not a problem under the antisymmetry approach.
  - Suppose that we have a u-precedence relation P_u with $\langle \mathrm{Neg}, \mathrm{N} \rangle, \langle \mathrm{Neg}, \mathrm{V} \rangle, \langle \mathrm{N}, \mathrm{V} \rangle \in P_u$.
  - Suppose that Vocabulary Insertion inserts $\underline{\text{neg}}$ for Neg, FLOWER for N, and BUY for V.

- This gives an s-precedence relation P_s with $\langle \underline{\text{neg}}, \textsc{flower} \rangle$, $\langle \underline{\text{neg}}, \textsc{buy} \rangle$, $\langle \textsc{flower}, \textsc{buy} \rangle \in P_s$.
- This can be realized as in (12), with FLOWER properly preceding BUY, while the non-manual marker neg is pronounced at the same time as both:
  * The Precedence Mapping Principle is satisfied for ⟨FLOWER, BUY⟩ because FLOWER properly precedes BUY.
  * The Precedence Mapping Principle is satisfied for ⟨neg, FLOWER⟩ because neg improperly precedes—is realized at the same time as—FLOWER.
  * The Precedence Mapping Principle is satisfied for ⟨neg, BUY⟩ because neg improperly precedes BUY.
  * It is not a problem that FLOWER ends before neg does, because the converse of the Precedence Mapping Principle does not hold, as discussed in section 3: even if FLOWER in some sense precedes part of neg, it does not follow that ⟨FLOWER, neg⟩ must be in P_s.

Against other possible accounts

- As discussed above, the problem with asymmetry is that because asymmetry entails irreflexivity, and thus proper precedence, it is incompatible with simultaneity.
- However, it is in principle possible to account for simultaneity without abandoning asymmetry.
- **Option 1: Multiple linearizations**
  - If content on different autosegmental tiers is linearized separately, generating a separate precedence relation on each tier then simultaneity is not an issue.
  - For example, in the tone spreading case, /fú/ 'rat' properly precedes /kɨ̀a/ 'your (sg.)' on the tonal tier, because the high tone of the former is realized before the low tone of the latter, and /fú/ properly precedes /kɨ̀a/ on the segmental tier, because the segments of the former are realized before the segments of the latter.
  - However, this involves an undesirable complication of the linearization process, for two reasons.
    * This approach requires linearization to apply multiple times, since it must occur separately for each autosegmental tier.
    * This approach requires a separate operation to link representations on different tiers—that is, to create simultaneity.
  - By allowing simultaneity to arise during linearization, we can avoid both issues under antisymmetry.
- **Option 2: No simultaneity at PF**
  - Another alternative, suggested by Richard Kayne (p.c.), is to propose that simultaneity arises in the phonology proper, subsequent to linearization.
  - However, as with the previous alternative, this proposal complicates linearization by separating linearization and the generation of simultaneity into separate operations.
  - Additionally, there is no conceptual reason for simultaneity to be banned at linearization.
    * The mainstream view of linearization is that it is an intermodular (PF) operation: it is involved in translating syntactic representations into phonological ones.

    * Given that the phonology clearly tolerates simultaneity, we would expect that linearization also tolerates simultaneity, since the goal of linearization is to help produce a phonological representation.

  – There is also empirical evidence suggesting that simultaneity can arise at PF.[8]

    * Nupe (Niger-Congo: Nigeria) has a polarity focus construction in which the verb is realized twice, as in (13).

(13) Musa ba nakàn ba
Musa cut meat cut
'Musa DID cut the meat' (Kandybowicz, 2007, 136)

    * According to Kandybowicz (2006, 2007, 2008), the exponent of the focus head is a floating low tone.
    * Because this tonal morpheme needs a host, it triggers insertion of an additional exponent of the verb.
    * Given that Vocabulary Insertion is an intermodular operation, it appears that the linking of /L/ 'FOC' and its verbal host arises at PF: if the linking instead arose in the phonology, it would require look-ahead to determine that the tonal morpheme requires a host to be inserted.
    * The intermodular nature of this linking is further supported by tonological interactions: instead of forming a contour with the lexical tone of the verbal host—the expected outcome if the tonal morpheme docks onto the verb in the phonology—the tonal focus morpheme triggers a leftwards "downstep" not otherwise attested in Nupe phonology (Kandybowicz, 2004).
    * In conclusion, the Nupe data provide evidence for simultaneity arising at PF rather than in the phonology.

Summary

- Because antisymmetry allows reflexivity, it entails a definition of precedence that allows simultaneity.
- This allows for more parsimonious accounts of simultaneity phenomena (e.g., grammatical tone) than are available under the asymmetry approach.

4.2 Multiple exponence

- By allowing Vocabulary Insertion to be potentially many-to-many, the present proposal can also account for multiple exponence without additional theoretical tools.
  – I take multiple exponence to include the phenomenon sometimes known as "multiple copy spell-out" (e.g., Kandybowicz, 2008), where the same word or phrase appears multiple times in an utterance.

[8] It is logically possible that simultaneity can arise both at PF and in the phonology. For example, certain varieties of Malay have a process of nasal spreading that crosses morpheme boundaries, as in /məŋ-ajak/ [mə̃ŋ̃ãjãʔ] 'to sift (active)' (Onn, 1976). This can be considered a form of simultaneity, as a nasal feature from /məŋ/ is realized on /ajak/. However, on Onn's analysis, this simultaneity must arise in the phonology, because it is ordered after other phonological rules. This is a general diagnostic of phonological simultaneity within rule-based approaches to phonology: if the process giving rise to simultaneity is ordered after other phonological processes, then it must be phonological itself. On the other hand, simultaneity can be determined to arise at PF if (i) the generation of simultaneity is sensitive to syntactic information (and not simply its phonological reflexes, such as prosodic phrasing); (ii) the generation of simultaneity feeds other PF processes; or (iii) the simultaneity can be shown to be present in the input to phonology.

- (14) gives an example from dialectal German in which the *wh*-word *wen* appears twice.
- If we reject the separation between morphology and syntax (e.g., Baunaz & Lander, 2018; Collins & Kayne, 2023), then unifying repetition of exponents above and below the word level in this way is desirable, if not necessary.

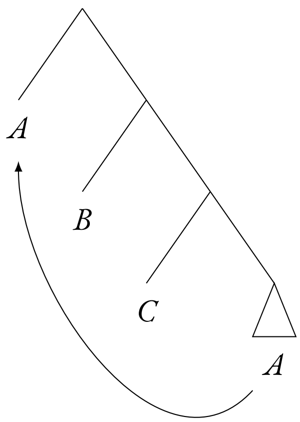
(14) wen glaubt Hans wen Jakob gesehen hat?
who thinks Hans who Jakob seen has
'Who does Hans think Jakob saw?' (McDaniel, 1986)

- If Vocabulary Insertion is many-to-many, then Vocabulary Insertion is not forced to insert one exponent for each head.
- This requires a slight modification of my description of Vocabulary Insertion.
- In section 3, we said that given a u-precedence relation P_u, Vocabulary Insertion adds $\langle x, y\rangle$ to the s-precedence relation P_s for all $\langle X, Y\rangle \in P_u$, where x is the Vocabulary Item selected to realize X and y is the Vocabulary Item selected to realize Y. If Vocabulary Insertion can insert multiple exponents, then it is incorrect to say that x and y are *the* Vocabulary Items inserted for X and Y. Rather, a more accurate description of Vocabulary Insertion is the following: for all $\langle X, Y\rangle \in P_u$, Vocabulary Insertion adds $\langle x, y\rangle$ to P_s for all x inserted for X and for all y inserted for Y.
- Given that I allow Vocabulary Insertion to be many-to-many, I view the preference for single exponence as a tendency caused by other factors.
  - A principle of Pronunciation Economy may directly favor the insertion of the fewest exponents possible (Fanselow & Ćavar, 2001). After all, it is easier for the speaker to say less.
  - There may be a parsing benefit to single exponence. In a sentence with only single exponence, every Vocabulary Item realizes different syntactic nodes. But when multiple exponence is introduced, the problem arises of determining whether two Vocabulary Items represent the same or different syntactic nodes. By muddling the relationship between syntactic nodes and Vocabulary Items, multiple exponence makes it more difficult to assign syntactic structure to a string.
  - If deletion of ordered pairs from the s-precedence relation is subject to economy, then certain types of multiple exponence will be disfavored (under a repair approach) for requiring more ordered pairs to be deleted. In particular, fully superfluous multiple exponence (Caballero & Harris, 2012), where multiple exponents realize the exact same features, typically requires more ordered pairs to be deleted than single exponence. This is illustrated in the following example.
- Let us illustrate how multiple exponence arises in the present framework.
- First, we'll consider single exponence.
- Suppose we have a u-precedence relation P_u with the ordered pairs in (15). This could correspond to a structure such as (16), where A has re-merged to a high position.

(15) Hypothetical u-precedence relation reflecting movement of A.

$$\left\{\begin{array}{ccc} \langle A, B\rangle & \langle A, C\rangle & \langle A, A\rangle \\ & \langle B, C\rangle & \langle B, A\rangle \\ & & \langle C, A\rangle \end{array}\right\}$$

(16) $[\,A\,[\,B\,[\,C\,[\,A\,]]]]$



- If we insert some Vocabulary Item a for A, b for B, and c for C, then this gives an s-precedence relation P_s with the ordered pairs in (17).

(17) An unrepaired s-precedence relation for (15) with single exponence.

$$\left\{\begin{array}{ccc} \langle a,b\rangle & \langle a,c\rangle & \langle a,a\rangle \\ & \langle b,c\rangle & \langle b,a\rangle \\ & & \langle c,a\rangle \end{array}\right\}$$

- This s-precedence relation is not antisymmetric, since it has $\langle a,b\rangle$ and $\langle a,c\rangle$ on the one hand and $\langle b,a\rangle$ and $\langle c,a\rangle$ on the other hand.[9]
- To resolve this, we have to delete two ordered pairs. For example, if A moves overtly, then we delete $\langle b,a\rangle$ and $\langle c,a\rangle$ to give $P_s = \{\langle a,b\rangle, \langle a,c\rangle, \langle a,a\rangle, \langle b,c\rangle\}$, producing the string *a b c*.
- Therefore, single exponence involves two deletions in this example.
- Now, let's consider multiple exponence.
- Keeping the u-precedence relation in (15), suppose we insert two Vocabulary Items a_1 and a_2 for A (it is irrelevant whether the two Vocabulary Items have the same phonological form).
- Then every ordered pair in P_u that involves A will have two counterparts in P_s: one where A is replaced by a_1, and one where A is replaced by a_2 (the exception is $\langle A,A\rangle$, which will have four counterparts).
  - For example, Vocabulary Insertion will map $\langle A,B\rangle$ onto $\langle a_1,b\rangle$ and $\langle a_2,b\rangle$.
- Consequently, Vocabulary Insertion now gives the s-precedence relation in (18).
  - To better indicate the correspondence between the u-precedence and s-precedence relation, the ordered pairs in (18) include subscripts indicating which ordered pair in (15) they realize.

[9] Note that the presence of $\langle a,a\rangle$ is unproblematic because antisymmetry allows reflexive ordering statements.

(18) An unrepaired s-precedence relation for (15) with multiple exponence. Subscripts denote each ordered pair's counterpart in (15).

$$\begin{Bmatrix} \langle a_1, b\rangle_{\langle A,B\rangle} & \langle a_1, c\rangle_{\langle A,C\rangle} & \langle a_1, a_1\rangle_{\langle A,A\rangle} & \langle a_1, a_2\rangle_{\langle A,A\rangle} \\ \langle a_2, b\rangle_{\langle A,B\rangle} & \langle a_2, c\rangle_{\langle A,C\rangle} & \langle a_2, a_1\rangle_{\langle A,A\rangle} & \langle a_2, a_2\rangle_{\langle A,A\rangle} \\ & \langle b, c\rangle_{\langle B,C\rangle} & \langle b, a_1\rangle_{\langle B,A\rangle} & \langle b, a_2\rangle_{\langle B,A\rangle} \\ & & \langle c, a_1\rangle_{\langle C,A\rangle} & \langle c, a_2\rangle_{\langle C,A\rangle} \end{Bmatrix}$$

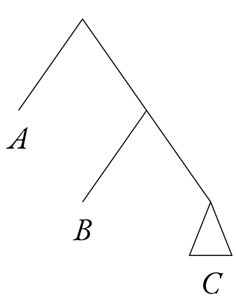
- This s-precedence relation violates antisymmetry—for example, we have $\langle a_1, b\rangle$ and $\langle b, a_1\rangle$—and thus requires repair.
- Any solution would require five deletions. For example, to realize a_1 at the left edge of the clause and a_2 "in situ," we would have to delete $\langle b, a_1\rangle$, $\langle c, a_1\rangle$, $\langle a_2, a_1\rangle$, $\langle a_2, b\rangle$, and $\langle a_2, c\rangle$, leaving the ordered pairs in (19).

(19) A repaired s-precedence relation for (15) with multiple exponence. Ordered pairs have been rearranged to make the surface order clearer.

$$\begin{Bmatrix} \langle a_1, a_1\rangle & \langle a_1, b\rangle & \langle a_1, c\rangle & \langle a_1, a_2\rangle \\ & \langle b, c\rangle & \langle b, a_1\rangle & \langle b, a_2\rangle \\ & & \langle c, a_1\rangle & \langle c, a_2\rangle \\ & & & \langle a_2, a_2\rangle \end{Bmatrix}$$

- This produces the string $a_1\ b\ c\ a_2$.
- Thus, producing fully superfluous multiple exponence requires more ordered pairs to be deleted than does single exponence.
- If the repair approach is correct, this may contribute to the cross-linguistic preference for single exponence.
- The previous example demonstrates that (fully superfluous) multiple exponence is possible when movement has occurred, giving rise to reflexive ordered pairs (see section 2.1).
- In fact, reflexive ordered pairs are required to generate fully superfluous multiple exponence in this framework.
- Suppose we have a u-precedence relation $P_u = \{\langle A, B\rangle, \langle A, C\rangle, \langle B, C\rangle\}$, reflecting a structure such as (20).

(20) [A [B [C]]]



- If Vocabulary Insertion inserts some a_1, a_2 for A, b for B, and c for C, this then gives the s-precedence relation $P_s = \{\langle a_1, b\rangle, \langle a_1, c\rangle, \langle a_2, b\rangle, \langle a_2, c\rangle, \langle b, c\rangle\}$.

- Here, there is a violation not of antisymmetry, but of totality: the two exponents of A, a_1 and a_2, are not ordered with respect to each other.
- Because there is no mechanism for adding ordered pairs to the s-precedence relation, we cannot repair this violation, so linearization fails.
- Thus, fully superfluous multiple exponence requires the u-precedence relation to contain reflexive ordered pairs.
- If displacement is the only source of reflexivity in linearization, then this predicts that fully superfluous multiple exponence can only arise when displacement has occurred.

Summary

- As shown in this section, by allowing Vocabulary Insertion to insert multiple exponents for a single node, we can produce multiple exponence.
- This account does not depend on any postsyntactic operations other than Vocabulary Insertion and linearization—there is no need for Fission.
- Unlike Nunes's (2004) account of "multiple copy spell-out", our account of multiple exponence does not assume the existence of copies, and thus is compatible with the multidominance theory of movement.[10]
- This account does not preclude the possibility that some cases of apparent multiple exponence involve multiple projections in the syntax, as argued by Wyngaerd et al. (2021).
- This proposal can account for multiple exponence involving portmanteaux. We demonstrate this in section 4.4, after first introducing my account of portmanteaux.

4.3 Portmanteaux

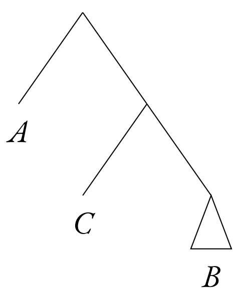
- Because it treats linear order as antisymmetric and treats Vocabulary Insertion as many-to-many, the current proposal allows for the insertion of portmanteaux without additional theoretical tools.
- The conceptual insight is that portmanteaux are an example not only of a many-to-one mapping (see section 2.2), but also of simultaneity: when multiple nodes are realized by a single exponent, they are realized simultaneously.
- Portmanteaux can be inserted under two structural configurations in this framework.
  - A portmanteau can be inserted to realize linearly adjacent nodes; this has been argued independently by Johnson (2012) and Ostrove (2018).
  - A portmanteau can be inserted when two nodes A and B stand in a relation of "linear symmetry," where the u-precedence relation contains both $\langle A, B\rangle$ and $\langle B, A\rangle$; this is an apparently novel prediction of the present framework.

[10] Nunes (2004) accounts for multiple exponence in the following way. He assumes that re-Merge leaves copies, and that copies must be deleted in order for a syntactic structure to be linearizable. He further assumes that Fusion renders the fused nodes invisible to linearization. Because linearization is what motivates copy deletion, and Fusion makes nodes invisible to linearization, a moved constituent can be realized more than once if one of its copies undergoes Fusion: once on its own and then again as part of a fused morpheme.

Adjacency-based portmanteaux

- Let us first discuss adjacency-based portmanteaux.
- Suppose we have a u-precedence relation $P_u = \{\langle A, B\rangle\}$.
- Suppose that the lexicon contains a portmanteau *ab* that realizes both *A* and *B*.
- If Vocabulary Insertion is many-to-many, then Vocabulary Insertion can select *ab* to realize *A* and *B* (a many-to-one relationship).
- If so, then $\langle A, B\rangle$ will be mapped onto $\langle ab, ab\rangle$ in the s-precedence relation P_s.
  - Because I have adopted antisymmetry rather than asymmetry, such a reflexive ordered pair poses no formal problem.
- This s-precedence relation will correspond to the string *ab*. This satisfies the Precedence Mapping Principle for $\langle ab, ab\rangle$: under the definition of precedence in (9), *ab* precedes *ab* (that is, *ab* precedes itself) because it is pronounced at the same time as itself. In other words, *ab* improperly precedes itself.
- Now, suppose that $P_u = \{\langle A, C\rangle, \langle A, B\rangle, \langle C, B\rangle\}$, so that *C* intervenes between *A* and *B*. This could correspond to the structure in (21).

(21) $[\, A\, [\, C\, [\, B\,]]]$



- If Vocabulary Insertion inserts *ab* for both *A* and *B* and some exponent *c* for *C*, then we have $P_s = \{\langle ab, c\rangle, \langle ab, ab\rangle, \langle c, ab\rangle\}$.
- There is now a clear violation of antisymmetry: we have both $\langle ab, c\rangle$ and $\langle c, ab\rangle$.
- However, the Principle of Maximality, repeated below, prevents the resolution of this violation.

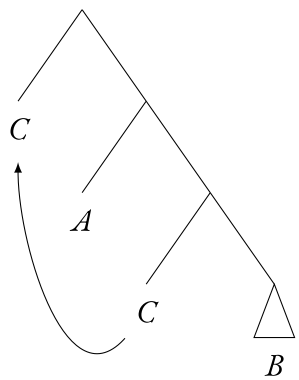
(7) Principle of Maximality: Let P_u be a u-precedence relation that is mapped onto an s-precedence relation P_s. Then for all $\langle X, Y\rangle \in P_u$ such that $\langle Y, X\rangle \notin P_u$, there exists $\langle x, y\rangle \in P_s$ such that *x* is an exponent of *X* and *y* is an exponent of *Y*.

- The pair $\langle ab, c\rangle$ in P_s corresponds to $\langle A, C\rangle$ in P_u. Because $\langle C, A\rangle \notin P_u$, $\langle A, C\rangle$ is protected by the Principle of Maximality, so its realization $\langle ab, c\rangle$ cannot be deleted.
- Likewise, the pair $\langle c, ab\rangle$ in P_s corresponds to $\langle C, B\rangle$ in P_u. Because $\langle B, C\rangle \notin P_u$, $\langle C, B\rangle$ is protected by the Principle of Maximality, so its realization $\langle c, ab\rangle$ in P_s cannot be deleted.
- Since we can delete neither $\langle ab, c\rangle$ nor $\langle c, ab\rangle$, there is no way to resolve the violation of antisymmetry, so linearization fails.

- Thus, disrupting adjacency prevents the insertion of a portmanteau. In other words, adjacency is the structural configuration for insertion of portmanteaux here.

- Now consider the case where we have $P_u = \{\langle C, A\rangle, \langle C, C\rangle, \langle C, B\rangle, \langle A, C\rangle, \langle A, B\rangle\}$. This represents the case where the "trace" of C intervenes between A and B, as in (22).

(22) $[\, C\, [\, A\, [\, C\, [\, B\,]]]]$



- If we insert c for C and ab as a portmanteau for A and B, then the P_u maps onto P_s as follows, giving $P_s = \{\langle c, ab\rangle, \langle c, c\rangle, \langle ab, c\rangle, \langle ab, ab\rangle\}$:
  - $\langle C, A\rangle \rightarrow \langle c, ab\rangle$
  - $\langle C, C\rangle \rightarrow \langle c, c\rangle$
  - $\langle C, B\rangle \rightarrow \langle c, ab\rangle$
  - $\langle A, C\rangle \rightarrow \langle ab, c\rangle$
  - $\langle A, B\rangle \rightarrow \langle ab, ab\rangle$

- Since we have both $\langle c, ab\rangle$ and $\langle ab, c\rangle$, antisymmetry is violated, so P_s requires repair.

- The ordered pair $\langle c, ab\rangle$ realizes $\langle C, B\rangle$ (as well as $\langle C, A\rangle$). There is no $\langle B, C\rangle$ in P_u, so the ordered pair $\langle c, ab\rangle$ is protected by the Principle of Maximality.

- On the other hand, $\langle ab, c\rangle$ realizes $\langle A, C\rangle$. Because $\langle C, A\rangle \in P_u$, the Principle of Maximality does not protect $\langle ab, c\rangle$.

- Consequently, we can resolve the violation of antisymmetry by deleting $\langle ab, c\rangle$, leaving $P_s = \{\langle c, ab\rangle, \langle c, c\rangle, \langle ab, ab\rangle\}$.

- This corresponds to the string $c\ ab$. In other words, "traces" do not prevent the insertion of portmanteaux under adjacency.

Symmetry-based portmanteaux

- Let us turn to the second configuration under which portmanteaux can be inserted: linear symmetry.

- In general, if we have a u-precedence relation with symmetric counterparts $\langle A, B\rangle$ and $\langle B, A\rangle$, then a portmanteau can be inserted for both A and B, regardless of whether they are linearly adjacent.

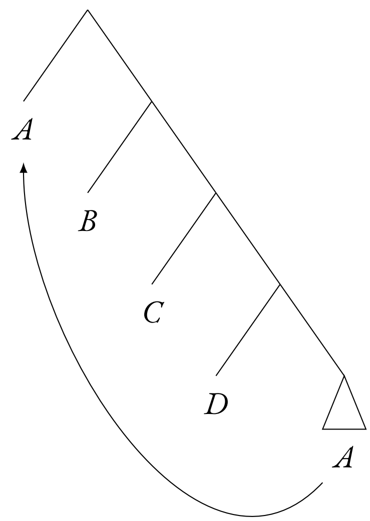
- To illustrate, suppose that P_u consists of the ordered pairs in (23). This corresponds to the case where A moves over B, C, and D, illustrated in (24).

- Note that there is no adjacency between A and C: B intervenes between the higher (left-edge) instance of A and C, while D intervenes between C and the lower (right-edge) instance of A.

(23) Hypothetical u-precedence relation for inserting portmanteaux under symmetry.

$$\left\{\begin{array}{cccc} \langle A,B\rangle & \langle A,C\rangle & \langle A,D\rangle & \langle A,A\rangle \\ & \langle B,C\rangle & \langle B,D\rangle & \langle B,A\rangle \\ & & \langle C,D\rangle & \langle C,A\rangle \\ & & & \langle D,A\rangle \end{array}\right\}$$

(24) [A [B [C [D [A]]]]]



- Suppose we insert a portmanteau *ac* for A and C, along with separative morphemes *b* and *d* for B and D respectively.
- Then the u-precedence relation in (23) will be mapped onto the s-precedence relation in (25), which simplifies to (26) once we ignore repetitions.
  - As with earlier examples, the ordered pairs in (25) are marked with subscripts indicating which ordered pair in (23) they realize.

(25) An unrepaired s-precedence relation for (23), reflecting insertion of portmanteaux under symmetry. Repetitions are shown for expositional purposes. Subscripts denote each ordered pair's counterpart in (23).

$$\left\{\begin{array}{cccc} \langle ac,b\rangle_{\langle A,B\rangle} & \langle ac,ac\rangle_{\langle A,C\rangle} & \langle ac,d\rangle_{\langle A,D\rangle} & \langle ac,ac\rangle_{\langle A,A\rangle} \\ & \langle b,ac\rangle_{\langle B,C\rangle} & \langle b,d\rangle_{\langle B,D\rangle} & \langle b,ac\rangle_{\langle B,A\rangle} \\ & & \langle ac,d\rangle_{\langle C,D\rangle} & \langle ac,ac\rangle_{\langle C,A\rangle} \\ & & & \langle d,ac\rangle_{\langle D,A\rangle} \end{array}\right\}$$

(26) An unrepaired s-precedence relation for (23), reflecting insertion of portmanteaux under symmetry. Repetitions have been removed.

$$\left\{\begin{array}{ccc} \langle ac,b\rangle & \langle ac,d\rangle & \langle ac,ac\rangle \\ & \langle b,d\rangle & \langle b,ac\rangle \\ & & \langle d,ac\rangle \end{array}\right\}$$

- There are two violations of antisymmetry here: we have both $\langle ac, b\rangle$ and $\langle b, ac\rangle$, and both $\langle ac, d\rangle$ and $\langle d, ac\rangle$.
- However, $\langle b, ac\rangle$ realizes $\langle B, C\rangle$ (as well as $\langle B, A\rangle$).
- Since $\langle C, B\rangle \notin P_u$, $\langle b, ac\rangle$ is protected by the Principle of Maximality as the realization of $\langle B, C\rangle$.
- By the same logic, $\langle ac, d\rangle$ is protected as the realization of $\langle C, D\rangle$.
- On the other hand, $\langle ac, b\rangle$ and $\langle d, ac\rangle$ are not protected because the ordered pairs they realize—$\langle A, B\rangle$ and $\langle D, A\rangle$—have symmetric counterparts.
- Thus, the only way to resolve the violation of antisymmetry is to delete $\langle ac, b\rangle$ and $\langle d, ac\rangle$, leaving $P_s = \{\langle b, ac\rangle, \langle b, d\rangle, \langle ac, ac\rangle, \langle ac, d\rangle\}$.
- This corresponds to the string *b ac d*.
- In other words, *ac* takes *C*'s position, that is, the position where we would expect *C* to be realized, all else being equal.
- In this way, portmanteaux can be inserted under symmetry, even if the nodes that the portmanteaux realize are not adjacent.

Summary

- To summarize, the present proposal allows for portmanteaux to be inserted under two structural configurations: adjacency and symmetry.
- As discussed above, authors such as Johnson (2012) and Ostrove (2018) have already argued for the insertion of portmanteaux under adjacency.
- The insertion of portmanteaux under symmetry is novel, at least to my knowledge.
  - It is not yet clear whether the theoretical possibility of symmetry-based portmanteaux is realized in natural language.
- Importantly, this account of portmanteaux requires no additional assumptions beyond the two theses of this talk: that linear order is antisymmetric, and that Vocabulary Insertion is potentially many-to-many.
- In a sense, the terminal node remains the unit of Vocabulary Insertion, but Vocabulary Insertion can insert the same Vocabulary Item for different terminal nodes, so that terminal nodes share an exponent.
- Crucially, this is not an *additional* assumption about Vocabulary Insertion, but simply a *different* one from that made by frameworks that assume Vocabulary Insertion to be one-to-one (see section 2.2).
- Additionally, I am not assuming that sequences of linearly adjacent nodes (or sets of nodes in symmetric precedence relationships) are the targets of Vocabulary Insertion.
- In other words, I am not proposing a novel primitive as the target for Vocabulary Insertion comparable to the span (Svenonius, 2016) or stretch (Ostrove, 2018)—in principle, Vocabulary Insertion can insert a portmanteau for any set of nodes, regardless of the structural relations between them.
- Factors external to Vocabulary Insertion determine whether a portmanteau can successfully be inserted.

– Vocabulary Insertion can naturally only insert a portmanteau if one is available in the lexicon.
– Because of the constraints imposed by linearization—the s-precedence relation must be transitive, total and antisymmetric, and it must reflect the u-precedence relation (as expressed by the Principle of Maximality)—it follows that portmanteaux can only be inserted for linearly adjacent nodes and for nodes in a symmetric relationship, as demonstrated above. In general, trying to insert portmanteaux in other configurations will cause linearization to fail.[11]

- Because it depends only on Vocabulary Insertion and linearization, both independently motivated[12] features of the linguistic system, the present proposal is conceptually preferable to other proposals that posit morphology-specific units or processes to derive portmanteaux.
  – As already discussed, this proposal does not posit a morphology-specific unit of Vocabulary Insertion comparable to the span or stretch.
  – Unlike in Distributed Morphology, we do not need to posit a morphological operation of Fusion (Halle & Marantz, 1993).
  – Unlike versions of Nanosyntax that adopt nonterminal spell-out, we do not need to posit otherwise unmotivated traceless movement ("spell-out-driven movement") to derive the right structural configuration for Vocabulary Insertion (Baunaz & Lander, 2018).

4.4 Multiple exponence with portmanteaux

- The present proposal can account for multiple exponence involving portmanteaux.

Fully superfluous multiple exponence of portmanteaux

- The proposal can account for fully superfluous multiple exponence of portmanteaux, where multiple portmanteaux express the same set of features.
- (27) provides an example from Dumi where the suffix *-si* 'non-first person dual', which expresses both person and number, occurs twice (van Driem, 1993, discussed in Harris, 2016).[13]

(27) *do:khot-n-si-si* 'I saw you (DU)' (Dumi (Sino-Tibetan: Nepal); Harris, 2016, 233)

- Suppose we have a u-precedence relation P_u with the ordered pairs in (28). This could correspond to a structure such as (29), where the constituent consisting of A and B has re-merged to a position above C.

(28) Hypothetical u-precedence relation reflecting movement of A and B.

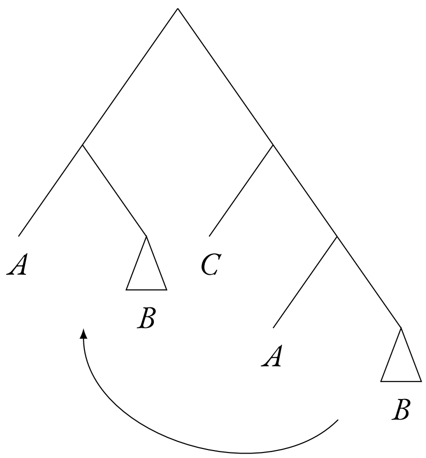
$$\left\{\begin{matrix} \langle A,B\rangle & \langle A,C\rangle & \langle A,A\rangle \\ \langle B,B\rangle & \langle B,C\rangle & \langle B,A\rangle \\ \langle C,B\rangle & & \langle C,A\rangle \end{matrix}\right\}$$

[11] There may be a parsing benefit to restricting portmanteaux to adjacent nodes. In effect, it reduces the hypothesis space for the listener, since they would only need to consider representations where a portmanteau corresponds to adjacent nodes.

[12] Vocabulary Insertion and linearization are independently motivated both empirically and conceptually. Empirically, they are independently motivated in that neither operation is proposed solely to account for portmanteaux. Conceptually, they are independently motivated in that some mechanism is independently required to pair syntactic structure with phonological content (the role of Vocabulary Insertion), and to give this content temporal order (the role of linearization). While these mechanisms are independently motivated, it is not conceptually necessary that they be post-syntactic (e.g., Collins & Kayne, 2023)).

[13] Note that examples such as (27) violate Kinyalolo's Constraint (Kinyalolo, 1991), which prohibits the insertion of identical exponents within a single complex head. Outputs that violate Kinyalolo's Constraint are readily generated in this framework. Therefore, I take the emergence of identical exponents within a single morphological word to be a matter of markedness, enforced differentially across languages at PF.

(29) [[A [B]] [C [A [B]]]]



- If we insert portmanteaux ab_1 and ab_2 for A and B and a morpheme c for C, then this gives rise to the s-precedence relation in (30), which simplifies to (31) after removing repetitions.

(30) An unrepaired s-precedence relation for (28) with multiple exponence of a portmanteau. Subscripts denote each ordered pair's counterpart in (28).

$$\left\{\begin{array}{ccccc}
\langle ab_1, c\rangle_{\langle A,C\rangle} & \langle ab_1, ab_1\rangle_{\langle A,A\rangle} & \langle ab_1, ab_2\rangle_{\langle A,A\rangle} & \langle ab_1, ab_1\rangle_{\langle A,B\rangle} & \langle ab_1, ab_2\rangle_{\langle A,B\rangle} \\
\langle ab_2, c\rangle_{\langle A,C\rangle} & \langle ab_2, ab_1\rangle_{\langle A,A\rangle} & \langle ab_2, ab_2\rangle_{\langle A,A\rangle} & \langle ab_2, ab_1\rangle_{\langle A,B\rangle} & \langle ab_2, ab_2\rangle_{\langle A,B\rangle} \\
\langle ab_1, c\rangle_{\langle B,C\rangle} & \langle ab_1, ab_1\rangle_{\langle B,A\rangle} & \langle ab_1, ab_2\rangle_{\langle B,A\rangle} & \langle ab_1, ab_1\rangle_{\langle B,B\rangle} & \langle ab_1, ab_2\rangle_{\langle B,B\rangle} \\
\langle ab_2, c\rangle_{\langle B,C\rangle} & \langle ab_2, ab_1\rangle_{\langle B,A\rangle} & \langle ab_2, ab_2\rangle_{\langle B,A\rangle} & \langle ab_2, ab_1\rangle_{\langle B,B\rangle} & \langle ab_2, ab_2\rangle_{\langle B,B\rangle} \\
 & \langle c, ab_1\rangle_{\langle C,A\rangle} & \langle c, ab_2\rangle_{\langle C,A\rangle} & \langle c, ab_1\rangle_{\langle C,B\rangle} & \langle c, ab_2\rangle_{\langle C,B\rangle}
\end{array}\right\}$$

(31) An unrepaired s-precedence relation for (28) with multiple exponence of a portmanteau, equivalent to (30). Repetitions have been removed.

$$\left\{\begin{array}{ccc}
\langle ab_1, c\rangle & \langle ab_1, ab_1\rangle & \langle ab_1, ab_2\rangle \\
\langle ab_2, c\rangle & \langle ab_2, ab_1\rangle & \langle ab_2, ab_2\rangle \\
 & \langle c, ab_1\rangle & \langle c, ab_2\rangle
\end{array}\right\}$$

- This s-precedence relation is not antisymmetric—for example, it contains both $\langle ab_1, c\rangle$ and $\langle c, ab_1\rangle$—and thus requires repair.

- Because every ordered pair in the u-precedence relation has a symmetric counterpart, the Principle of Maximality does not protect any ordered pair, leaving multiple options for repair.

- If we delete $\langle ab_1, c\rangle$, $\langle ab_2, c\rangle$, and $\langle ab_2, ab_1\rangle$, this gives $P_s = \{\langle c, ab_1\rangle, \langle c, ab_2\rangle, \langle ab_1, ab_1\rangle, \langle ab_1, ab_2\rangle, \langle ab_2, ab_2\rangle\}$, which generates the string $c\ ab_1\ ab_2$.

Partially superfluous multiple exponence

- This proposal can also account for partially superfluous multiple exponence, where the features of one exponent are a proper subset of the features of another exponent (Caballero & Harris, 2012).

- For example, in (32), person is expressed twice: by the prefix *ke-*, which only expresses person, and by the suffix *-pwa*, which also expresses number (Dahlstrom, 2000, discussed in Caballero & Harris, 2012).

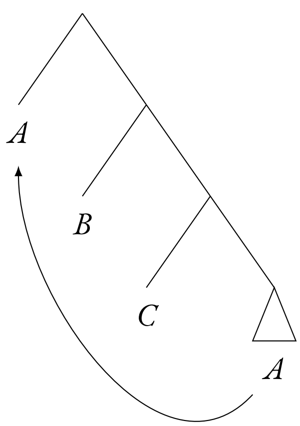
(32) ke-nowi:-pwa
2-go.out-2PL
'You (pl.) go out.' (Meskwaki (Algic: USA); Caballero & Harris, 2012, 176)

- We will again assume the u-precedence relation in (15), which could correspond to a structure such as (16) (both repeated below).

(15) Hypothetical u-precedence relation reflecting movement of A.

$$\left\{\begin{array}{ccc} \langle A,B\rangle & \langle A,C\rangle & \langle A,A\rangle \\ & \langle B,C\rangle & \langle B,A\rangle \\ & & \langle C,A\rangle \end{array}\right\}$$

(16) $[\,A\,[\,B\,[\,C\,[\,A\,]]]]$



- Suppose Vocabulary Insertion inserts a for A, b for B, and a portmanteau ac for A and C, so that A is expressed both by the separative morpheme a and as part of the portmanteau ac.

- This gives the s-precedence relation in (33), which simplifies to (34) after removing repetitions.

(33) An unrepaired s-precedence relation for (15) with partially superfluous multiple exponence. Subscripts denote each ordered pair's counterpart in (15).

$$\left\{\begin{array}{cccc} \langle a,b\rangle_{\langle A,B\rangle} & \langle a,ac\rangle_{\langle A,C\rangle} & \langle a,a\rangle_{\langle A,A\rangle} & \langle a,ac\rangle_{\langle A,A\rangle} \\ \langle ac,b\rangle_{\langle A,B\rangle} & \langle ac,ac\rangle_{\langle A,C\rangle} & \langle ac,a\rangle_{\langle A,A\rangle} & \langle ac,ac\rangle_{\langle A,A\rangle} \\ & \langle b,ac\rangle_{\langle B,C\rangle} & \langle b,a\rangle_{\langle B,A\rangle} & \langle b,ac\rangle_{\langle B,A\rangle} \\ & & \langle ac,a\rangle_{\langle C,A\rangle} & \langle ac,ac\rangle_{\langle C,A\rangle} \end{array}\right\}$$

(34) An unrepaired s-precedence relation for (15) with partially superfluous multiple exponence, equivalent to (33). Repetitions have been removed.

$$\left\{\begin{array}{ccc} \langle a,b\rangle & \langle a,ac\rangle & \langle a,a\rangle \\ \langle ac,b\rangle & \langle ac,ac\rangle & \langle ac,a\rangle \\ & \langle b,ac\rangle & \langle b,a\rangle \end{array}\right\}$$

- There are three violations of antisymmetry in the s-precedence relation: $\langle a,b\rangle$ vs. $\langle b,a\rangle$, $\langle a,ac\rangle$ vs. $\langle ac,a\rangle$, and $\langle ac,b\rangle$ vs. $\langle b,ac\rangle$.

- The ordered pair $\langle b, ac\rangle$ realizes $\langle B, C\rangle$, which has no counterpart $\langle C, B\rangle$ in P_u. Consequently, $\langle b, ac\rangle$ is protected by the Principle of Maximality, so $\langle ac, b\rangle$ must be deleted instead.
- For the other two violations of antisymmetry, there are several options. As an example, if we delete $\langle b, a\rangle$ and $\langle ac, a\rangle$, then we will have $P_s = \{\langle a, a\rangle, \langle a, b\rangle, \langle a, ac\rangle, \langle b, ac\rangle, \langle ac, ac\rangle\}$, giving the string *a b ac*, which corresponds with (32).
- Thus, partially superfluous multiple exponence can be generated within this framework.

Overlapping multiple exponence

- The present proposal can also account for overlapping multiple exponence, where two or more portmanteaux share some feature(s) but differ in others (Caballero & Harris, 2012).
- An example is given in (35), from Daga (Murane, 1974; discussed in Caballero & Harris, 2012). Here, agreement is expressed on two suffixes: *-nigas*, which also expresses the intensive, and *-ivin*, which also expresses the present continuous.

(35) kanda-nigas-ivin
awaken-INTENSIVE.1SG.SUBJ-PRS.CONTINUOUS.1SG.SUBJ
'I am awakening.' (Daga (Trans-New Guinea: Papua New Guinea); Caballero & Harris, 2012, 176)

- Again maintaining the u-precedence relation in (15), corresponding to (16), suppose that we insert a portmanteau *ab* for *A* and *B* and a portmanteau *ac* for *A* and *C*.
- This gives the s-precedence relation P_s in (36), which simplifies to $\{\langle ab, ab\rangle, \langle ab, ac\rangle, \langle ac, ab\rangle, \langle ac, ac\rangle\}$.

(36) An unrepaired s-precedence relation for (15) with overlapping multiple exponence. Subscripts denote each ordered pair's counterpart in (15).

$$\begin{Bmatrix} \langle ab, ab\rangle_{\langle A,B\rangle} & \langle ab, ac\rangle_{\langle A,C\rangle} & \langle ab, ab\rangle_{\langle A,A\rangle} & \langle ab, ac\rangle_{\langle A,A\rangle} \\ \langle ac, ab\rangle_{\langle A,B\rangle} & \langle ac, ac\rangle_{\langle A,C\rangle} & \langle ac, ab\rangle_{\langle A,A\rangle} & \langle ac, ac\rangle_{\langle A,A\rangle} \\ & \langle ab, ac\rangle_{\langle B,C\rangle} & \langle ab, ab\rangle_{\langle B,A\rangle} & \langle ab, ac\rangle_{\langle B,A\rangle} \\ & & \langle ac, ab\rangle_{\langle C,A\rangle} & \langle ac, ac\rangle_{\langle C,A\rangle} \end{Bmatrix}$$

- With both $\langle ab, ac\rangle$ and $\langle ac, ab\rangle$, this s-precedence relation has a single violation of antisymmetry.
- However, $\langle ab, ac\rangle$ realizes $\langle B, C\rangle$ and thus is protected by the Principle of Maximality, as in the previous example.
- Consequently, the only way to resolve the violation of antisymmetry is to delete $\langle ac, ab\rangle$, giving $P_s = \{\langle ab, ab\rangle, \langle ab, ac\rangle, \langle ac, ac\rangle\}$.
- This produces the string *ab ac*, which corresponds to (35).

5 Discussion

- I have argued for two proposals in service of advancing a more restrictive theory of externalization.
- The first proposal is that linear order is better modeled as antisymmetric than asymmetric.

- Conceptually, this proposal reflects changes to the theoretical landscape since Kayne 1994.
- In effect, a side effect of the reframing of movement as Merge is that reflexivity becomes endemic to syntax.
- If we assume that linear order is asymmetric, then such reflexivity poses a problem when syntactic structure is linearized.
- However, the problem can be avoided if linear order is taken to be antisymmetric, thereby allowing reflexivity.
- The main empirical advantage of antisymmetry over asymmetry is its ability to account for simultaneity.
    * Here, I discussed tonal morphemes, tone spreading, non-manual signs, and portmanteaux, but the proposal can be extended to other simultaneity phenomena.
    * For example, it should be compatible with proposals that treat (components of) intonational contours as exponents of syntactic structure.
    * This is no small advantage: if we count intonation, then simultaneity is a universal or near-universal property of language.
- There appear to be no advantages of adopting asymmetry over antisymmetry.
    * One might argue that antisymmetry introduces a complication in that linearization needs to determine whether to create a sequential or simultaneous representation.
    * However, if simultaneity simply occurs wherever it is possible (Kremers, 2013)—for example, where material occupies different autosegmental tiers—then there is no burden of deciding between simultaneity and sequentiality.

• The second proposal is that Vocabulary Insertion is not one-to-one, but many-to-many.
  - Despite the well-known fact that the relationship between syntactic features and their exponents is many-to-many, a number of morphological theories assume the mechanism behind this relationship (i.e., Vocabulary Insertion) to be one-to-one.
  - Such theories must then propose additional mechanisms to account for deviations from this idealized one-to-one relationship.
  - By contrast, I attribute the many-to-many relationship between syntactic features and exponents to Vocabulary Insertion itself, obviating the need for additional mechanisms.
  - Consequently, we can generate portmanteaux and multiple exponence without adopting (i) morphology-specific operations such as Fission or Fusion, or (ii) morphology-specific units such as the span or stretch.
  - Allowing Vocabulary Insertion to be many-to-many makes the operation more powerful, potentially raising concerns about overgeneration.
  - However, I have demonstrated that linearization constrains Vocabulary Insertion: under the wrong conditions, insertion of portmanteaux or multiple exponents causes linearization to fail.
  - I also suggested other factors that may constrain Vocabulary Insertion, although these were not the focus of the talk.
      * I suggested in section 4.2 that parsing and economy may favor single exponence.
      * On the other hand, multiple exponence may be favored because it arguably benefits the listener: it provides more opportunities to perceive content, and in some cases makes the syntactic representation more explicit (when "traces" are pronounced, as in (14)).

- This picture of competing constraints influencing Vocabulary Insertion suggests an Optimality Theoretic approach.[14]
- Such an approach would bring Vocabulary Insertion in line with other postsyntactic phenomena: Optimality Theory is mainstream in treatments of phonology proper and of prosodic parsing (Selkirk, 2011), and is gaining ground in studies of linearization (Kusmer, 2020; Johnson, 2023). I leave this to future work.

- The proposals in this talk constitute a first step towards a novel research program, which I call **Intermodular Morphology**.
- The goal of this research program is to capture morphological generalizations without a morphology module. In effect, there is syntax, there is phonology, and there are the intermodular operations that translate between them—in other words, the syntax-phonology interface or "PF."
- Specifically, Intermodular Morphology rejects PF operations that are not *directly implicated* in the translation from syntax to phonology. Thus, PF operations must have the following properties:

(37) Properties of PF operations
  a. The operation takes as its input (i) the output of syntax or (ii) the output of an earlier PF operation.[15]
  b. The output of the operation is not a syntactic representation.

- Intermodular Morphology thus excludes most postsyntactic operations of Distributed Morphology, as well the spell-out driven movement of Nanosyntax, since these are non-syntactic operations that produce syntactic representations as output, in violation of (37b).
- Likewise, because there is no morphology component, there are no representations proper to that component. Consequently, there can be no spans unless they are produced as the output of an intermodular operation.
- Intermodular Morphology thus avoids the conceptual challenges faced by these theoretical tools (see section 2.2 and Collins & Kayne, 2023) and presents a more parsimonious view of Language, with fewer modules and fewer primitives.
- Moreover, by reducing the number of unexplained primitives, Intermodular Morphology forces us to go beyond explanatory adequacy (Chomsky, 2004) in our account of morphological phenomena.
- In this talk, I have taken linearization and Vocabulary Insertion to be intermodular, licensing their use in accounting for morphological generalizations.

[14] Distributed Morphology's Subset Principle (Halle, 1997) and Nanosyntax's Superset Principle (Starke, 2009) can be considered inviolable faithfulness constraints governing permissible mismatches between features of syntactic structures and features of their exponents. In an Optimality Theoretic approach, these would be replaced by one or more faithfulness constraints. For example, a form of Max might penalize cases where an exponent has less features than the structure it realizes, while a form of Dep might penalize cases where an exponent has more features than the structure it realizes.

[15] I intend an inclusive *or* here. For example, as understood here, Vocabulary Insertion takes as input both the output of syntax and the output of linearization.

- Linearization takes the syntactic structure as its input, satisfying (37a), and produces the u-precedence relation as its output. The u-precedence relation is a set of ordered pairs of terminal nodes, which is not a syntactic representation, thereby satisfying (37b).[16]
- Likewise, Vocabulary Insertion takes as its inputs the u-precedence relation and the syntactic structure (since features are used in selecting exponents) and produces the s-precedence relation. The s-precedence relation is a set of ordered pairs of exponents, which is not a syntactic object.

- Intermodular Morphology is a research program, not a specific framework.
  - The proposals advanced in this talk represent only one implementation of Intermodular Morphology.
  - Other researchers may assume a different inventory of intermodular operations, or may assume these operations to be of a different nature.
  - Researchers may vary in whether they attribute a specific phenomenon to the syntax, the phonology, intermodular operations, or some combination of these.
    * For example, Collins & Kayne's (2023) Morphology-as-Syntax rejects postsyntactic Vocabulary Insertion, and in general, it seeks morphological explanations in the syntax. Despite these differences, Morphology-as-Syntax can be considered an implementation of Intermodular Morphology: they account for morphological generalizations without a morphology module.
- I hope that researchers will take seriously the search for an Intermodular Morphology, even if they do not agree with the specific proposals advanced in this talk.

References

Arregi, Karlos & Andrew Nevins. 2012. *Morphotactics: Basque auxiliaries and the structure of Spellout*. Dordrecht: Springer.

Baunaz, Lena & Eric Lander. 2018. Nanosyntax: The basics. In Lena Baunaz, Liliane Haegeman, Karen De Clercq & Eric Lander (eds.), *Exploring nanosyntax*, 3–56. Oxford: Oxford University Press.

Caballero, Gabriela & Alice C. Harris. 2012. A working typology of multiple exponence. In Ferenc Kiefer, Mária Ladányi & Péter Siptár (eds.), *Current issues in morphological theory: (ir)regularity, analogy and frequency*, 163–188. Amsterdam: John Benjamins.

Caha, Pavel. 2009. *The nanosyntax of case*. Tromsø: University of Tromsø PhD thesis.

Chomsky, Noam. 1995. Bare phrase structure. In Héctor Campos & Paula Kempchinsky (eds.), *Evolution and revolution in linguistic theory*, 51–109. Washington, D.C.: Georgetown University Press.

Chomsky, Noam. 2004. Beyond explanatory adequacy. In Adriana Belletti (ed.), *Structures and beyond: The cartography of syntactic structures, volume 3*, 104–131. Oxford: Oxford University Press.

Chomsky, Noam. 2008. On phases. In Robert Freidin (ed.), *Foundational issues in linguistic theory: Essays in honor of Jean-Roger Vergnaud*, 133–166. Cambridge, MA: MIT Press.

[16] This point holds regardless of whether Merge produces sets or ordered pairs. If Merge produces sets, then ordered pairs of terminal nodes have no status in the syntax, so the u-precedence relation cannot be a syntactic object. If Merge produces ordered pairs, then a complex syntactic object is an *ordered pair* of ordered pairs. The u-precedence relation, by contrast, is a *set* of ordered pairs, and thus not a syntactic object.

Collins, Chris & Richard S. Kayne. 2023. Towards a theory of morphology as syntax. *Studies in Chinese Linguistics* 44(1). 1–32.

Dahlstrom, Amy. 2000. Morphosyntactic mismatches in Algonquian: Affixal predicates and discontinuous verbs. In Arika Okrent & John P. Boyle (eds.), *Proceedings from the panels of the Chicago Linguistic Society's thirty-sixth meeting*, 63–87. Chicago: Chicago Linguistic Society.

van Driem, George. 1993. *A grammar of Dumi*. Berlin: Mouton de Gruyter.

Fanselow, Gisbert & Damir Ćavar. 2001. Remarks on the economy of pronunciation. In Gereon Müller & Wolfgang Sternefeld (eds.), *Competition in syntax*, 107–150. Berlin: De Gruyter Mouton.

Halle, Morris. 1997. Distributed Morphology: Impoverishment and Fission. In Benjamin Bruening, Yoonjung Kang & Martha McGinnis (eds.), *PF: Papers at the interface*, 425–449. Cambridge, MA: MITWPL.

Halle, Morris & Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In Kenneth Hale & Samuel Jay Keyser (eds.), *The view from building 20: Essays in honor of Sylvain Bromberger*, 111–176. Cambridge, MA: MIT Press.

Harris, Alice C. 2016. *Multiple exponence*. New York: Oxford University Press.

Hyman, Larry M. 2011. The representation of tone. In Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume & Keren Rice (eds.), *The Blackwell companion to phonology*, vol. 2, 2304–2333. Malden: Blackwell.

Johnson, Kyle. 2012. Towards deriving differences in how *Wh* movement and QR are pronounced. *Lingua* 122. 529–553.

Johnson, Kyle. 2023. Keeping sisters straight. June 25. Paper presented at How Many Mothers? Multidominance in Syntax. Amherst: University of Massachusetts.

Kandybowicz, Jason. 2004. Nupe tonology and the categorical identity of verb copy tones: A pilot experimental study. *University College London Working Papers in Linguistics* 16. 17–53.

Kandybowicz, Jason. 2006. On Fusion and the architecture of PF. Paper presented at Penn Linguistics Colloquium (PLC) 30. Philadelphia: University of Pennsylvania.

Kandybowicz, Jason. 2007. On fusion and multiple copy spell-out: The case of verbal repetition. In Norbert Corver & Jairo Nunes (eds.), *The copy theory of movement* (Linguistik Aktuel/Linguistics Today 107), 119–150. John Benjamins.

Kandybowicz, Jason. 2008. *The grammar of repetition: Nupe grammar at the syntax-phonology interface*. Amsterdam: John Benjamins.

Kayne, Richard S. 1994. *The antisymmetry of syntax*. Cambridge, MA: MIT Press.

Kinyalolo, Kasangati K. W. 1991. *Syntactic dependencies and the Spec-Head agreement hypothesis in Kilega*. Los Angeles: University of California Los Angeles PhD thesis.

Kremers, Joost. 2012. The syntax of simultaneity. *Lingua* 122. 979–1003.

Kremers, Joost. 2013. Linearisation as repair. In Patrick Brandt & Eric Fuß (eds.), *Repairs: The added value of being wrong*, 207–236. Boston: De Gruyter.

Kusmer, Leland Paul. 2020. Optimal Linearization: Word-order typology with violable constraints. *Syntax* 23(4). 313–346.

Malanoski, Aidan. 2024. Right node raising and Flexible Cyclic Linearization. In Jiaji Yu, Erika Petersen, Anissa Zaitsu & Boris Harizanov (eds.), *Proceedings of the 40th West Coast Conference on Formal Linguistics*, 223–232. Somerville, MA: Cascadilla Proceedings Project.

McDaniel, Dana. 1986. *Conditions on wh-chains*. New York: City University of New York PhD thesis.

Murane, Elizabeth. 1974. *Daga grammar: From morpheme to discourse*. Norman: Summer Institute of Linguistics.

Nunes, Jairo. 2004. *Linearization of chains and sideward movement*. Cambridge, MA: MIT Press.

Onn, Farid Mohamed. 1976. *Aspects of Malay phonology and morphology*. Urbana: University of Illinois at Urbana-Champaign PhD thesis.

Ostrove, Jason. 2018. Stretching, spanning, and linear adjacency in Vocabulary Insertion. *Natural Language & Linguistic Theory* 36. 1263–1289.

Pfau, Roland & Josep Quer. 2002. V-to-Neg raising and negative concord in three sign languages. *Rivista di Grammatica Generativa* 27. 73–86.

Prince, Alan & Paul Smolensky. 2004. *Optimality Theory: Constraint interaction in generative grammar*. Malden: Blackwell.

Selkirk, Elisabeth. 2011. The syntax-phonology interface. In John Goldsmith, Jason Riggle & Alan C. L. Yu (eds.), *The handbook of phonological theory*, 435–484. Malden: Wiley-Blackwell 2nd edn.

Starke, Michal. 2009. Nanosyntax: A short primer to a new approach to language. *Nordlyd* 36(1). 1–6.

Svenonius, Peter. 2016. Spans and words. In Daniel Siddiqi & Heidi Harley (eds.), *Morphological metatheory*, 201–222. Amsterdam: John Benjamins.

Taraldsen, Knut Tarald. 2018. Spanning versus constituent lexicalization: The case of portmanteau prefixes. In Lena Baunaz, Liliane Haegeman, Karen De Clercq & Eric Lander (eds.), *Exploring nanosyntax*, 88–107. Oxford: Oxford University Press.

Wyngaerd, Guido Vanden, Karen De Clercq & Pavel Caha. 2021. Late Insertion and root suppletion. *ReVEL* 19(18). 81–123.