Phase unlocking and the derivation of verb-initiality in San Martín Peras Mixtec

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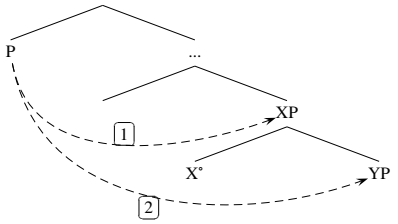
1. Introduction

Recent work proposes that extraction out of a phase first requires Agree with that phase, 'unlocking' it (Rackowski & Richards 2005, van Urk & Richards 2015, Halpert 2019, a.o.). This unlocking step is represented in (1). Agreement with a phase XP by some probe P, [1], 'unlocks' that phase, allowing the same probe to Agree with (and move) constituents within that phase, [2].

(1)



While most prior work on phase unlocking has focused on extraction out of CPs, in this paper, we extend this idea to subextraction out of complex DPs (see also Branan 2018, Ershova to appear).

The empirical basis for our claims comes from a subextraction asymmetry in San Martín Peras Mixtec (SMPM), summarized in (2).

(2) **SMPM Subextraction Asymmetry**: Ā-extraction is blocked out of local external arguments, but is permitted out of internal arguments and *long-distance* external arguments.

We show that this asymmetry can be captured via the following chain of reasoning: (i) DPs are phases and their subconstituents are opaque to Agree (e.g. Svenonius 2004); (ii) SMPM derives its verb-initial word order via Agree-driven object shift, followed by remnant VP-movement (Massam 2001, et seq.); (iii) assuming that v^0 is implicated in both object shift and successive-cyclic Ā-movement, Agree between v^0 and an internal argument DP unlocks it—rendering it transparent for subextraction. Additional evidence for this proposal comes from the fact that other moved constituents (such as goal arguments and embedded clauses) are also transparent for subextraction.

After outlining our main proposal, we turn to two other empirical patterns which help elucidate additional nuances of the phase-unlocking theory. First, we show that long-distance subextraction out of embedded external arguments is possible. Though we do not propose a concrete analysis of this phenomenon, we tentatively link it to Richards's (1998) Principle of Minimal Compliance. Second, we show that the independent availability of DP-internal movement in SMPM is consistent with the claim that

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phase-unlocking must be accompanied by movement to the phase edge (van Urk & Richards 2015, *pace* Rackowski & Richards 2005).

This paper is organized as follows: in §2, we provide background on SMPM clause and DP structure. In §3, we exemplify the subextraction asymmetry summarized in (2). In §4, we introduce our main proposal, first providing evidence that SMPM word order is derived via object shift and remnant VP-movement, then arguing that object shift plus phase unlocking accounts for the asymmetry. In §5, we introduce two outstanding questions about the theory of phase unlocking and show how SMPM may help answer them. §6 concludes.

2. Language Background

SMPM is a variety of Mixtec (Otomanguean) spoken by roughly 11, 500 people within the municipality of San Martín Peras, Oaxaca, Mexico (Instituto Nacional de Estadística y Geografía 2020) and by diaspora communities throughout California.[1] The language displays a VS(DO)(IO)(CP) word order.[2]

(3) Tàxin [$_S$ Maria] [$_{DO}$ íín ntsìkă] [$_{IO}$ ndà'ă Juan]
give.COMPL M. one banana hand Juan
'Maria gave a banana to Juan.'

(4) Kàchi [$_S$ rà] [$_{CP}$ xîìn ñá chìchí]
say.COMPL he buy.COMPL she avocado
'He said she bought an avocado.'

Various Ā-movements target a pre-predicate position (Hedding 2022), which we take to be Spec-CP.

(5) **Yóó** xàxi [__] kwì'i?
who eat.COMPL fruit
'Who ate the fruit?'

(6) **Inta rà** **táta** và'a ká'an [__] tu'un sá'án
only CLF.M man well speak.CONT language Spanish
'Only one man spoke Spanish well (...in those times)'

The formation of complex possessive DPs depends on the alienability and noun class of the possessum. Inaliable possession has no special morphology, (7a), alienable possession is formed with an intervening possessive morpheme, (7b), and possessa in the "animal" noun class (which includes various round objects in addition to animals) trigger a special possessive morpheme *sànà*, (7c). In all cases, the possessor follows the possessum.

(7) a. sè'e Maria
child M.
'Maria's child'

b. karro ñà'ă Eraclio
car POSS E.
'Eraclio's car'

c. tsìnà sànà Juan
dog POSS.AML J.
'Juan's dog'

3. The Subextraction Asymmetry

3.1. No Subextraction out of (Local) External Arguments

SMPM displays a subextraction asymmetry between local external arguments and local internal arguments. Wh-possessors cannot subextract out of local external arguments, (8a), but can subextract out of

[1] All SMPM examples come from the first author's fieldwork since 2017 with speakers living in California and Mexico. The basic asymmetry between internal and external arguments was established working with four speakers. The claim that extraction out of embedded external arguments is permitted is based on the judgments of one speaker, and remains to be confirmed with a wider set of consultants.

[2] We use Leipzig Glossing Conventions with the following additions: AML= Animal Noun Class, CONT= Continuative, EMPH= Emphatic Marker, FAM= Familiarity Marker, POT= Potential.

internal arguments, (8b).[3]

(8) a. *__Yóó__ xàxi [tsìnà sànà __] kôñù?
who eat.COMPL dog POSS.AML meat
Intended: 'Whose dog ate the meat?' (local ext. arg.)

b. __Yóó__ sà-kŭxi Maria [tsìnà sànà __]?
who CAUS-eat.POT M. dog POSS.AML
'Whose dog did Maria feed?' (int. arg.)

Crucially, this is truly an asymmetry between external and internal arguments, not a subject/object asymmetry. Extraction out of unergative subjects (which originate as external arguments) is impossible, (9a), while movement out of unaccusative subjects (which origintate as internal arguments) is grammatical, (9b).[4]

(9) a. *__Yóó__ ndâyi [tsìnà sànà __]?
who bark.CONT dog POSS.AML
Intended: 'Whose dog is barking?' (local ext. arg.)

b. __Yóó__ nìxi'i [tsìnà sànà __]?
who die.COMPL dog POSS.AML
'Whose dog died?' (int. arg.)

Moreover, subextraction is possible out of other internal arguments, such as goal DPs[5], (10), and embedded clauses, (11).

(10) __Yóó__ tàxin Maria iin ntsikă [ndà'ă __]?
who give.COMPL M. one banana hand
'Who did Maria give a banana to?'

(11) __Nă__ kàchi Juan [xàxi Ana __]?
what say.COMPL J. eat.COMPL A.
'What did Juan say that Ana ate?'

Finally, although SMPM bans subextraction out of local external arguments, it does allow cross-clausal movement out of *embedded* external arguments, (12).

(12) __Yóó__ ká'án Pedro [$_{CP}$ ndâyi [tsìnà sànà __]]
who think.CONT Pedro bark.CONT dog POSS.AML
'Whose dog does Pedro think is barking?' (embedded ext. arg.)

Thus, we arrive at the generalization stated in (2) above: Ā-extraction is banned out of local external arguments, but permitted out of all other arguments.

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[3] As noted in Hedding (2020), some speakers find DPs with possessed kinship terms (e.g., *whose mother*) to be slightly more opaque for extraction than other possessives. A similar pattern is reported by Coon (2009). In this paper, we abstract away from this point of variation and leave to future work the question of whether this variation is driven primarily by semantics or a distinct syntactic structure.

[4] A similar contrast between extraction out of unergative and unaccusative subjects is found in Tzotzil (Aissen 1996) and Ch'ol (Coon 2009). These Mayan languages are genetically unrelated to SMPM, but form part of the same Mesoamerican linguistic area (Campbell et al. 1986).

[5] Like other languages of the region (Campbell et al. 1986), meanings often associated with prepositions (locatives, benefactives, recipients) are expressed using terms for parts of the body. In this paper, we analyze these as relational nouns which are inalienably possessed. Nothing crucial hinges on this decision. If evidence emerges that these body part terms have been reanalyzed as true prepositions—as argued by Lillehaugen (2003, 2004) for Valley Zapotec languages—then we could either say that: (i) these prepositional phrases are not phases and consequently are always transparent for extraction; or (ii) they are phases that are unlocked via Agreement in the same way as other internal arguments.

3.2. Against Freezing

Some previous work has argued that subjects are islands because they must move to their surface position (i.e., Spec-TP), causing their sub-constituents to be "frozen" in place (e.g., Takahashi 1994, Boeckx 2003). We argue that a freezing account of the SMPM asymmetry is not viable. First, unergative and unaccusative subjects do not behave alike with respect to subextraction. Second, as we will argue more directly in the next section, SMPM derives its word order via VP-movement to Spec-TP. As such, there is no movement of DP arguments to Spec-TP which would trigger freezing. Finally, and most importantly, the SMPM subextraction asymmetry displays the *opposite* patterning than what is expected under a subject freezing account,[6] summarized in (13).

(13) **Movement-Subextraction Correlation:** The constituents that *move* are those that become transparent for extraction—while those that don't move remain opaque.

4. Accounting for the Subextraction Asymmetry

We now argue that the Movement-Subextraction Correlation is tied to the syntax of verb-initial word order in SMPM. We provide evidence that this involves *object shift* of all internal arguments out of the verb phrase, followed by remnant movement of the verbal constituent to a structurally higher position (Massam 2001, et seq.). Crucially, following Rackowski & Richards (2005), the Agree operation that underlies object shift, initiated by the phase head v^0, renders these arguments transparent for further subextraction by v^0 (thus, v^0 is implicated in both A- and successive-cyclic Ā-movement). Finally, as external argument DPs are generated in a higher position, they do not interact with v^0 and thus remain opaque.[7]

4.1. VSO as Remnant VP-Movement

To start, we briefly contrast two syntactic approaches to deriving VSO word order cross-linguistically (see Clemens & Polinsky 2017 for a more in-depth overview). Under a head movement analysis, V^0 undergoes (successive) head movement past the subject, stranding other VP-internal material; this has been proposed for closely related Chalcatongo Mixtec (Macaulay 2005) as well as for other unrelated languages (e.g. Clemens & Coon 2018, Clemens 2019). Conversely, a phrasal movement analysis requires that the verb phrase undergoes remnant movement after its internal arguments have vacated it (e.g. Massam 2001, Lee 2006, Collins 2017). For ease of exposition, we take the moving verbal constituent under a phrasal movement account to be a VP, though nothing crucial hinges on this assumption.[8]

These approaches can be empirically differentiated, based on the types of VP-internal elements that may (or may not) move with the verb. The VP-movement account readily permits complex constituents to also front; in contrast, the V^0-movement account is much more restricted in this regard.[9] We will see that SMPM permits a variety of complex VP-internal constituents to front with the verb, thus pointing towards the VP-movement analysis.

First, (14a) demonstrates that VP-internal adverbs must front. Such adverbs may be pre- or post-verbal (Eischens 2019); the latter option yields V-Adv-S-O word order. This can be straightforwardly modeled as right-adjunction of a AdvP to the VP, (14b).

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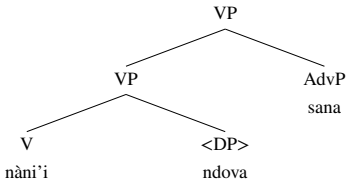
[6] It remains to be explored why object shift in SMPM does not display freezing. Little (2020), for instance, shows that VSO order in Tumbalá Ch'ol renders objects opaque for subextraction, by hypothesis because they become frozen. One possibility, proposed by Little, is that variation in freezing effects is due to the timing of Agree and object shift.

[7] This final point holds only for local subextraction out of external arguments. Long-distance subextraction out of embedded external arguments will be discussed in Section 5.1.

[8] The relevant constituent is more likely to be a *v*P, given examples such as (8b), which show that raised verbs may contain causative morphology. However, we abstract away from this point for the purposes of this short paper.

[9] For instance, recent V^0-movement analyses of other verb-initial languages (e.g. Niuean, Mayan languages) have permitted only prosodically weak VP-internal elements to surface with the fronted verb via postsyntactic reordering (Clemens & Coon 2018, Clemens 2019).

(14) a. [$_{VP}$ Nàni'i **sana**] Rosa ndova b.
find.COMPL accidentally Rosa guaje
'Rosa accidentally found guaje.'



Note that (14a), by itself, does not immediately point to a VP-movement analysis, since bare adverbs may also be analyzed as Adv^{0}s that project along the clausal spine (Cinque 1999). Indeed, Clemens (2019) offers a head movement account of seemingly similar data in Niuean, with a V^0 undergoing roll-up head movement through various projecting Adv^{0}s. However, the examples in (15) additionally show that the adverbs in SMPM are phrasal, as they may undergo phrasal movement (focus fronting, in this case).[10]

(15) a. [$_{VP}$ Nĭ-chi'i **ti míí và**] Pedro utù rà
NEG.COMPL-plant also FAM EMPH P. milpa his
'Pedro didn't plant his milpa at all.'

b. Context: "I think Pedro is finishing planting his milpa."
Ù'ún, nchĭxa. **Ti míí và** [$_{VP}$ nĭ-chi'i [__]] rà utù rà
no not.true also FAM EMPH NEG.COMPL-plant he milpa his
'No, that's not true. He didn't plant his milpa AT ALL.'

Second, objects may front with the verb in select contexts. In SMPM, reciprocal objects may not vacate the VP, resulting in VOS word order.

(16) [$_{VP}$ Xìni **tá'an**] ndù
see.COMPL RECP 1PL.EXCL
'We saw each other.'

At first blush, this is reminiscent of patterns of *pseudo noun incorporation* seen cross-linguistically (Massam 2001, et seq.). However, in SMPM, this pattern also includes constituents *properly containing* reciprocals. As shown in (17), complex DPs (e.g. indirect objects) that contain reciprocals must also front with the verb.[11]

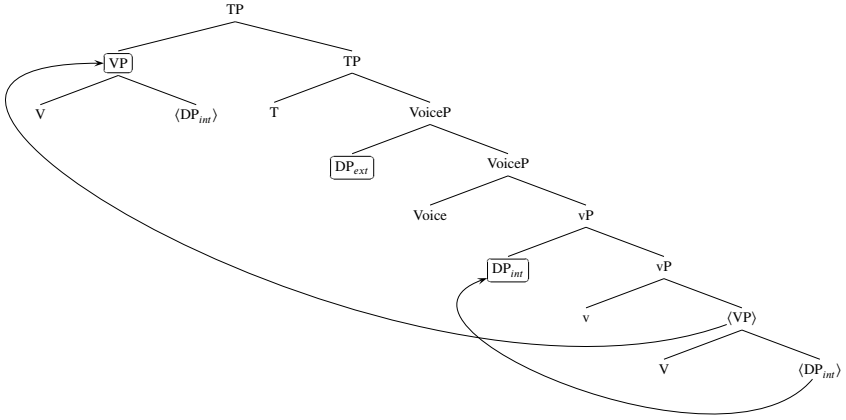
(17) [$_{VP}$ Taxin **ndà'ă tá'an**] míí ná káàn ita
give.POT hand RECP FAM 3PL.F DEM flower
'They are going to give flowers to each other.'

This pattern appears to be otherwise unattested in other languages,[12] and we do not provide an account of it at this time. However, its very existence serves to further highlight the phrasal nature of the fronted verbal constituent.

As alluded to above, a derivation of VSO word order that involves VP-movement requires that all internal arguments—direct objects, indirect objects, and embedded CPs alike—first move out of the VP. Since these XPs linearly follow external arguments, we propose that they undergo object shift to Spec-*v*P and that external arguments are base-generated in Spec-VoiceP. We also assume that the VP-remnant moves to Spec-TP (Alexiadou & Anagnostopoulou 1998, Oda 2005, Coon 2010); this is consistent with previous speculations that Spec-TP is not a landing site for DPs in Mixtec (Ostrove 2018). This is schematized in (18):

[10] See also further arguments for a phrasal adjunction analysis from Yuan (2022), based on closely related San Juan Piñas Mixtec.
[11] Ostrove (2018: p. 151) additionally shows that complex DPs containing reciprocal possessors must front with the verb as well.
[12] It is, however, also found in closely related San Juan Piñas Mixtec (Yuan 2022).

(18)



Importantly, direct objects, indirect objects, and embedded CPs are the arguments that permit subextraction out of them. This bears out the Movement-Subextraction Correlation from above.

4.2. Movement and Phase Unlocking

With these analytical pieces in place, we now turn to how movement may feed subextraction. We propose that this interaction may be captured through an 'unlocking' theory of phasehood. This theory states that a probe must first undergo Agree with a phase, in order to further extract an element out of that phase (Rackowski & Richards 2005), as shown in (1) above.

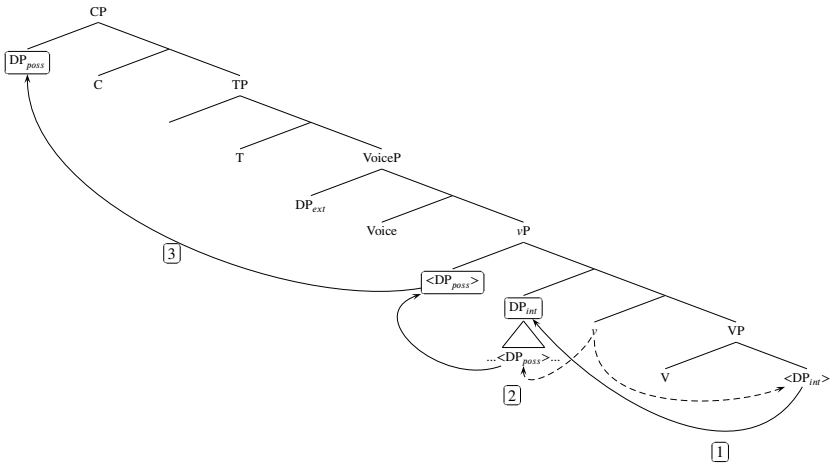
This approach has been fruitful in accounting for subextraction patterns out of a variety of otherwise opaque domains (e.g. CPs, *v*Ps, and DPs) in a wide range of languages (Rackowski & Richards 2005, van Urk & Richards 2015, Branan 2018, Halpert 2019, Lee & Yip 2021, Ershova to appear, a.o.). Our contribution to this theory is the novel analytical connection with the VP-fronting treatment of VSO word order: under the standard assumption that the Agree operation underlies movement, object shift to Spec-*v*P—independently needed to derive verb-initial word order in SMPM—'unlocks' a DP or CP phase for subextraction.

An example such as (19), involving subextraction out of an internal argument DP, therefore requires the following steps. v^0 first Agrees with the internal argument (i.e., the entire possessive DP), triggering object shift to Spec- *v*P and unlocking it, [1]. Because v^0 and C^0 are both phase heads, Ā-movement to Spec-CP requires the extracted element (i.e., the wh-possessor) to first stop at Spec-*v*P. Therefore, v^0 Agrees again, raising the wh-possessor from within the unlocked DP to an outer Spec-*v*P, [2] (following van Urk & Richards 2015).[13] VP then undergoes remnant movement to Spec-TP (omitted in the tree below). Finally, the subextracted possessor moves from Spec-*v*P to Spec-CP, [3]. (Subextraction out of embedded CPs, we propose, follows a similar logic.)

(19) **Yóó** sà-kǔxi Maria [tsìnà sànà [__]]?
who CAUS-eat.POT M. dog POSS.AML
'Whose dog did Maria feed?'

[13] Van Urk & Richards (2015) propose that, in the Nilotic language Dinka, Ā-extraction of a DP out of an embedded CP is similarly preceded by unlocking and moving the CP itself to Spec-*v*P. The DP then raises out of the CP to an outer Spec-*v*P, prior to any further movement steps. In Dinka, evidence for the successive-cyclic nature of this derivation comes from word order restrictions in the language. That this analysis is independently replicated in SMPM, on the basis of a distinct set of facts, constitutes further evidence for it.

(20)



To summarize, we have proposed that the SMPM subextraction asymmetry arises from v^0 Agreeing with internal argument DPs and CPs, but not external arguments; this step of Agree vacates internal arguments out of the VP in the derivation of VSO word order. Crucially, it also serves to 'unlock' the relevant constituents (phases) for further subextraction.

5. Further Aspects of the 'Unlocking' Theory of Phases

The remainder of this paper extends our analysis to two additional dimensions of phase unlocking. First, we suggest that long-distance subextraction out of external arguments may be subsumed under a broader generalization about when phases may be obviated. Second, we turn to pied-piping with inversion in SMPM and its implications for the role of the phase edge in long-distance extraction.

5.1. Long-distance Subextraction as Phase Obviation

So far, the fact that SMPM permits cross-clausal subextraction out of external argument DPs, as in (12), remains unexplained under our account. What 'unlocks' the external argument in (12) but not in comparable monoclausal contexts, given that there are no differences in argument structure in these configurations? We observe that, in (12), the external argument DP is contained within an *embedded CP phase*—and propose that this is the crucial factor that facilitates further subextraction in this configuration.

In fact, DP phases that are enclosed within larger phases seem to generally permit further subextraction out of them. This is shown in (21)-(22) with recursive possession constructions.[14] Again, it is not immediately obvious what unlocks the inner DP for subextraction. For instance, there is no "roll-up" inversion of the inner DP to the edge of the outer DP, which we might otherwise expect if this DP were unlocked by Agree with the outer D^0.[15]

(21) **Yóó** nì-xì'ì [$_{DP}$ tsìnà sànà [$_{DP}$ nána __]]
who -COMPL-die dog POSS.AML mother
'Whose mother's dog died?'

(22) **Yóó** tàx=ún tùtsyà [$_{DP}$ ndà'ă [$_{DP}$ nána __]]
who give.COMPL=you atole hand mother
'Whose mother did you give atole to?'

These patterns suggest that subextraction is generally permitted out of phases contained within larger unlocked phases—thus motivating a broader explanation. We summarize this point as the Phase Obviation

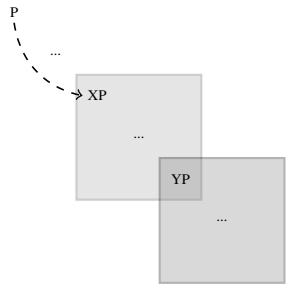
[14] As mentioned in footnote 5, we assume that prepositional meanings are encoded using inalienably possessed body parts.

[15] See also Coon (2009) on similar facts in Ch'ol.

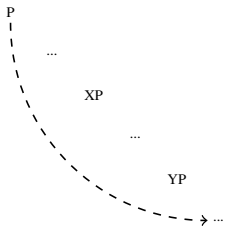
Generalization in (23). This generalization captures the exceptionally transparent nature of both external argument DPs within embedded CPs and possessor DPs within nested possessive constructions.

(23) **Phase Obviation Generalization (POG):** A phase YP that is properly contained within another phase XP can be freely subextracted out of, so long as XP has been unlocked.

a. P unlocks XP



b. YP also unlocked



While we do not commit to a particular formal implementation of the POG at this time, we note that the logic of this generalization seems reminiscent of the Principle of Minimal Compliance of Richards (1998, 2001):

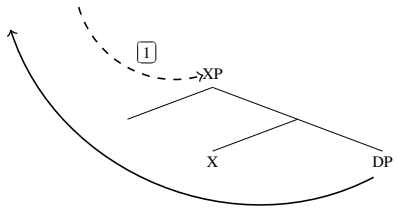
(24) **Principle of Minimal Compliance (PMC):**
Once a probe *P* has successfully targeted a goal *G*, any other goal *G*' that meets the same featural search criterion, and is dominated by G, is accessible to subsequent probing by *P* irrespective of locality conditions. *(version adapted from Preminger 2019)*

In the context of phase unlocking, Rackowski & Richards (2005) originally invoke the PMC to account for subextraction without movement to the phase edge (which we discuss in §5.2 below). However, SMPM suggests that we may extend this further. Given the POG in (23), Agree with a phase not only unlocks that phase, but also unlocks *all additional phases contained within it* (see also Huang (2022) on phase obviation as an effect of the PMC). We leave further explorations[16] of this idea for future work.

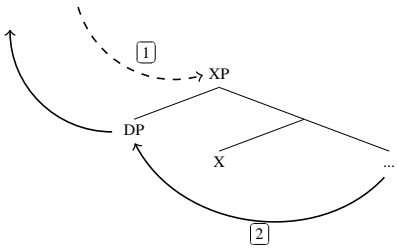
5.2. Inversion with Pied-Piping to the Phase Edge

In Rackowski & Richards's (2005) original theory, phase unlocking is sufficient for subextraction—thus, subextraction out of CP *need not* stop at the phase edge, (25) (see also Halpert 2019). However, this is a point of debate: van Urk & Richards (2015) argue that *both* unlocking *and* movement to the phase edge are necessary to move out of that phase, (26).

(25) Unlocking only



(26) Unlocking and movement to edge



[16]Intriguingly, like SMPM, the Northwest Caucasian language West Circassian also bans local subextraction out of external (ERG) arguments but permits it out of internal (ABS) arguments, while also permitting cross-clausal subextraction out of embedded external arguments (Ershova to appear). Ershova (to appear) also pursues a phase unlocking analysis, though in conjunction with several ancillary assumptions (for instance, Ershova ties the subextraction asymmetry to language-specific properties, such as polysynthesis and syntactic ergativity). However, the fact that the same pattern is found in SMPM suggests that a more general analysis is needed. We leave for future research the question of whether our approach may be extended to West Circassian.

SMPM has an independent property that can help contribute to this debate (though it does not fully resolve the theoretical uncertainty). Like other Mesoamerican languages (Smith Stark 1988), SMPM displays *pied-piping with inversion (PPWI)*: wh-words move to the left edge of the constituent that they pied-pipe. Following previous work on other Mesoamerican languages (Aissen 1996, Coon 2009), we assume that PPWI within possessive DPs involves movement of wh-possessors to Spec-DP.

Importantly, this inversion is equally available for external and internal argument DPs alike, (27)-(28):

(27) [**Yóó** tsìnà sànà __] ndáyi __
who dog POSS.AML bark.CONT
'Whose dog is barking?'

(28) [**Yóó** tsìnà sànà __] nìxi'i __
who dog POSS.AML die.COMPL
'Whose dog died?'

These data are revealing in two ways. First, while inversion to the phase edge is generally available, it does not facilitate subextraction; as we have already seen, local external arguments may not be subextracted out of (compare (27) and (9a)). This reinforces the point that the phase unlocking step is a prerequisite for subextraction; movement to the phase edge is *insufficient* by itself.

Nonetheless, since PPWI still takes place within constituents that may be subextracted out of (e.g., the internal argument in (28)), this pattern also suggests that movement to the phase edge *does* still take place in addition to phase unlocking (van Urk & Richards 2015, *pace* Rackowski & Richards 2005). A next step is to determine more carefully if inversion (i.e. movement to the phase edge) is a *necessary* ingredient for subextraction along with unlocking.

6. Conclusion

In this paper, we have argued that a ban on subextraction out of external arguments in SMPM provides novel evidence for an 'unlocking' theory of phases (Rackowski & Richards 2005). In SMPM, object shift of internal argument DPs feeds subextraction out of them—movement-via-Agree renders these otherwise opaque domains transparent. In addition, the pattern of SMPM contributes to several important empirical questions in this domain, such as the conditions that permit phase obviation and the role of the phase edge in extraction. Finally, our analysis has implications for the broader debate about how verb-initial clauses are derived (e.g. Clemens & Polinsky 2017). Our analysis supports a predicate (VP)-fronting analysis, with potential applications to other languages. More broadly, the subextraction pattern that we demonstrate in SMPM could be used to diagnose otherwise string-vacuous movements within verb-initial clauses in other languages.

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