Post-syntactic altruism in Tiwa*

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Studies of narrow syntactic movement have distinguished between greed – when an element moves to satisfy its own requirements – and altruism – when an element moves to satisfy requirements of another element. We argue that a similar distinction between greed and altruism can be made for post-syntactic displacement. In the Tibeto-Burman language Tiwa, tense doubles or inverts with focus only in the context of overt agreement. We argue that it is a positional requirement of the agreement morph that causes post-syntactic displacement of tense, rather than any property of the tense morph itself. Thus the trigger and target of displacement are distinct – a phenomenon we refer to as altruistic displacement. We discuss crosslinguistic patterns of post-syntactic altruism and contrast them with greedy displacement – a pattern where the same morph is both the trigger and target of displacement. We model Tiwa inversion and doubling via constraint interaction, arguing that these patterns arise due to competing pressures in the grammar – a pressure to satisfy a morphotactic condition on the position of the agreement morph and a pressure to obey default linearization principles. We highlight that competing pressures can lead to surface variation and give rise to multiple exponence, both of which are present in Tiwa.

1 Introduction to the issue

A long tradition of work in syntax has sought to understand the motivations for narrow syntactic movement. In early Minimalism, movement was assumed to be GREEDY; that is, it was assumed that an element always moves to satisfy its own requirements (Bošković 1995, 2007; Chomsky 1995, a.o.). However, it has been argued that movement can instead be ALTRUISTIC; sometimes an element that moves appears to be moving to satisfy the requirements of a distinct element in the structure (Lasnik 1995, 2003; Zyman 2017, a.o.). In addition to movement that occurs in the narrow syntax, various instances of displacement and reordering occur in the post-syntax (Marantz 1988; Embick and Noyer 2001; Matushansky 2006; Arregi and Nevins 2012, 2018, a.o.). In this paper, we aim to demonstrate that, just as with narrow syntactic movement, the motivations for postsyntactic displacement are heterogenous, with some displacement operations showing greed and others altruism.

*We would like to thank the members of the Tiwa community, particularly Bibiana Maslai and Juliana Maslai, for their collaboration. We are grateful for the feedback from Karlos Arregi, Bronwyn Bjorkman, Mitcho Erlewine, Emily Hanink, Sharon Inkelas, Laura Kalin, Neil Myler, Jason Ostrove, Asia Pietraszko, Marie-Luise Popp, Daniel Siddiqi, anonymous NELS and LSA reviewers, and audiences at UC Berkeley's Syntax & Semantic Circle, NELS50, and LSA 2020.

Our case study of altruism in the post-syntax centers around a process of morpheme inversion and doubling in Tiwa (Tibeto-Burman; India). In Tiwa verbal morphology, focus marking can sometimes intervene between tense and agreement in the base-generated order. When this base order occurs, tense doubles or inverts with focus in the post-syntax to result in surface adjacency between tense and agreement, as schematized in (1).

(1) a. Base-generated order
V-ASP-**T**-FOC-AGR
b. Surface order with inversion
V-ASP-FOC-**T**-AGR
c. Surface order with doubling
V-ASP-**T**-FOC-**T**-AGR

We propose that this inversion and doubling of tense is altruistic. We argue that these displacement operations are motivated by requirements of the agreement morph, rather than the requirements of tense itself. The Tiwa data thus suggest that post-syntactic displacement can be altruistic just as narrow syntactic movement can be.

In analyzing this altruistic pattern of displacement in Tiwa, we argue that morphs may be specified with two types of conditions that make reference to their local environment – conditions on insertion and conditions on position. Conditions on insertion state what preconditions must hold of the local context in order for the insertion of a morph to be possible, and these conditions are used to license contextual allomorphy in a way essentially equivalent to the contextual realization rules of Distributed Morphology (Halle and Marantz 1993, a.o.). Conditions on position, on the other hand, are the linear requirements that a morph imposes on its environment and are used to govern relative position of morphs. We argue that post-exponence repairs, such as inversion and doubling, can be triggered to satisfy conditions on the position of a morph once it is inserted into the structure. In the case of Tiwa, we specifically argue that one of the agreement morphs is specified with a condition on position that causes tense to invert with focus or double as schematized in (1). We model the altruistic displacement patterns in Tiwa via simple constraint interaction in a hybrid OT-DM framework of morphology that is non-lexicalist and realizational, as well as constraint-based and output-oriented (Rolle 2020).

In modeling this pattern via constraint interaction, we highlight the way in which the Tiwa data appear to illustrate a "resolution of a basic tension between two competing pressures" in the sense of Hyman (2003: 246). Specifically, the doubling pattern in Tiwa arises as a result of competition between a morphotactic pressure, namely the pressure to satisfy the condition on position of the agreement morph, and a more general principle in the language, namely a pressure for the surface order to match the default linearization of the syntactic structure. In the doubled order seen in (1c), the first copy of tense surfaces in the position expected given default linearization principles, while the second surfaces adjacent to agreement to satisfy the agreement morph's condition on position. We argue that such competing pressures in the Tiwa synchronic grammar instantiate one pathway to multiple exponence. The Tiwa data therefore inform our understanding of the factors that can result in multiple exponence crosslinguistically.

The remainder of the paper is organized as follows. In Section 2, we provide relevant background information on Tiwa verbal morphology and allomorphy. In Section 3, we

introduce two patterns which are to be captured by our analysis, namely morph inversion and morph doubling. Section 4 provides our analysis of the Tiwa patterns as post-syntactic altruism, couched within Optimality Theory. Section 5 zooms out and examines post-syntactic altruism as well as its counterpart post-syntactic greed in a crosslinguistic sample, while Section 6 situates Tiwa within the typology of multiple exponence. Finally, Section 7 concludes.

2 Tiwa verbal morphology and allomorphy

Tiwa (ISO 639-3: lax) is a Tibeto-Burman language spoken by approximately 33,900 people primarily in Assam, northeast India (Eberhard et al. 2020). Unless otherwise noted, the data presented in this paper come from fieldwork with three primary consultants conducted by Virginia Dawson across four field trips to Umswai, Assam in 2015–2018. Additional supplementary data were also collected from one of those consultants via WhatsApp in 2019 and 2020. This section provides the relevant background on Tiwa morphology and allomorphy in order to understand our main proposal. We refer the reader to Dawson 2020 for a more complete summary of Tiwa morphology and syntax and references to previous work.

We focus here on Tiwa verbal morphology. The finite verb in Tiwa can host several affixes that occur in a fixed order. The slot closest to the root can be occupied by either aspect or negation (but not both), and tense follows this aspect/negation slot. Subject agreement is optional and follows tense; it is only overt for first person singular subjects.[1] A morphological template is provided in (2) with possible combinations of morphs given in (3) and an example in (4).[2]

(2) Verbal morphology template

[root	-	ASP/NEG	-	TENSE	-	AGR	]
		-do IPFV		-Ø NPST		-ng/-âng 1SG	
		-ga PFV		-m PST			
		-o/-w NEUT					
		-ya NEG					

[1] We do not take a stance on whether this marker expresses true agreement or a type of clitic doubling. We use the term 'agreement' for convenience, and its syntactic status does not directly affect our analysis.

[2] The following abbreviations are used in glossing of Tiwa examples throughout: 1 'first person', 3 'third person', ACC 'accusative', ADD 'scalar additive', AGR 'agreement', CF 'contrastive focus', CL 'classifier', FOC 'focus', IPFV 'imperfective', NEG 'negation', NEUT 'neutral aspect', NPST 'non-past', PFV 'perfective', PST 'past', SG 'singular'. Tone is represented orthographically following the system adopted in Jose 2014. It plays no central role in the alternations discussed here. Glosses for data from other languages use abbreviations from the original source.

(3) Possible combinations of verbal morphology

root	ASP/NEG	TENSE	AGR	gloss
V	-do	-Ø	(-ng)	IPFV
V	-do	-m	(-âng)	IPFV PST
V	-ga	-Ø	(-ng)	PFV
V	-ga	-m	(-âng)	PFV PST
V	-o	-Ø	(-ng)	NEUT
V	-o	-m	(-âng)	NEUT PST
V	-ya	-Ø	(-ng)	NEG
V	-ya	-m	(-âng)	NEG PST

(4) khôna-ya-m**(-âng)**
hear-NEG-PST-1SG
'I did not hear.'

Agreement can appear with an overt pronoun and is transparently related to the 1SG pronoun. In (5) and (6) below, the first instance of *âng* is a pronoun in the expected subject position. The second is an agreement marker, appearing after tense and aspect inflection.

(5) **âng** hât-jíng lí-do-m-**âng**
I market-to go-IPFV-PST-1SG
'I went to market.'

(6) **âng** pe kashóng-gô kan lái-do-Ø**-ng**
I the dress-ACC wear-IPFV-NPST-1SG
'I'm putting on the dress.'

These examples additionally demonstrate that 1SG agreement has two allomorphs: *-ng* [-ŋ] and *-âng* [-âŋ], the latter with a full vowel and a falling tone (like its pronoun counterpart). The two allomorphs are further illustrated in (7) below with the same verb root.

(7) a. lí-ya-Ø**-ng**
go-NEG-NPST-1SG
'I will not go.'

b. lí-ya-m**-âng**
go-NEG-PST-1SG
'I did not go.'

The *-âng* allomorph of 1SG only surfaces after the tense marker *-m* PST, while *-ng* appears elsewhere. Taking this distribution as a central feature, we analyze 1SG allomorphy as being morphosyntactically conditioned. The basic morphological realizational rules we adopt are presented in (8).

(8) a. [1SG] ↔ -âng / [PST] __
b. -ng (elsewhere)

This morphosyntactic approach to the distribution of *-ânng* vs *-ng* is not the only possibility. Jose (2014), in his comprehensive dictionary of Tiwa, analyzes 1SG allomorphy as being phonologically conditioned rather than morphosyntactically conditioned. For Jose, *-ânng* appears after consonants, while *-ng* appears after vowels (Jose 2014: 14, 361).[3]

We do not adopt this analysis for several reasons. First, the only context where we see *-ânng* is after past tense *-m*. No other tense or aspect suffixes end in a consonant,[4] and 1SG agreement cannot directly appear after the verb root (which can end in a consonant), seen from (3) above. Second, a phonological conditioning account leaves unexplained patterns of morpheme inversion and doubling that occur only in the presence of the *-ânng* allomorph, which will be the focus of the remaining sections of the paper.

Before moving to doubling and inversion, however, another possibility must be dismissed, namely, that *-ânng* and *-ng* are surface variants of a single underlying form. In this case, there would be no allomorph selection, and the surface difference would be derived in the phonological component alone. It is easy to dismiss one version of such an analysis – namely underlying *-ng* /-ŋ/ – as there is no process of [a]-epenthesis in Tiwa. It is clear that this [a] (along with its falling tone) derives from the full pronominal form. We therefore concentrate on another version: underlying *-ânng* /-âŋ/ with deletion of the vowel after another vowel.

There are few vowel-initial suffixes to which we can compare the behavior of 1SG. Neutral aspect (which gives rise to present, future, and habitual interpretations; Dawson 2020) and locative case both alternate between the surface forms *-o* and *-w*, with *-o* appearing after consonants and *-w* after vowels (e.g. *mán-**o*** 'will get' vs. *lí-**w*** 'will go'; *hat-**o*** 'in the market' vs. *nó-**w*** 'in the house').[5] The most parsimonious analysis of each of these suffixes is a single underlying representation /o/, which becomes [w] after a vowel. This alternation could provide support for the hypothesis that VV sequences are not allowed and are actively repaired in Tiwa.[6]

A deletion account of 1SG allomorphy would assume that [â] is deleted from *-ânng* 1SG to repair an illicit *VV sequence. Such an account, however, struggles to capture data like (9). As was just noted, neutral aspect, underlyingly /o/, is realized as *-o* after consonants but *-w* after vowels. Realization of NEUT as *-w* in (9) would break up the VVV sequence,

[3]Note that all page numbers from Jose 2014 refer to the Tiwa-English portion of the dictionary.

[4]The additional *-gam* and *-dom* suffixes that Jose (2014) notes can appear before *-ânng* can be morphologically decomposed into *-ga* PFV + *-m* PST and *-do* IPFV + *-m* PST (Dawson 2020). The consonant variant of neutral aspect (*-w*) only appears after vowel-final verb roots. Rather than the *-ânng* allomorph of 1SG appearing after *-w*, as Jose's account might predict, the *-ng* allomorph surfaces and there is no overt exponent of NEUT due to a ban on VV sequences and complex codas. This is discussed further with respect to (9).

[5]We note that Jose (2014: 24) provides at least one example where the [o] variant of the neutral aspect purportedly can appear after a vowel (*thi-o-ng* 'I will die'), but our consultants reject this and similar examples.

[6]The only potential suffix aside from *-ânng* 1SG that is found in Jose's dictionary which begins with /a/ is the discourse marker *-arô*, which is transparently derived from *arô* 'and'. When it appears after a vowel, no deletion takes place, as shown in (i).

(i) pe-**arô** khóp-sha-bô pasê-ya-m
3SG-ARO word.CL-one-ADD speak-NEG-PST
'S/he, instead, did not say a word!' (Jose 2014: 18)

It is unclear whether this morph should actually be classified as a suffix, or simply an unstressed discourse marker. Therefore we set this marker aside, assuming that it is not truly affixal.

eliminating the need for [â] deletion. Instead, [â] does not surface and NEUT has no overt realization.

(9) /root-NEUT-NPST-AGR/
/lí-o-Ø-ng/ [líng] *[líong] *[líwng] cf. */lí-o-Ø-**âng**/ *[líwâng]
'I will go'

Moreover, a deletion account must contend with the fact that the *-âng* allomorph has underlying tone, namely a falling tone. There is no trace of this tone in the environments where *-ng* surfaces. Finally, just as we stated for the alternative characterization of *-âng/ -ng* as phonologically-conditioned allomorphy, this alternative with a single underlying form /-âng/ fails to account for a pattern of morpheme doubling and inversion. We turn to this matter now.

3 Inversion and doubling in Tiwa

Our realizational rule in (8) involves special conditioning of [1SG] in the context of [PST]. Further evidence for the close relationship between subject agreement and tense comes from patterns of tense inversion and doubling. This is seen with three clitics: the discourse marker *-bó*, the general informational focus marker *-lô*, and the contrastive focus marker *-sê*. Importantly, these three clitics act as a class with respect to their morphological positioning and behavior in the verbal domain. The most common position is for them to be merged outside agreement, and therefore the last morph in the verbal word. In (10), all of these examples can be translated as 'I did not go' (with different pragmatic shades of meaning, which we set aside here).

(10) 'I did not go.'
a. /root-NEG-PST-AGR-**bo**/
/lí-ya-m-âng-**bó**/ [líyamâng**bó**]
b. /root-NEG-PST-AGR-**CF**/
/lí-ya-m-âng-**sê**/ [líyamâng**sê**]
c. /root-NEG-PST-AGR-**FOC**/
/lí-ya-m-âng-**lô**/ [líyamâng**lô**]

It is possible, however, for these clitics to adjoin instead to a smaller structure and be merged INSIDE agreement. When the clitic merges inside agreement it splits tense and agreement, which are no longer adjacent based on their merge positions alone. Interestingly, the *-ng* allomorph of 1SG agreement is not used, as would be expected following a vowel-final focus marker under Jose's (2014) account of agreement allomorphy.

(11) /root-NEG-PST-FOC-AGR/
*/lí-ya-m-lô-ng/ *[líyamlông]

Instead, the presence of *-m* PST still conditions the insertion of the *-âng* allomorph of 1SG. Additionally, one of two displacement operations is triggered: inversion or doubling of the tense morph *-m* PST. Below, we contrast *-lô* FOC merged in a high position (12a) versus merged in a low position (12b)-(12c).

(12) 'I did not go.'

a. High FOC, No Displacement of *-m*
/root-NEG-**PST**-AGR-FOC/
/lí-ya-**m**-âng-lô/ [líya**m**ânglô]

b. Low FOC, Inversion
/root-NEG-**PST**-FOC-AGR/
/lí-ya-**m**-lô-âng/ → lí-ya-lô-**m**-âng [líyalô**m**âng]

c. Low FOC, Doubling
/root-NEG-**PST**-FOC-AGR/
/lí-ya-**m**-lô-âng/ → lí-ya-**m**-lô-**m**-âng [líya**m**lô**m**âng]

In (12b), *-m* PST inverts with focus to appear adjacent to *-âng* 1SG on the surface, and in (12c), *-m* doubles, appearing on both sides of focus, also yielding surface adjacency between *-m* PST and *-âng* 1SG.[7] Thus in both cases, inversion and doubling ensure that *-âng* 1SG is adjacent to *-m* PST.

Crucially, without overt 1SG agreement, *-m* PST never inverts with focus, nor can it double. In (13) below, the subject is third person singular, which does not co-occur with an overt agreement exponent. Here, *-m* PST must appear before the focus clitic *-lô*.

(13) '(S)he did not go.'

a. /root-NEG-**PST**-FOC/
/lí-ya-**m**-lô/ [líya**m**lô]

b. /root-NEG-**PST**-FOC/
/lí-ya-**m**-lô/ ↛ *lí-ya-lô-**m** *[líyalô**m**]

c. /root-NEG-**PST**-FOC/
/lí-ya-**m**-lô/ ↛ *lí-ya-**m**-lô-**m** *[líya**m**lô**m**]

The ungrammaticality of the order FOC-PST in the absence of *-âng* 1SG indicates that FOC does not simply have a lower possible merge site below tense (i.e. */root-NEG-**FOC**-PST/), as this would leave unexplained why past *-m* ONLY inverts with focus or doubles in the context of the allomorph *-âng* 1SG. The data in (13) also suggest that the dislocation of *-m* PST is not narrow syntactic movement. If T – the tense head – underwent movement in the syntax past Foc – the focus head – we would expect such syntactic movement to be possible with or without *-âng*. If the realization of [1SG] as the allomorph *-âng* was a necessary condition for narrow syntactic movement of T, this would constitute a look-ahead problem and violate the modular separation of syntax from morphology.

Thus, the unavailability of inversion and doubling without *-âng* 1SG suggests that these instances of displacement are not syntactic, but rather post-syntactic. Post-syntactic insertion of the allomorph *-âng* 1SG feeds displacement, with inversion and doubling of *-m* PST strictly dependent upon the presence of *-âng* 1SG.

[7] Typologically, the doubled X-Y-X pattern resembles periodic or alternating multiple exponence (Harris 2017), and what Caballero and Inkelas (2013) call superfluous exponence. We return to the place of Tiwa doubling within a wider typology of multiple exponence in Section 6.

4 Analysis as post-syntactic altruism

In our analysis below, we argue that *-m* PST undergoes inversion and doubling altruistically in the post-syntax, to meet requirements of *-âng* 1SG. We couch our analysis within the core tenets of Distributed Morphology (DM; Halle and Marantz 1993, a.o.).[8] These include a model which is non-lexicalist (i.e. "syntax all the way down") and realizational (i.e. "late insertion" of phonological primitives via Vocabulary Items), and allows for syntactic feature bundles and structures to be manipulated by post-syntactic operations (e.g. fission, fusion, deletion, insertion, etc.). Under this model, all allomorphy is decided post-syntactically.

For several key steps in our analysis, we adopt a constraint-based and output-oriented version of DM, what Rolle (2020) refers to as OT-DM (with many predecessors, e.g. Noyer 1992; Trommer 2001a,b, 2002; Wolf 2008; Dawson 2017; Foley 2018, a.o.). All of the core architectural assumptions of DM remain, but rules are replaced with constraints in an input-output computation involving parallel application of operations (à la Optimality Theory; Prince and Smolensky 1993). The OT-DM framework may come in a strong version in which all post-syntactic operations take place in parallel at spell-out, or a weaker version in which one set of post-syntactic operations takes place at spell-out, while another takes place in a later input-output computation. In the weaker version, the latter computation can be interpreted either as a separate pre-phonology morphological module, or interleaved within the phonological module itself. Within this analytic range, post-syntactic altruism remains regardless, our main point in this paper.

We adopt a weak version of an OT-DM model, assuming two stages in the post-syntactic derivation. We posit that Vocabulary Items (i.e. exponents/morphs) can be specified with two types of conditions that reference their local context (following Kalin and Rolle 2020) and that exploit these two stages of the derivation. First, CONDITIONS ON INSERTION are those preconditions that must exist in an environment in order for insertion of a Vocabulary Item to be possible. These preconditions are assessed first and are used to license contextual allomorphy. Second are CONDITIONS ON POSITION, which are assessed later. They are conditions that a Vocabulary Item requires of its linear environment and are used to govern relative position (e.g. 2nd position and other special clitics, infixes, templatic effects, etc.).[9]

In what follows, we argue that a condition on insertion licenses the insertion of the allomorph *-âng* 1SG, while a condition on position associated with *-âng* triggers the altruistic inversion or doubling of *-m* PST.

4.1 Condition on insertion with -âng

As stated, each Vocabulary Item (VI) may contain a condition on insertion, which specifies the context within which it can be inserted (essentially, the contextual realization rules of

[8] This is as opposed to inferential or incremental morphological models; see Stump 2001 for theory comparison.

[9] While the strictest form of OT is non-derivational and includes one and only one input-output mapping, several derivational alternatives exist which involve multiple input-output mappings, most notably Stratal OT. Our analysis clearly requires something comparable to the latter.

DM). The multiple allomorphs of 1SG differ in their conditions on insertion. Example (8) is repeated below.

(14) a. [1SG] ↔ -ângng / [PST] __
b. -ng (elsewhere)

When FOC is merged between PST and 1SG (its low adjunction site), general linearization principles (e.g. the Mirror Principle or something equivalent; Baker 1985) will yield the order in (15a). Note that in this context, *-âng* is still inserted rather than the default *-ng*. This yields the post-exponence structure in (15b), even though the allomorph trigger (PST) and target (1SG) are not linearly or structurally adjacent.

(15) a. /...-**PST**-FOC-**1SG**/
b. /...-**m**-lô-**âng**/ cf. */...-**m**-lô-**ng**/

This contrasts with several well-known examples where an intervening morph blocks the application of allomorphy between a trigger and target. One famous case is in Latin (Embick 2010: 70–75, and references therein), where aspect triggers special allomorphs of agreement. If the aspect morph *-vi* PERF is linearly adjacent to first person singular agreement, it conditions a special allomorph *-ī*. However, if there is an intervening morph (e.g. a phonologically overt tense marker *-sā* in the pluperfect), AGR is exponed as the common first person singular exponent *-m*. Thus, here, non-locality blocks allomorphy.

(16) Latin locality-sensitive agreement allomorphy (Embick 2010: 74)
a. amāvī
am-ā-vi-Ø-**ī**
love-TH-ASP-T-**AGR**
'I loved.' (perfect indicative)
b. amāverām
am-ā-ve-sā-**m**
love-TH-ASP-T-**AGR**
'I had loved.' (pluperfect)

Noting the non-locality involved in the Tiwa pattern, we see two possible directions. The first is to assume that non-locality is a universally banned relation in allomorphy (Embick 2010). For the Tiwa data, this would require that there is no stage in the derivation where the exponents of the trigger (PST) and the target (1SG) are non-local. Under this interpretation, dislocation of the past tense morph *-m* happens at the same time as allomorphy. There would thus be no need to distinguish (for Tiwa) conditions on insertion versus conditions on position; contextual realization rules would be subject to a universal locality requirement for triggers and targets.

For this type of account to work for Tiwa, the 1SG allomorph *-âng* would have to be able to, in a sense, "facilitate" its own insertion by triggering the simultaneous dislocation of *-m* PST. This would still, then, be different from the case of Latin where the special agreement allomorph *-ī* is unable to change its local environment to facilitate its own insertion. Under this type of view, therefore, some other mechanism would be needed to determine which allomorphy targets were able to modify their own environments at the time of exponence.

We instead choose to pursue a different type of account that does not require strict adjacency between the trigger and target of allomorphy. A growing body of evidence demonstrates that absolute adjacency (whether defined structurally or linearly) is too restrictive. Numerous non-local allomorphy patterns have been identified (Merchant 2015; Moskal 2015a,b; Moskal and Smith 2016; Kastner and Moskal 2018; Božič 2019; Smith et al. 2019; Choi and Harley 2019, a.o.), whose empirical content requires us to minimally loosen locality restrictions in allomorphy (e.g. replacing an adjacency requirement with a domain locality requirement, such as phases). One example showing non-adjacency is below from Choi and Harley 2019 for Korean, where the trigger is the honorific marker *-si* (underlined) and the target is the embedded verb *cwumwusi-* in its honorific suppletive form (bolded).

(17) Korean non-local suppletive allomorphy (Choi and Harley 2019: 1355)

halapeci-kkeyse pang-eyse **cwumwusi**-po-si-ess-ta
grandfather-NOM.HON room-in **sleep.HON**-try-HON-PST-DECL
'Grandfather tried to sleep in the room.'

Choi and Harley emphasize that because this allomorphy holds over the intervening matrix verb *po-* 'try', strict adjacency-based locality fails whether assessed linearly or structurally (p. 1359).

Returning to the Tiwa case, (15b) would represent an intermediate form /...-m-lo-**ângng**/ in which the trigger (underlined) and the target (in bold) are also separated by an intervening morph. Thus, if we allow for non-local allomorphy, we can divorce exponence from constraints governing linear reorganization (post-exponence). This is conceptually attractive as it allows us to maintain a principle which often is implicit: conditions on insertion (i.e. exponence) cannot alter the structure within which they are placed.[10] We can refer to this as the 'No self-licensing principle', characterized in (18).

(18) **No self-licensing principle**
At exponence, individual Vocabulary Items cannot facilitate their own licensing by altering the context (e.g. by reordering elements, copying elements, adding or deleting elements, etc.)

In other words, in the competition between the Tiwa 1SG exponents *-ng* and *-âng*, neither allomorph may "cheat" by manipulating other morphs around them.[11] See Kalin and Rolle 2020 for further argumentation.

4.2 Condition on position with -âng

We propose that the VI *-âng* 1SG has an additional requirement that it be surface-adjacent to *-m* PST, its allomorphy trigger. As stated, such requirements are referred to as conditions on position, which specify the morphological or phonological structure that must be

[10] We note that Embick and Noyer (2001: 562) are explicit in stating that that Local Dislocation – a similar formalism related to our conditions on position that can change the local environment of a morph – "occurs after Vocabulary Insertion".

[11] This does not imply that no other changes may take place simultaneous to exponence. It simply means that the triggers of such changes cannot be the allomorphs themselves, but rather more general principles.

linearized to the right or left of a VI. Such conditions are part of a long lineage of work on post-syntactic morph order manipulation, particularly in DM via Local Dislocation (Embick and Noyer 2001; Embick 2007; Embick and Marantz 2008, a.o.) and other metathesis operations (Guseva and Weisser 2018; Arregi and Nevins 2018).

Conditions on position can be understood as a type of subcategorization frame (Lieber 1980; Inkelas 1990; Booij and Lieber 1993; Zec 2005; Paster 2006; Yu 2007; Bennett et al. 2018; Brinkerhoff 2019; Rolle and Hyman 2019; Tyler 2019; Kalin and Rolle 2020, a.o.). Subcategorization approaches are ideal for accounting for idiosyncratic quirks of lexical items, which cannot be reduced to a more general system (e.g. as used in Paster 2006).

Our formalization of subcategorization is distinct from previous approaches, while being in the spirit of such analyses. What we interpret as a condition on position of *-âng* 1SG is formalized as two kinds of structures within a single pre-linearized string. For example, in (19) the underlying representation of the allomorph is in white (labeled UR). This constitutes its phonological substance (i.e. consonants, vowels, and tones). The morphological/phonological structure which is subcategorized for is in gray (labeled SC), which is what the phonological substance "desires" to be adjacent to if possible. Such structure expands on the notion of Phantom Structure introduced in Rolle and Lionnet 2020 to capture subcategorization-like requirements in grammatical tone alignment.

(19) Structure for the VI *-âng*

SC	**UR**
-m	-âng
[T:PST]	[ϕ:1SG]

The importance of this notation will be seen shortly in the Optimality Theoretic implementation in the next section, specifically establishing correspondence relations involving output candidates.

If the condition on position of a morph is not (incidentally) satisfied by the merge position corresponding to the VI, post-exponence repairs occur to satisfy this condition. In Tiwa, inversion and doubling of *-m* PST are repairs that serve to satisfy the condition on position for *-âng* 1SG.[12]

In contrast to *-âng*, the elsewhere allomorph *-ng* lacks a condition on position entirely. This is represented below by a lack of a subcategorized structure.

(20) Structure for the VI *-ng*

UR
-ng
[ϕ:1SG]

Consequently, *-ng* 1SG never triggers post-syntactic displacement.

[12] A potential alternative to attributing inversion and doubling to a property of *-âng* 1SG would be to adopt Ryan's (2010) analysis of morphotactics involving bigram constraints. There, the locus of morphotactic idiosyncrasy is in the constraint set, and not attributable to an individual VI itself. For example, a sample constraint used for Tagalog is "ka-pag" (p. 769), which can be interpreted as either (i) penalizing each instance of *ka* that is not immediately followed by *pag* (based on Ryan 2010: 767), or (ii) penalizing an output candidate lacking *ka-pag* (based on Ryan 2019: 151). Under this model, notions of post-syntactic "altruism" and "greed" do not appear to be appropriate.

4.3 Altruistic inversion and doubling via constraint interaction

We now demonstrate how we derive the altruistic inversion and doubling patterns in Tiwa via simple constraint interaction within Optimality Theory (OT; Prince and Smolensky 1993).

As stated, if *-âng* 1SG is non-adjacent to *-m* PST, post-exponence repairs of inversion and doubling function to satisfy the condition on position. These instances of post-syntactic displacement are altruistic in the following sense. The trigger of inversion and doubling is *-âng* 1SG, as it is *-âng* which has the condition on position requiring adjacency with *-m* PST. However, the undergoer of inversion and doubling is not *-âng* 1SG itself, but rather *-m* PST. Therefore, *-m* dislocates altruistically to satisfy *-âng*.

The attested patterns of inversion and doubling can be modeled using the constraints in (21). As in other OT models, we assume that inversion and doubling are freely available operations whose outputs are selected only if they are output-optimizing. The latter three constraints have been adapted from common OT reference works (McCarthy and Prince 1995; Kager 1999; Yip 2002; McCarthy 2008).

(21) a. POSITION-OV(MORPH): For a morph m_o in an output candidate (O) in correspondence with a morph m_v in its Vocabulary Item (V), the position of m_o in a string of morphs is identical to the position of m_v in its string of morphs (i.e. the string consisting of the UR and the SC)

b. R-ANCHOR-IO(MORPH): A morph at the right edge of a word in the input (I) corresponds to a morph at the right edge in the output (O)

c. LINEARITY-IO(MORPH): The precedence structure of the morphs in the input (I) is preserved in the output (O)[13]

d. INTEGRITY-IO(MORPH): No morph in the input (I) has multiple correspondents in the output (O)

We can illustrate the role of these constraints as shown in (22) below. The input to this structure is the string of morphs that was the result of exponence and (default) linearization. At this stage of the derivation the competition between *-âng* and *-ng* has been resolved, with the special allomorph *-âng* having been chosen because it is in the relevant locality domain of the trigger *-m*. No subsequent operation at this stage can return to the lexicon (i.e. Vocabulary) to choose *-ng*, even if such a move would better satisfy a constraint ranking. Such structures simply cannot be generated by GEN.

[13] A technical definition of LINEARITY comes from McCarthy 2008 (p. 198).

(ii) LINEARITY (LIN)
Let *input* = $i_1 i_2 i_3 ... i_n$ and *output* = $o_1 o_2 o_3 ... o_m$
Assign one violation mark for every pair i_w and i_y
if i_w $\Re$ o_x and i_y $\Re$ o_z
and i_w precedes i_y
and o_z precedes o_x

It may be possible to conflate LINEARITY constraints with POSITION constraints (which we use to enforce output adjacency between *-âng* and *-m*), but this is unnecessary for the purposes of this paper. Crucially, LINEARITY constraints are about precedence without reference to adjacency.

(22)

Input: /lí$_a$-ya$_b$-m$_c$-lô$_d$-âng$_e$/	POS-OV	ANCH-IO	LIN-IO	INT-IO
a. fully faithful lí$_a$-ya$_b$-m$_{c,1}$-lô$_d$-âng$_{e,2}$	*!			
b. *-m* inversion ☞ lí$_a$-ya$_b$-lô$_d$-m$_{c,1}$-âng$_{e,2}$			*	
c. *-m* doubling ☞ lí$_a$-ya$_b$-m$_{c,1}$-lô$_d$-m$_{c,1}$-âng$_{e,2}$				*
d. *-âng* doubling lí$_a$-ya$_b$-m$_{c,1}$-âng$_{e,2}$ -lô$_d$-âng$_{e,2}$	*!			*
e. *-âng* inversion lí$_a$-ya$_b$-m$_{c,1}$-âng$_{e,2}$-lô$_d$		*!	*	

(23)

SC	**UR**
-m$_1$	-âng$_2$
[T:PST]	[ϕ:1SG]

Let us unpack this tableau. First, consider the outputs which violate highly ranked POSITION-OV (POS-OV), which functions to enforce conditions on position (for *-âng*, listed in (23)). In its VI, *-âng* is preceded by a (subcategorized) morph *-m*. If in an output, *-âng* is not immediately preceded by *-m*, it violates this constraint POS-OV. Correspondence between the VI and output strings are marked as blue numbers. This is in contrast to the red italicized letters, which indicate correspondence between input and output morph strings.

Two candidates violate POS-OV. The first is a. (the fully faithful candidate), wherein *-âng* is immediately preceded by *-lô*. The second is d. (*-âng* doubling), wherein one copy of *-âng* is not preceded by *-m* and thus also violates POS-OV. All other candidates satisfy POS-OV (i.e. all instances of *-âng* occur in a sequence [...-m$_1$-âng$_2$]).

Next, candidate e. violates R-ANCHOR-IO(MORPH) (ANCH-IO). This constraint enforces no movement from the edge of the word, which is violated here, where it is *-âng* which inverts rather than *-m*. All other candidates comply with ANCH-IO (all end in *-âng*).

The two remaining candidates are the altruistic ones: b. where *-m* inverts with intervening *-lô* and c. where it doubles. Both are equally optimal given this constraint ranking. Inversion of *-m* violates LINEARITY-IO(MORPH) (LIN-IO) governing linear precedence relations (input order of morphs *-lô* and *-m* is inverted). Likewise, the doubling of *-m* violates INTEGRITY-IO(MORPH) (INT-IO) since there are two correspondents of *-m* in the output.

By separating post-exponence conditions on position from conditions on insertion, we can derive both of the Tiwa patterns – inversion and doubling – through a simple interaction of constraints. The constraint POS-OV mandating that the condition on position for *-âng* 1SG be met is highly ranked, while *-âng* itself is prevented from undergoing inversion or doubling to satisfy its own condition on position (ANCH-IO). The result is the altruistic displacement of *-m* PST.

5 Post-syntactic altruism and greed beyond Tiwa

We have seen that the inversion and doubling patterns found in Tiwa can be characterized as altruistic – the element that undergoes displacement does so to meet the requirements of a distinct element. In this section, we explore other patterns of altruism in the post-syntax crosslinguistically. Addtionally, we contrast post-syntactic altruism with post-syntactic greed.

5.1 Post-syntactic altruism in a cross-linguistic perspective

Altruistic patterns of post-syntactic displacement occur beyond Tiwa and can result in reordering, doubling, or optionality between the two. One pattern that is similar to the pattern seen in Tiwa is that of ergative displacement within Basque complex auxiliaries, which are known to display a cluster of displacement phenomena across dialects. Arregi and Nevins (2012) propose that the tense head (T) in an auxiliary is subject to a T-NONINITIALITY constraint. If T is spelled-out in an initial position within the auxiliary, post-syntactic displacement operations serve to ensure that T is in second position within the auxiliary. In the Alboniga Basque dialect, ergative displacement occurs when T would be initial, resulting in inversion (metathesis) or doubling.[14]

(24) Ergative displacement in Alboniga Basque
(de Yrizar 1992: Vol. 1, 470, as cited in Arregi and Nevins 2012: 284)

a. Base-generated order
/T-DAT-**ERG**-C/

b. Ergative metathesis
ERG-T-DAT-C

s	-eun	-tz	-n	(>seuntzan)
CL.E.2.SG	-PST.3.SG	-CL.D.3.SG	-CPST	

c. Ergative doubling
ERG-T-DAT-**ERG**-C

s	-eu	-ku	**-su**	-n	(>seuskusun)
CL.E.2.SG	-PST.3.SG	-CL.D.1.PL	**-CL.E.2.SG**	-CPST	

We can characterize displacement of the ergative agreement affix as altruistic in that it dislocates to satisfy the positional requirement of T (not any requirements it itself has). This example illustrates that altruism need not involve subcategorization for a specific morph, as conceivably any morph before T would satisfy its noninitiality constraint.[15]

[14] Translations were not provided for these examples.

[15] Arregi and Nevins (2012) (and later Arregi and Nevins 2018) formalize these patterns via Generalized Reduplication (Harris and Halle 2005), a formalism quite distinct from our OT-DM approach here. Whether the Basque pattern qualifies as altruistic depends on how this formalism is interpreted. Of the starting structure in (24a), the T-DAT-ERG portion of the string (in brackets) is reduplicated, and a subsequent deletion operation (targeting the portion in gray) results in a surface doubling pattern.

(iii) Ergative doubling in Basque via Generalized Reduplication (Arregi and Nevins 2012: 283)
T DAT ERG C →
⟦ T DAT ⟩ ERG ⟧ C →

While Tiwa and Basque allow both inversion and doubling as options, some patterns of post-syntactic altruistic displacement show only one or the other of these options. In Bole (West Chadic; Nigeria), verbs display a pattern of suffix doubling (Ryan 2019). A small set of suffixes – subject agreement suffixes *-an* PL.S and *-ak* 2/3.F.SG.S, and ventive suffixes *-in* and *-it* – show doubling patterns where they appear on both sides of a set of potential intervening suffixes. Doubling occurs only in the context of two aspectual suffixes – perfective *-ko* and totality *-ti* – which appear after the doubled copy.

(25) Bole suffix doubling (Ryan 2019: 144-145)

a. [ŋgòráŋgò:yí]
ŋgòr**-an**-ko-yi
tie-**PL.S**-PERF-NULL.O
'they tied it'

b. [ŋgòrántáŋgó]
ŋgòr**-an**-to**-an**-ko
tie-**PL.S**-3.F.SG.O-**PL.S**-PERF
'they tied her'

c. [ŋgòríttí]
ŋgòr**-it**-ti
tie-**VENT**-TOT
'that X tie (it) up and bring it'

T DAT ERG – T DAT ERG C →
ERG T DAT ERG C

Here, reduplication serves to satisfy the NONINITIALITY requirement of T. However, the material that is reduplicated (the target) includes T itself (the trigger), and as such this does not clearly look like altruism strictly speaking.

In contrast, a Generalized Reduplication account of the Tiwa facts does seem to show altruism. Under such an analysis, reduplication would serve to satisfy the condition on position for *-âng* 1SG. Crucially, the reduplicated material (the target) does NOT include *-âng* 1SG (the trigger), as shown below.

(iv) Tense doubling in Tiwa via Generalized Reduplication
PST FOC 1SG →
⟦ PST ⟨ FOC ⟧ 1SG →
PST FOC – PST FOC 1SG →
PST FOC PST 1SG

Thus, Tiwa doubling and inversion are altruistic even under a different set of analytical assumptions, such as those of Generalized Reduplication.

There are several reasons why we do not adopt Generalized Reduplication for our analysis. First, in order to capture that reduplication happens at morpheme edges (not explicit in Harris and Halle 2005), Arregi and Nevins (2012) must employ both rules and constraints in their architecture; under OT, only constraints are needed and rules are superfluous. Second, it is not clear what kind of objects ⟦ ⟧ or ⟩ ⟨ are when they are inserted temporarily in the string (they do not appear to be phonological or morphological epenthesis). Third, doubling as reduplication does not match the typology of partial reduplication (Harris 2017: 211).

d. [ŋgòríttáttìì]
ŋgòr-**it**-to-**it**-ti
tie-**VENT**-3.F.SG.O-**VENT**-TOT
'that X tie (it) up for her and bring (it)'

In all examples of doubling in Bole, the result is adjacency between a subject agreement suffix or ventive suffix and an aspectual suffix. From the logic in interpreting the Tiwa data, we may therefore attribute doubling as triggered by the aspectual suffix. Because the aspectual suffix trigger itself does not dislocate, this pattern also qualifies as altruistic.[16] We return to these data below in our discussion of multiple exponence.

Other postsyntactic displacement phenomena resemble altruistic inversion. We highlight here one such case from Moro (Kordofanian; Sudan) which is distinct from the Tiwa patterns in being prosodically-driven: a morph altruistically moves to satisfy a global prosodic requirement, not an idiosyncratic requirement of a single morph.[17] Jenks and Rose (2015) present an example of mobile affixation in Moro. The default linearization of object markers is as suffixes on the verb (26a). However, in certain grammatical contexts high-toned object markers (e.g. -ŋá 2SG.OM) undergo post-syntactic displacement to surface as prefixes on the verb, and appear in the initial position of the macrostem constituent, such as in the proximal imperfective (26b). In contrast, object markers which are not high-toned (e.g. -lo 3PL.OM) do not dislocate in these exact same grammatical contexts (26c)–(26d).

(26) Moro mobile affixation (Jenks and Rose 2015: 271)

a. Perfective
ɡ-a-vəleð-á-**ŋá**
SM.CL-RTC-pull-PFV-**2SG.OM**
's/he pulled you'

[16] As we noted in footnote 12 above, Ryan (2019) himself does not employ subcategorization in his analysis, but rather directly encodes all bigrams in a language as constraints. As such, he does not characterize these patterns as altruistic (or an equivalent term).

[17] A case similar to Moro involves phonologically-conditioned affix order in Washo (isolate; United States), as argued for in Benz 2019. This case also involves affix ordering sensitive to prosodic constraints. By default, inclusive agreement suffixes (and the causative suffix) appear closer to the verb root than the near future suffix (X-Y order in (a) below). However, in the presence of the negative suffix (or interrogative suffix), the inclusive exceptionally appears outside of both near future and negative (Y-Z-X order in (b) below).

(v) Washo phonologically-conditioned affix ordering (Jacobsen 1964: 590, 1973, as cited in Benz 2019: 5)

a. le-íməʔ-**hu**-áša?-i
1SBJ-drink-**PL.INCL**-NEAR.FUT-IND
'We (incl.) are going to drink.'

b. le-íməʔ-áša?-é:s-**hu**-i
1SBJ-drink-NEAR.FUT-NEG-**PL.INCL**-IND
'We (incl.) aren't going to drink.'

Paster (2006: 229) suggests an analysis whereby reordering is triggered by a prosodic subcategorization requirement of the negative and interrogative morphemes, while Benz (2019) states this as a ban on stem-final stress. Either way, the inclusive suffix (which does not have any condition) undergoes altruistic displacement to satisfy these prosodic requirements.

b. Proximal imperfective
ɡ-a-**ŋǵ**-vəleð-a
SM.CL-RTC-**2SG.OM**-pull-IPFV
's/he is about to pull you'

c. Perfective
ɡ-a-vəleð-ɔ́-**lo**
SM.CL-RTC-pull-PFV-**3PL.OM**

d. Proximal imperfective
ɡ-a-vɔ́léð-á-**lo**
SM.CL-RTC-pull-IPFV-**3PL.OM**

Jenks and Rose (2015) analyze the proximal imperfective context as requiring a high tone at the beginning of the macrostem. If an object marker has such a high tone, it altruistically displaces to become pre-verbal (26b); the object marker itself has no requirements which need to be satisfied. However, if no such high-toned object marker exists in the input, a high tone must be inserted on the root itself, which begins the macro-stem (26d).

The three patterns discussed in this section demonstrate that post-syntactic altruism can be driven by various conditions: adjacency requirements between morphs (as in Tiwa and Bole), general positional requirements of a morph (as in Basque), or overall prosodic requirements (as in Moro). Further, the form that altruistic displacement takes also varies, with some patterns involving inversion, some involving doubling, and some patterns involving optionality between the two. We therefore conclude that post-syntactic altruism – specifically the displacement of one element to satisfy requirements of another element – is not limited to Tiwa but is more broadly attested.

5.2 Altruism's counterpart: Post-syntactic greed

In our introduction, we established a clear parallel between greed and altruism in syntactic movement and post-syntactic displacement. Let us examine one pattern which we might classify as greedy post-syntactic displacement, which can result in the same patterns of inversion and doubling as in Tiwa.

In some dialects of Spanish (e.g. Mexican Spanish), imperatives show plural inversion and doubling (Harris and Halle 2005; Kayne 2010; Postma 2013; Harris 2017: 212; Arregi and Nevins 2018, a.o.). We base our discussion on the data and analysis in Arregi and Nevins 2018. The standard order in imperatives is for the plural suffix *-n* to precede the reflexive clitic *-se* (27a). However, an inversion pattern between *-n* and *-se* is also attested (27b), as well as a doubling pattern (27c).

(27) 'Sit down! (imperative plural)' (Arregi and Nevins 2018: 626)

a. Standard order
/root-**PL**-CL.REFL/
/siénte-**n**-se/

b. Inversion
/root-**PL**-CL.REFL/
/siénte-**n**-se/ → siénte-se-**n**

c. Doubling
/root-**PL**-CL.REFL/
/siénte-**n**-se/ → siénte-**n**-se-**n**

Arregi and Nevins (2018) argue that the plural *-n* is subject to a constraint NONINITIALITY within the post-verbal clitic group. In response to this constraint, inversion of *-n* with a pronominal clitic or doubling on either side of the clitic results in at least one occurrence of *-n* that is non-initial.[18]

These post-syntactic operations are greedy in the sense that the trigger of displacement is *-n* PL due to its NONINITIALITY requirement, and the undergoer of displacement is also *-n*. Here, greed is characterized as displacement of an element to satisfy its own requirements. Under this characterization, post-syntactic operations can show greed or altruism, just like narrow syntactic movement.[19]

6 Tiwa doubling and the typology of multiple exponence

In the Tiwa doubling pattern, only one morphosyntactic feature [T:PST] is being exponed, but on the surface it corresponds to two exponents. This meets the definition of multiple exponence (ME), as in Harris 2017. In this section, we connect the Tiwa doubling pattern to the ME literature. Harris (2017) identifies several similar doubling patterns, one she calls PERIODIC ME (in Camling, Noon, Sentani, and Laz) and another she calls ALTERNATING ME (in Czech, Mexican Spanish, and Chichewa). While there are clear parallels, we emphasize the uniqueness of Tiwa and discuss the development of its ME as a resolution of competing pressures in the grammar.

6.1 Multiple exponence and grammaticalization

The ME patterns which look most similar to the Tiwa cases are Harris's periodic ME and alternating ME, both of which involve a Z-X-Y-X morph string where a morph X is repeated across an intervening morph Y.[20] One common source of such ME patterns as identified

[18]Unlike our POSITION constraint in (21a), this NONINITIALITY constraint must be interpreted as an existential constraint (Arregi and Nevins 2018: 627) rather than a universal constraint: it is not the case that *all* copies of *-n* PL need to be non-initial, just one.

[19]Arregi and Nevins (2018) formalize their analysis via Generalized Reduplication, as established in footnote 15 above. A reader may question how we could derive such patterns in our OT model. This is especially pertinent given that in the tableau in (22) above, the patterns where *-ânga* doubles or inverts (post-syntactic greed) are harmonically bounded by those where *-m* does (post-syntactic altruism). From this grammar alone, post-syntactic greed could not be generated.

There are two general strategies one could take. The first would be to establish additional constraints which would circumvent the harmonic bounding problem (of which there would be many possibilities). The other is to deny the existence of post-syntactic greed, and reinterpret the Spanish facts (and ones like it) as due to some other constraint, such as DERIV>INFL which states that derivational morphs (*-se* CL.REFL) must be followed by inflectional morphs (*-n* PL). We leave such debates to future work.

[20]The difference between periodic and alternating ME is subtle, and the allomorphic nature of Tiwa doubling makes it tricky to typologize. Placing it in one or the other type is not critical to our main points in this subsection.

by Harris – supported in Caballero and Inkelas 2018[21] – is the grammaticalization of auxiliaries (with verbs, i.e. univerbation), determiners (with nouns), and compounding generally. Consider Camling, a Kiranti language which, like Tiwa, is also in the Sino-Tibetan family (Harris 2017: 56). With verbs in sequence in Camling, each verb root forms its own word and inflection is repeated on both verbs, as shown in (28).

(28) Camling construction with verbs in sequence
(Ebert 1993: 91, as cited in Harris 2017: 123)

capca nhais-**ung-e**-nʌ ap-**ung-e**
tiger chase-**1.S-NPT**-SEQ shoot-**1.S-NPT**
'I will chase the tiger and shoot him'

It is reasonable to suspect that the verbs in sequence in (28) acted as a predecessor for analogous structures found WITHIN single words, which constitute ME. In (29a) below, the third person patient suffix *-(y)u* is repeated after the secondary functional verb *-ngas*. As an independent verb, it means 'stay, remain, keep', but used in this modificational context it conveys progressive, continuative, and perfect aspect. Similarly, in (29b) the inflectional suffixes *-u* 3.P and *-ng* 1.S are repeated after the suffix *-c* indicating a third person non-singular patient. Unlike the previous example, doubling here cannot straightforwardly be related to an independent verb form, thus illustrating the degree of grammaticalization of ME here.

(29) Camling multiple exponence (Ebert 1997: 28, 20, as cited in Harris 2017: 141, 56)

a. museppa m-ngalung-da map-**u**-ngas-**yu**
ash her-face-LOC rub-**3.P**-V2.stay-**3.P**
'She had rubbed ash on her face'

b. lod-**u-ng**-c-**u-ng**
tell-**3.P-1.S**-3NS.P-**3.P-1.S**
'I told them'

We bring up these Camling patterns to show that the Tiwa ME patterns are distinct and almost certainly have a different diachronic origin (a conclusion also reached by Ryan 2019 for Bole, discussed below). Most obviously, the Tiwa patterns do not resemble grammaticalization of a verb compound or verb-auxiliary construction in any clear way. An example of doubling in Tiwa is repeated below.

(30) /root-NEG-**PST**-FOC-AGR/ → root-NEG-**PST**-FOC-**PST**-AGR
/lí-ya-**m**-lô-âng/ → lí-ya-**m**-lô-**m**-âng
'I did not go'

Here, what is being doubled is tense, plausibly triggered by subject agreement. This pattern that we find in Tiwa is in fact the opposite of what Harris (2017: 56) generalizes regarding this type of ME pattern: "in most examples, the carrier morpheme is derivational

[21]For example, Caballero and Inkelas (2018: 128) write, "we propose, building on Harris's insights and analysis, that Type 1 ME results when a language possesses a compound-like construction requiring agreement, in some property or properties, between its daughters".

or inherent inflectional morphology" – for example TAM categories – "while the multiple exponents are contextual inflectional morphemes" – such as subject agreement or case (also citing Booij 1994, 1996). In short, there is no plausible diachronic pathway to Tiwa doubling involving auxiliary or compound grammaticalization.

6.2 Multiple exponence due to resolving competing pressures

A more reasonable hypothesis as to the origin of Tiwa ME is a compromise between multiple competing pressures. Let us begin by exemplifying what we mean by returning to the Bole facts discussed in Section 5.1.

Ryan (2019) also explicitly classifies the Bole data he examines as ME, and he too rejects its origin via verb-auxiliary univerbation. He specifically examines a number of cognate expressions in closely related languages, which together suggest that "the whole suffix string was likely already intact when Bole innovated doubling" (p. 149). Instead, Ryan attributes the emergence of doubling as "motivated by local analogical pressures in the form of bigram morphotactics" (p. 150), via "a process called morphotactic extension, which essentially amounts to analogy in affix order" (p. 154).

Consider two simple morph strings in Bole in (31): [ROOT-it-ti] and [ROOT-it-to] (the former repeated from (25c)). These involve the ventive suffix *-it* followed either by totality aspect *-ti* or an object marker *-to*.

(31) Simple morph strings in Bole (Ryan 2019: 145–146)

a. [ŋgòríttí]
ŋgòr**-it-ti**
tie-**VENT-TOT**
'that X tie (it) up and bring it'

b. [ŋgòrító]
ŋgòr**-it-to**
tie-**VENT-3.F.SG.O**
'that X tie (it) for her and bring (it)'

Let us assume that the bigrams *it-ti* and *it-to* are both sufficiently strong (relative to other bigrams). If all three morphs appear, *-it* cannot simultaneously be adjacent to both *-ti* and *-to* due to the linear nature of the morph strings. Each imposes a morphotactic pressure which must be resolved. For this pattern in Bole, the compromise between these pressures is to double the *-it* morph, even though this would violate some lower-ranked constraint against ME. As such, the pattern [ROOT-it-to-it-ti] (25d above) is rendered optimal. This is a fundamentally different kind of origin for ME compared to the Camling type.

ME emerging from the negotiation of two morphological tensions forms the central insight in Hyman's (2003) analysis of Chichewa. Here, the tension is specifically understood as between the Mirror Principle (a syntactic mapping principle; Baker 1985) and obeying the morphotactics of derivational affix order, namely [CAUSATIVE-APPLICATIVE-RECIPROCAL-PASSIVE], the Bantu C-A-R-P template. For example, the Chichewa syntactic structure [[[verb root] RECIP] APPL] (i.e. [[V]R]A) maps variably to /V-A-R/ with inversion or /V-R-A-R/ with doubling. The string /R-A/ satisfies the Mirror Principle, and the string /A-R/ satisfies the CARP template constraint.

Returning to the Tiwa patterns, these too can be understood as a compromise between two pressures: one pressure is to satisfy the condition on position of *-ânga* 1SG, while the other is a pressure for the surface order to match the default linearization of the syntactic structure. In total, while Harris (2017) attributes little role to active copying processes in accounting for ME patterns – "a form-copying solution would seem to be rather limited" (p. 190), citing copying patterns in Kiranti languages – cases such as Tiwa strengthen exactly such a position. We find it unlikely that all ME patterns of these types will have a common origin, nor should they be necessarily due to a single mechanism within a synchronic grammar.[22]

7 Conclusion

We have argued that Tiwa shows a pattern of post-syntactic displacement that is altruistic. The allomorph *-ânga* of 1SG agreement is inserted when the verb is marked with past tense *-m* due to its condition on insertion. However, this morph *-ânga* is additionally specified with a condition on position that requires surface adjacency to *-m* PST. If the default linearization of the syntactic structure does not incidentally yield adjacency of *-ânga* 1SG and *-m* PST, then *-m* undergoes inversion or doubling as a repair. This inversion or doubling of *-m* is altruistic because the displacement serves to satisfy the positional requirements of *-ânga*, not any requirements of *-m* itself.

We have also demonstrated that similar patterns of altruistic post-syntactic displacement occur across multiple unrelated languages, yielding multiple surface patterns. Altruistic displacement can result in morph doubling, as in Bole, morph reordering, as in Moro (and Washo), or optionality between reordering and doubling, as in Basque as well as Tiwa. We have additionally shown that post-syntactic altruistic displacement is not always due to an adjacency requirement between morphs. Instead, a morph may reorder or double altruistically to satisfy general prosodic requirements, as in Moro, or to satisfy a templatic positional requirement of another morph, as in Basque. Additional crosslinguistic investigation could yield an even broader typology of triggers of post-syntactic altruistic displacement.

Further, we have shown that patterns of post-syntactic inversion and doubling that look very similar to the Tiwa pattern can be greedy rather than altruistic; that is, a morph may undergo displacement in the post-syntax to satisfy its own positional requirements, as reported in Spanish dialects. We leave open as a research question what the typology of greedy displacement looks like as well as how to model such patterns in the framework proposed here. If there exist both altruistic and greedy post-syntactic displacement, this parallels the existence of both greedy and altruistic movement in the narrow syntax. We view this type of cross-modular parallelism as a welcome, if not unexpected, finding.

Finally, our analysis of the Tiwa displacement patterns supports the claim of Arregi and

[22]One could ask what the original motivation for the condition on position of Tiwa *-ânga* 1SG would have been. One reason the altruistic pattern in Tiwa could have developed could be due to a locality bias in allomorphy (Božič 2019), which is a robust cross-linguistic finding even if not universal (see discussion in Section 4.1 above). In Tiwa, allomorphy of 1SG is conditioned by tense, even in the absence of underlying adjacency. Thus the condition on position of *-ânga* 1SG serves to bring about surface adjacency between the trigger and target of allomorphy. Under this interpretation, locality manifests both synchronically (e.g. restricted to a single word, or a phase) and diachronically as a locality bias.

Nevins (2018) that surface variation can be "localized within morphotactically grounded constraints" (p. 674), such as conditions on position, rather than in distinct syntactic structures. By modeling the Tiwa data via contraint interaction, we highlight the ways in which the surface patterns arise due to a tension between this type of morphotactic constraint (namely, the condition on position of *-âng* 1SG) and general linearization principles in the language. These competing constraints lead to a synchronic grammar in which multiple surface strings are equally optimal and where multiple exponence (ME) is possible. Our findings align with literature suggesting that resolution of competing pressures in the grammar is a possible pathway to ME (Hyman 2003; Ryan 2019), and that instances of ME that arise in this way may, in fact, involve active copying processes in the synchronic grammar. We suggest that further investigation of such patterns could yield additional insight into both the diachronic and synchronic motivations of ME and displacement in the post-syntax.

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