Deriving verb-initial word order in Mayan

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Abstract: Individual languages in the Mayan family display either rigid VSO or alternating VOS/VSO word orders (England 1991). In this paper we review problems with previous accounts of Mayan word order and argue that verb-initial (V1) order is consistently derived by head movement of the verb to a position above the subject and BELOW Infl^0, which accounts for uniformity in verb-stem formation across the family. After an in-depth examination of the factors that have been reported to determine postverbal argument order, we present three distinct paths to VOS: (i) postsyntactic reordering of NP objects (following Clemens 2014, 2017), (ii) right-side subject topicalization (Can Pixabaj 2004; Curiel 2007), and (iii) heavy-NP shift (Larsen 1988). This account makes testable predictions in the domains of word order and prosodic constituency, and has implications for the derivation of verb-initial order cross-linguistically.[*]

1. INTRODUCTION. Languages of the Mayan family are predominantly verb-initial (V1) in discourse-neutral contexts and fall into two main groups with respect to postverbal argument order: (i) languages with rigid VSO, and (ii) languages with alternating VOS/VSO (England 1991). For VOS/VSO-alternating languages, a variety of factors have been reported to determine postverbal argument order, including specificity, definiteness, animacy, phonological weight, and discourse status.

The degree of variation in the factors that govern postverbal order presents a challenge for any account of V1. Despite this variation, however, a number of common patterns emerge. Drawing on these patterns and other similarities across the family (e.g. Grinevald & Peake 2012; England & Zavala 2013; Bennett et al. 2016; Aissen et al. 2017, discussed in §2), we begin this paper by providing a unified account of Mayan V1. Though a full study of word order variation in the roughly thirty currently-spoken Mayan languages is beyond the scope of the present work, we will draw from a diverse set of publications on a range of Mayan languages to demonstrate a broad base of support for our unifying analysis. We further outline the consequences and predictions of our account—especially with respect to prosodic constituency—which can be tested on these and other verb-initial languages in future work.

Our specific proposal for the derivation of Mayan V1 (see §2 and §4) is based on head-movement of the verb root to a projection above the subject and below $Infl^0$. From a cross-linguistic perspective, there is nothing new about a head-movement approach to V1; assuming that subjects remain low, head movement is a well-supported way to achieve VSO in a variety of languages (see Clemens & Polinsky 2017 for a recent overview). For Mayan languages with rigid VSO, like Q'anjob'al, relatively little needs to be said. Nonetheless, to our knowledge this is the first explicit proposal for a head-movement approach to Mayan V1.

More controversial is the claim that a head-movement account for V1 should be maintained even for languages which have been described as basically VOS, or alternating VOS/VSO. We examine one such language in detail in this paper: Ch'ol, a language of the Ch'olan–Tseltalan branch. For the family more generally, we argue that there are three types of VOS clauses, each independently motivated, which may coexist in a single language. We further posit that each of these paths to VOS, shown in 1, is compatible with a single head-movement analysis of Mayan V1 syntax.

(1)   Paths to VOS
        a. subject in high right-side topic position
        b. heavy-NP shift of phonologically heavy subjects
        c. prosodic re-ordering of bare NP objects

We provide a syntactic account for 1a based on Aissen 1992, supported by evidence from the Mayan literature for the existence of high topics to the right of the verb (e.g. Can Pixabaj 2004; Curiel 2007), in addition to the well-established topic position to the left of the verb. Similarly, heavy-NP shift, as in 1b, is attested in a wide range of languages, including those of the Mayan family (see Larsen 1988). Here, we remain agnostic as to whether heavy-NP should receive a syntactic, prosodic, or processing account. Finally, with an empirical focus on Ch'ol, we provide novel evidence for the existence of 1c in Mayan: VOS is derived post-syntactically through reordering of the object due to prosodic requirements. Specifically, drawing on Clemens's (2014, 2017) proposal for VOS in Niuean, we argue that bare NP objects are subject to a high-ranked prosodic constraint which requires them to be linearly adjacent to the verb so that they can be pronounced in the same prosodic phrase as their selecting head.

The account sketched above makes strong testable predictions: all else being equal, word order in Mayan should be VSO, with VOS arising due to the factors listed in 1. In principle, any language should allow subjects to appear to the far right if they are topics, as in 1a, or phonologically heavy, as in 1b. However, languages that generally allow bare NP arguments (i.e. NP LANGUAGES; see Chierchia 1998; Bošković 2008) may frequently show VOS due to the prosodic constraint we motivate below, which protects full DP arguments from reordering by virtue of their phasehood. Though much of the empirical discussion and subsequent proposal below focuses on Ch'ol, we point to converging evidence in other languages and suggest avenues for testing the predictions of our account.

The remainder of this paper is organized as follows. In section 2, we provide basic information about the Mayan family and present our proposal for a head-movement account of stem derivation and VSO. Next, in section 3, we look in more detail at variation in word order across the family in order to understand the environments for VOS and VSO, including a specific look at VOS and VSO in Ch'ol. Section 4 reviews the existing accounts of Mayan word order: XP-fronting of a predicate (Coon 2010) and base-generation of right-side specifiers (Aissen 1992). We discuss insights to be taken from each approach as well as the benefits of adopting our head-movement account. In section 5, we present our account of VOS and VSO sentences in Ch'ol, in which bare NP objects shift towards the verb in order to satisfy a high-ranked constraint on prosodic constituency. Finally, in section 6, we briefly discuss VOS in other Mayan languages and the potential for extending the analysis to include languages with a general

preference for peripheral topics. We discuss prosodic predictions of each avenue to VOS, as well as directions for future work and cross-linguistic implications, before concluding in section 7.

2. A UNIFIED MAYAN SYNTAX. In this section, we offer the first head-movement account of Mayan V1. The Mayan language family consists of about thirty languages divided into six major subgroups as shown in 2 (Campbell and Kaufman 1985); these languages are spoken today in Mexico, Guatemala, and Belize by roughly five million people (England 2003). Below, we examine data from the major sub-families; for more information on subgroupings, see Campbell & Kaufman 1985; England & Zavala 2013; Bennett et al. 2016 and references cited there.

(2)   Mayan language family (Campbell & Kaufman 1985)
   a. **Yucatecan**: Yucatec, Itzaj, Lacandon, Mopan
   b. **Huastecan**: Huastec
   c. **Ch'olan–Tseltalan**: Ch'ol, Chontal, Ch'orti', Tseltal, Tsotsil
   d. **Q'anjob'alan**: Tojolab'al, Chuj, Q'anjob'al, Akatek, Popti', Mocho'
   e. **Mamean**: Mam, Tektitek, Awakatek, Chalchitek, Ixil
   f. **K'ichean**: Kaqchikel, Tz'utujil, K'iche', Achi, Sipakapense, Sakapultek, Poqomam, Poqomchi', Q'eqchi', Uspantek

Despite considerable variation across the family, Mayan languages share a number of commonalities relevant to our proposal, which we review briefly here; for general grammatical overviews, see Grinevald & Peake 2012; England & Zavala 2013; Bennett et al. 2016; Aissen 2017.

Most Mayan languages are pro-drop, allowing core arguments to be omitted. Overt nominal arguments are unmarked for case. Instead, grammatical relations are head-marked on the predicate with two sets of person/number markers: SET A (ergative, possessive) and SET B (absolutive). The majority of the data in this paper are drawn from transitive sentences, in which subjects bear Set A markers and objects bear Set B markers. Third-person singular Set B morphology is unmarked across the family, and in many languages free-standing pronouns are used only for emphasis. Transitive examples from Ch'ol and Chuj are shown in 3.[1]

(3)   a. Tyi k-chuk-u-yety.

               PFV A1-carry-SS-B2

               'I carried you.'   (Ch'ol)

           b. Ix-ach-ko-chel-a'.

               PFV-B2-A1P-hug-SS

               'We hugged you.'   (Chuj)

These examples also illustrate that in verbal predicates, a TAM marker normally appears clause-initially. There is variation across the family as to whether and where a word boundary is transcribed internal to the TAM–stem complex.[2] Verb stems are often suffixed with a STATUS SUFFIX, the nature of which may vary depending on transitivity, aspect, and other factors.

        For many Mayan languages, Set A markers are understood to be prefixes, while Set B markers are clitics (see discussion in Grinevald & Peake 2012). While order of morphemes on the stem is relatively consistent across the Mayan family, languages vary as to the location of the Set B clitic, as schematized in 4. For example, in the sentences in 3 above, Ch'ol shows the low option 3a, while Chuj illustrates the high option 3b.

(4)   TAM − {ABS} − ERG – verb.stem − {ABS}

        Mayan languages exhibit two basic word order types: (i) rigid VSO, and (ii) alternating VOS/VSO (England 1991).[3] Head-movement offers the most straightforward account of V1 in rigidly VSO languages like Q'anjob'al, shown in 5a, and the VSO structures of alternating-VOS/VSO languages like Ch'ol, shown in 5b.

(5)   a. Max y-il   [_S no' tx'i'] [_O naq Lwin].

             PFV   A3-see   CLF dog   CLF Pedro

             'The dog saw Pedro.'   (Q'anjob'al; Baquiax Barreno et al. 2005:169)

           b. Tyi i-kuch-u   [_S aj-Maria   ] [_O jiñi si'   ].

             PFV A3-carry-SS   CLF-Maria   DET wood

             'Maria carried the wood.'   (Ch'ol)

Looking ahead, head-movement of the verb into a position above the external argument will form the foundation of our account of VOS in VOS/VSO languages. Before turning to the derivation of VOS, we outline our proposal for VSO here.

To derive V1 in both VSO and VOS/VSO-alternating languages, we propose that the root undergoes head movement to a head above the subject and below Infl^0. This complex stem lands in the head that hosts the status suffix, labeled SS^0 in this paper.[4] The order of morphemes in the stem—ROOT-(VOICE)-STATUS.SUFFIX—is consistent with the MIRROR PRINCIPLE (Baker 1985). As shown in 6, successive head movement lands the stem in a position below the TAM marker in Infl^0, and above the subject in VoiceP. The position of clitics, which regularly intervene between TAM and the verb stem (discussed in §4.2 below), provides further evidence for this structure.

(6)   Head-movement VSO
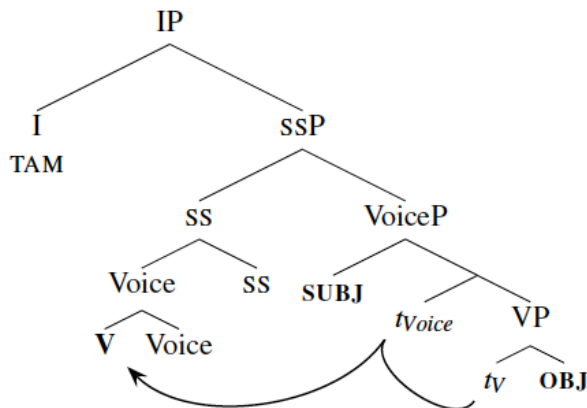
This proposal provides a natural account of VSO order—available to ALL Mayan languages to some extent—while connecting languages in the Mayan family to other unrelated verb-initial languages that have received head-movement accounts (see Clemens & Polinsky 2017 for a recent overview of V1 languages). Specifically, V1 order is a natural consequence of (i) verb-movement to a relatively high clausal position, and (ii) the fact that the subject remains low (on the latter point, see Aissen 1992, Coon 2017b). Finally, the pan-Mayan attributes of morpheme order within the verbal complex are found in languages that predominantly rely on VSO order and those for which VOS order is most common. Only the head-movement account can capture this observation, and so we maintain that VOS is ALWAYS derived in Mayan.

The question then becomes how to derive VOS order in such a way that it is compatible with a general head-movement account of V1. In section 5, we argue for a prosodic account of basic VOS order in Ch'ol, in which bare NP objects are post-syntactically reordered to satisfy prosodic requirements.[5] In section 6, we turn to the other paths to VOS listed in 1 above: right-side topics and heavy-NP shift. Before formalizing our account of VOS, we consider the complex set of factors that condition word-order variation in the postverbal realm.

3. MAYAN WORD ORDER. Though Mayan languages are generally described as 'verb initial', in many languages, all six orders of S, V, and O are possible (see e.g. Brody 1984 on Tojolab'al; Hofling 1984 on Yucatecan languages; Can Pixabaj 2006 on Uspantek). This section examines the factors governing word-order alternations in Mayan. Section 3.1 briefly reviews the ordering of preverbal arguments, and then sections 3.2 and 3.3 discuss postverbal variation, the main focus of this paper. While a range of factors have been claimed to govern postverbal order in languages that show variation, we suggest—following Minkoff 2000—that some of these factors may be attributed to processing effects (see also some discussion in Brody 1984; Skopeteas & Verhoeven 2009). Once these extra-grammatical factors are eliminated, we focus on the first of a series of generalizations which we argue cannot be attributed to processing alone: a ban on D^0-level material (i.e. determiners, demonstratives, pronouns, proper names) in VOS object position, which is active in a subset of Mayan languages (see §6.4 for a typology of Mayan languages) and corroborated for Ch'ol (see §3.4).

3.1. PREVERBAL ORDERS. Though Mayan languages are generally V1, a range of work across the family has shown that one or both arguments may appear preverbally for topic, focus, *wh*-questions, and relativization (e.g. Norman 1977, discussed in Larsen 1988, and Aissen 1992). Topic position precedes focus position, as shown in the SOV example in Tsotsil in 7 and the OSV example in 8.

(7)   [TOP A   ti   prove tzeb-e   ] [FOC sovra   ]   ch'ak'bat.
            TOP DET poor   girl-ENC   leftovers   was.given
        'It was leftovers that the poor girl was given.'   (Tsotsil; Aissen 1992:51)

(8) [TOP U-meyaj-ej   ] [FOC in-ten   ] k-inw-il-ik   ti'ij.
      A3-work-TOP   EMPH-1PRON   IPFV-A1-see-SS 3PRON
      'His work, I look after it for him.'   (Itzaj; Hofling 2000:196)

For many languages, including the ones cited above, preverbal topichood is morphologically marked. In other cases, word order alone can indicate that a preverbal constituent is the topic of the utterance (Broadwell 2000; Gutiérrez Bravo & Monforte y Madera 2008). Generally speaking, if a clause has an unmarked, preverbal topic, that topic is also the grammatical subject. We return to topics in more detail in section 6.

While the ordering of preverbal elements is clearly linked to discourse status (in addition to A'-movement for *wh*-questions and relativization), the relative ordering of postverbal arguments is less well understood, and also appears to show more variation across the family. Accounting for variation in postverbal word order is the focus of the remainder of this paper.

3.2. POSTVERBAL ORDERS. Determining 'basic word order' in any given language is not always a straightforward matter, and in Mayan this is particularly true (see discussion in Brody 1984; Larsen 1988; England 1991; Quizar 1979; Robinson 2002). As already discussed, Mayan languages are generally pro-drop and arguments may appear in preverbal and postverbal positions. As a result, it is very uncommon in naturally-occurring speech to find a transitive sentence with two overt arguments (DuBois 1987; England & Martin 2003), and it is even less common for both overt arguments to appear postverbally. Fewer than 3% of corpus sentences in England and Martin's (2003) survey have two overt arguments (see Robinson 2002; Curiel 2007; Skopeteas & Verhoeven 2005; Vázquez Álvarez & Zavala 2013 for other detailed numerical corpus counts). Yet, however uncommon sentences with two overt post-verbla arguments (V-NP$_1$-NP$_2$ clauses) may be in natural speech, they provide key evidence about the derivation of word order in the Mayan family.

In her detailed study of Mayan word order, England (1991) begins by grouping Mayan languages into three main types based on the behavior of postverbal arguments: (i) VSO (e.g. Mam, Tektiteko, Awakateko, Ixil, Q'anjob'al); (ii) VOS (e.g. Mopan, Lakandon, Tsotsil); and (iii) alternating VOS/VSO (e.g. Ch'ol, Tseltal, Kaqchikel, K'iche', Akateko). However, while languages in the VSO category have a rigid ordering of postverbal arguments (i.e. VOS is

generally prohibited), the distinction between the latter two categories—VOS and alternating VOS/VSO—is less clear. England (1991) ultimately concludes that these two alternatives should be collapsed into a single category of VOS languages that allow VSO to varying extents (see also Quizar 1979).[6]

Factors that have been proposed to influence the ordering of postverbal arguments include phonological weight, discourse prominence, definiteness, specificity, animacy—and, in some cases, the RELATIVE values of these features. In section 6, we review the evidence that phonologically heavy arguments may undergo heavy-NP shift to the right. In addition, section 6 reviews evidence from the Mayanist literature for a PERIPHERAL topic position, ordered either to the left or to the right of the main clausal structure. In the rest of section 3, we concentrate on the remaining factors influencing postverbal argument order: definitenes, specificity, and animacy. We suggest below that the relevant grammatical factor at play is not semantic definiteness or specificity, per se, but rather the presence of D^0-level material. We further propose that the apparent animacy effects are due to processing and should not factor in to grammatical accounts of word order.

3.3. DEFINITENESS, SPECIFICITY, AND ANIMACY. Much of the literature discussing the apparent effect of animacy on postverbal word order in Mayan languages cites the seminal work of Norman and Campbell (1978:146), who state that for Proto-Mayan that, 'unmarked order was VSO when S and O were equal on the [animacy] feature hierarchy, VOS when S was higher than O'. Norman and Campbell base this claim primarily on comparative data from two genetically distant Mayan languages: Huastec and Tseltal. Tseltal examples are illustrated in 9: the VSO sentence in 9a involves two animals, while in the VOS sentence in 9b, the human subject outranks the non-human object.

(9)   a. La s-t'om ta ti'el [S ts'i'] [O te   baka].
           ASP A3-bite   dog   DET cow
           'The dog bit the cow.'
        b. La s-mil   [O baka] [S te   Pedro].
           ASP A3-kill   cow   DET Pedro
           'Pedro killed the cow.'   (Tseltal; Norman and Campbell 1978:145)

Quizar (1979) and England (1991) add, based on data from a range of languages, that the relative DEFINITENESS of postverbal nominals should be included in the features governing word order. A related distinction is also illustrated in the examples in 9: the object in the VSO sentence in 9a includes a determiner, while the object in the VOS sentence in 9b does not. This distinction will be important to our discussion below.

Though the claim in Norman & Campbell 1978 is widely cited, conflicting statements also exist, and a range of seemingly more complex interactions arise. Larsen (1988:341) writes of K'iche' that, 'if the NP in O function is animate, it must be "non-definite"'. Brody (1984:720) states that for Tojolab'al, VSO is only acceptable when the subject is high-ranked in animacy and the object is low-ranked, in apparent conflict with Norman and Campbell's generalization. Hofling (2000) writes for Itzaj that SPECIFICITY is the crucial factor:

> [while] animacy of arguments has some effect on interpretations, with subjects typically human, specificity appears to be more important. If the first argument following the verb is equal to, or greater, in specificity than the second argument, the sentence is ambiguous out of context, with a VSO interpretation preferred (Hofling 2000:191).

A careful look at the data on which generalizations like these are based lends credibility to a proposal by Minkoff (2000), who suggests a processing explanation for the apparent relevance of animacy and prominence in the emergence of hierarchy effects in Mayan languages (this type of explanation is also alluded to in other work on Mayan word order, including Bohnemeyer 2009 and Skopeteas & Verhoeven 2005). Recall from section 2 that Mayan languages (i) are verb-initial, (ii) show no case-marking on nominals, and (iii) permit pro-drop of both subject and object. A transitive V1 configuration is schematized in 10.

(10)   V [NP$_1$] [NP$_2$]

Taken together, the three factors above mean that, at the point at which a speaker has uttered a string [V]–[NP$_1$], out of context, the listener will not know whether the first nominal is the subject or the object. For one thing, neither argument will be marked for case. This

generalization holds true for all Mayan languages, and is shown in 11 for VOS/VSO-alternating Itzaj. The verb does show Set A agreement with a third-person subject (recall that third-person Set B is unmarked), but when both arguments are third person, the third-person Set A marker does not disambiguate. According to Hofling (2000), provided that both interpretations are equally plausible, this type of sentence may be interpreted as either VOS or VSO, as in 11.

(11)   T-u-kin-s-aj   [NP1 winik] [NP2 b'alum].
        PFV-A3-die-CAUS-SS   man   jaguar
        'A man killed a jaguar.' / 'A jaguar killed a man.'   (Itzaj; Hofling 2000:191)

The confluence of grammatical features that leads to this ambiguity (V1 order, headmarking, and pro-drop) is likely to affect the processing of Mayan languages—EVEN THOSE WITH RIGID VSO. In Minkoff's terms, 'the processor cannot determine which argument is the subject until it has identified both arguments' (Minkoff 2000:205). In a VSO language, three possibilities are available for the string [V]–[NP$_1$] when the verb is transitive: it could be that NP$_1$ is the subject and the object is still to come, as in 12a; that NP$_1$ is the subject and the object has been pro-dropped, as 12b; or that NP$_1$ is the object and the subject has been pro-dropped, as in 12c.

(12) Interpretations of [V]–[NP$_1$] in a VSO language
      a.   **V   [NP$_1$]**   [NP$_2$]
      b.   **V   [NP$_1$]**   *pro*
      c.   **V**   *pro*   **[NP$_1$]**

Note that this type of processing uncertainty would not arise in SVO languages, or if either or both arguments were marked for case, or if only subjects could be pro-dropped.

Minkoff proposes that in V1, caseless, pro-drop languages like those of the Mayan family, the processor 'is innately configured so that it values any interpretation that assigns the agent role to any argument that might bear it, and that this value is proportional to the animacy of the argument in question' (see also discussions of HARMONIC ALIGNMENT in Skopeteas & Verhoeven 2005; Bohnemeyer 2009). In other words, apparent effects of animacy may arise as a strategy to ease the burden on the processor. Following Minkoff, we take the apparent role of

animacy in determining postverbal word order to be a PROCESSING effect: when presented with a constructed example in a language with variable VOS/VSO, we suggest that consultants are most likely to assign the role of subject to the most animate/salient argument—regardless of whether the grammar of the language in question would in fact generate such a sentence.

Crucially, we claim that apparent effects of animacy are not encoded in the grammars of speakers: they will not be found in naturally-produced examples, and do not play a role in sentence production. Indeed, grammatical descriptions that report animacy hierarchy effects in Mayan base their discussion on elicited examples. Again, this is often NECESSARY, since it is very rare to find two postverbal arguments in natural speech; see e.g. Mondloch 1978; Hofling 2000; Minkoff 2000; Can Pixabaj 2006; Vázquez Álvarez 2011). The broader lesson, which extends beyond word order in Mayan languages, is to develop diverse methods of data collection.

Given the factors described above, there is an inherent risk associated with relying too heavily on elicited judgments for non-naturally occurring examples. For Akatek, for example, Peñalosa (1987:283) writes that consultants presented with V-NP$_1$-NP$_2$ sequences with two third-person nominal arguments 'may give contradictory interpretations on different occasions, be confused, or say it depends on the context which is subject and which is object.' Likewise, in a controlled study of postverbal word order in Yucatec, Skopeteas and Verhoeven (2005) report a wide range of variation in interpretations assigned by participants to V-NP$_1$-NP$_2$ sentences, including ones in which the second argument is interpreted as a subconstituent of the first. The problem described here has been replicated in our own work with Ch'ol, and is articulated clearly by Larsen (1988), who writes of K'iche' that

> … even though my informants might, when presented with [certain constructed examples], accept these as good [VOS] sentences, they never seemed to produce such sentences spontaneously … similarly, even though my informants might accept sentences like [certain constructed examples] as well-formed [VSO] sentences, I have never encountered such sentences in texts (Larsen 1988:345).

Indeed, in Robinson's (2002:76) corpus study of Tenejapa Tseltal, he states that he has 'found little evidence in favor of the claim, first made by Smith (1975) and later cited by Norman and

Campbell (1978) and Dayley (1981), that Tenejapa Tzeltal constituent order is determined by a hierarchy of animacy.' On this topic, see also Polian's (2013) grammar of Oxchuc Tseltal.

When it comes to VOS/VSO-alternating languages, then, what DO speakers produce? In her larger survey, England (1991:464) concludes that once animacy is set aside, 'the general rule is that VOS is used when the S is definite and the O indefinite, while VSO is used when both S and O are definite.' Note that the crucial factor is the status of the OBJECT; the general preference for definite subjects in V-NP$_1$-NP$_2$ configurations may be connected to discourse constraints (DuBois 1987) and topicality, to which we return in section 6 below.

In his spoken corpus of 4,631 clauses, 909 of which are transitive, Robinson (2002) finds two naturally-occurring VSO sentences in Tseltal. In one, the constituent analyzed as the object is phonologically heavy (discussed in §6); in the other, shown in 13, the object appears with a determiner.

(13)   Ma ba s-tak'   xlok' j-k'atin   [$_S$ jo'tik   ]
       NEG   A3-be.possible AUX   A1-take.warmth.from   1PL.PRON
       [$_O$ te   j-ch'ultat-tik-e   ].
           DET   A1-holy.father-1PL-ENC
       'It is not possible for us to get out and warm ourselves in the sun.'
       (Tseltal; Robinson 2002:76)

The rest of the naturally-occurring examples with two postverbal arguments are VOS sentences. In all of the examples Robinson provides, the object is a determinerless NP, as in 14.

(14)   Ja'   nax laj jich, la laj s-ta   [$_O$ alchaxiltik   ] [$_S$ te   winik-e].
        EMPH only HS thus   PFV HS A3-find   orange.orchard   DET man-ENC
        'Thus it was, the man found an orange orchard.'   (Tseltal; Robinson 2002:61)

Below, we propose that it is the absence of D^0-level material on the object—including determiners, demonstratives, pronouns, and proper names—which triggers VOS in Ch'ol, and we develop a prosodic account for this pattern. We suggest, following Larsen (1988) and England (1991), that while elicitation is a valuable tool for ruling out ungrammatical examples,

care must be taken when evaluating judgments on constructed examples. In particular, based on our survey of reported word order variation across Mayan, we suggest that the absence of D⁰-level material on VOS objects (not DEFINITENESS or SPECIFICITY per se) is a grammatical fact to be accounted for in languages for which word order has been reported to be sensitive to definiteness/specificity.

We claim, however, that the reported effects of animacy result from processing considerations, and are not present in the mental grammars of speakers. This is in keeping with the fact that the effects of animacy are best supported by speakers' judgments of constructed examples (i.e. a processing task), rather than by naturally-produced sentences. We discuss specific examples of this for Ch'ol in the section that follows, and propose that animacy effects should not be considered in developing an account of the grammar of V1 order.[7]

3.4. VOS AND VSO IN CH'OL. Basic word order in Ch'ol is described as VOS (Vázquez Álvarez 2002, 2011; Coon 2010, 2017a), illustrated in the examples in 15.

(15)   a. Tyi i-kuch-u   [o si'   ] [s aj-Maria].
        PFV   A3-carry-SS   wood   CL-Maria
        'Maria carried wood.' (Coon 2010:355)
    b. Tyi   y-il-ä   [o x'ixik] [s wiñik].
        PFV   A3-see-SS   woman   man
        'The man saw the woman.'   (Ch'ol; Vázquez Álvarez 2011:21)

As the above examples show, VOS in Ch'ol is possible regardless of the animacy of the object; conversely, inanimate SUBJECTS are generally dispreferred, regardless of word order (see e.g. England 1991:449 and note 6). However, as discussed in detail in Coon 2010, VOS objects cannot be full DPs. This is shown by the ungrammaticality of the sentences in 16.

(16)   a. *Tyi   i-kuch-u   [o ili   si'   ] [s aj-Maria].
        PFV   A3-carry-SS   DEM wood   CL-Maria
        Intended: 'Maria carried wood.'   (Ch'ol; Coon 2010:355)

b. *Tyi   y-il-ä   [$_O$ jiñi x'ixik] [$_S$ wiñik].

    PFV   A3-see-SS   DET woman   man

    Intended: 'The man saw the woman.'   (Ch'ol)

One exception to this rule occurs when the subject undergoes heavy-NP shift, as shown in 17 below (see also section 6.2).

(17)   a. *Tyi   i-boñ-o   [$_O$ ili   otyoty] [$_S$ jiñi wiñik].

       PFV   A3-paint-SS   DEM house   DET man

       Intended: 'The man painted this house.'

    b. Tyi   i-boñ-o   [$_O$ ili   otyoty] [$_S$ jiñi wiñik ta'-bä   k'oty-i   ].

       PFV   A3-paint-SS   DEM house   DET man   PFV-REL arrive-SS

       'The man who arrived painted this house.'   (Ch'ol)

In general, however, determiners, demonstratives, and proper names are all rejected in VOS object position in Ch'ol (and free-standing pronouns too, though these generally only appear in preverbal positions). It is worth emphasizing that this restriction appears to pertain to the presence of D^0-level material, not semantic interpretation. As discussed in Coon 2010 and in section 6.1 below, BARE NOUNS in VOS object position may receive definite interpretations in Ch'ol, given an appropriate context. Possessed nouns and numerals—including the numeral *one*, which may appear with indefinites—also behave as bare NPs, and we assume following Coon (2010) that possessive phrases and numerals sit below the level of D^0.

If both arguments in a Ch'ol sentence are postverbal and the object is a full DP, the resulting order is VSO. This is shown in 18.

(18)   a. Tyi   i-kuch-u   [$_S$ aj-Maria] [$_O$ ili   si'   ] .

       PFV   A3-carry-SS   CL-Maria   DEM wood

       'Maria carried this wood.'

    b. Tyi   y-il-ä   [$_S$ aj-Pedro] [$_O$ jiñi w'iñik   ].

       PFV   A3-see-SS   CLF-Pedro   DET man

       'Pedro saw the man.'   (Ch'ol)

Note that in 18b, the subject is a proper name. If the immediately postverbal argument were instead a bare NP, a VOS interpretation would be most natural. By making the first postverbal argument a full DP, we rule out the possibility of a VOS reading (due to the restriction against DP objects in VOS). In 18a, the VOS reading is also ruled out for pragmatic reasons (wood does not carry women) and a general dispreference for inanimate subjects.

Vázquez Álvarez (2002) writes that animacy may influence the order of postverbal arguments, and provides the example in 19.

(19)   Tyi   y-il-ä   [s x'ixik] [o tyuñ].
        PFV   A3-see-SS   woman   rock
        'The woman saw the rock.'
        Not: 'The rock saw the woman.'   (Ch'ol; Vázquez Álvarez 2002:28)

We suggest that this interpretation arises due to the processing considerations outlined in section 3.2 above. This proposal is in keeping with Vázquez Álvarez's own account: he notes that, while speakers will offer a VSO interpretation, they insist that this interpretation sounds incorrect, and would only be said by someone who is learning Ch'ol or forgetting how to speak it (Vázquez Álvarez 2002:fn. 2).

As with animacy, the ban on full DPs in VOS object position may also affect how constructed sentences are evaluated by consultants. As Vázquez Álvarez (2011:22) notes in his description of the sentence in 20, 'a definite noun in the [immediately postverbal] position can also have an effect on the VOS reading… The noun with *li* is more readily interpreted as the subject, even if it is in the position usually reserved for the object' (Vázquez Álvarez 2011:22).

(20)   Tyi   y-il-ä   [li   wiñik] [x'ixik].
        PFV   A3-see-SS   DET man   woman
         'The man saw the woman.'
        ? 'The woman saw the man.'   (Ch'ol; Vázquez Álvarez 2011:22)

In other words, when presented with a sentence like 20, the hearer will reason that the immediately postverbal argument must be the subject, since DP objects are banned from VOS object position.

To summarize: in Ch'ol, we aim to provide an account for the generalization, reported in Coon 2010 and supported by naturally-produced data, that NP objects appear in VOS constructions, while DP objects appear in VSO (setting aside for now phonologically heavy subjects, which we tackle in §6). However, the discussion above has served to highlight that other factors may also play a role in how consultants evaluate constructed examples in Ch'ol. In particular, problems arise when consultants are asked to provide interpretations for V-NP$_1$-NP$_2$ sentences with two third-person arguments, as we also saw for other languages above. In what follows, we set processing considerations aside, specifically the role of animacy, and present a prosodic account of the contrast between NP and DP objects, restricting ourselves to sentences generated by the grammar.

4. PREVIOUS ACCOUNTS. In this section we examine previous analyses of the derivation of V1 orders in Mayan. We begin in section 4.1 by considering approaches that take V1 to be base-generated, as articulated in Aissen 1992 and assumed in much subsequent work on Mayan. In section 4.2, we discuss the proposal in Coon 2010 that V1 is derived by fronting of a maximal projection (containing the predicate and object) over the subject. We discuss challenges faced by these analyses before presenting in detail our head-movement account of V1 order.

4.1. RIGHT-SIDE SPECIFIERS. The standard approach to Mayan V1 base-generates VOS by placing the subject in a right-side specifier (Aissen 1992), as in 21.

(21)   Right-side specifier VOS
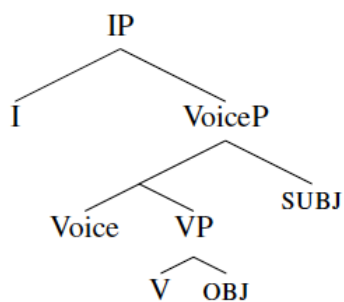
Aissen proposes that the linearization of specifiers is parameterized, such that specifiers of functional categories appear to the left (i.e. topic and focus), and specifiers of lexical categories to the right (i.e. postverbal subjects). Specifier parameterization also captures word order in the nominal domain, where *wh*-possessors precede the noun and all other possessors follow it.[8]

Aissen (1992:44) explicitly states that her account is not meant to capture variation in postverbal order. Nonetheless, an Aissen-style base-generation approach does allow for the derivation of VSO via object post-posing to a right-side specifier, as in 22. Such an approach is also in line with suggestions in Norman 1977, discussed in Larsen 1988 and England 1991.

(22)   Right-side specifier VSO
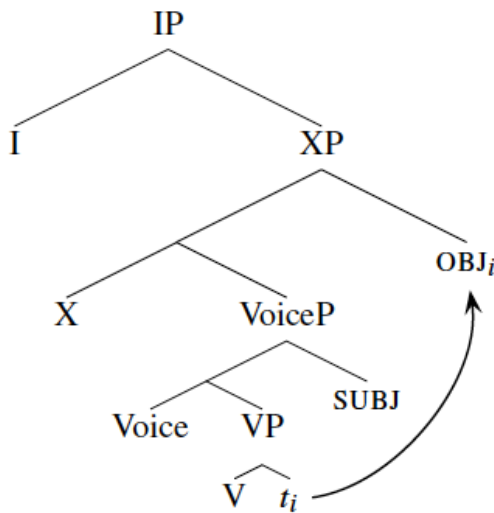
This type of derivation for VSO is discussed in detail in Chung 2006, 2017, Clemens & Polinsky 2017, and Coon 2010. From a pan-Mayan perspective, base-generating subjects in a right-side specifier is a natural approach to languages that are predominately VOS, but presents complications for rigid-VSO languages like Q'anjob'al and Mam.

4.2. VP-FRONTING. Coon (2010) argues for a predicate-fronting account of the VOS/VSO patterns described for Ch'ol in section 3.4 above. Drawing on Massam's (2001) account of similar alternations in the Polynesian language Niuean—in which VOS also occurs with NP objects, and VSO with DP objects—Coon proposes that bare NP objects remain internal to the *v*P, which fronts to Spec,IP, as in 23.

(23)   Predicate-fronting VOS
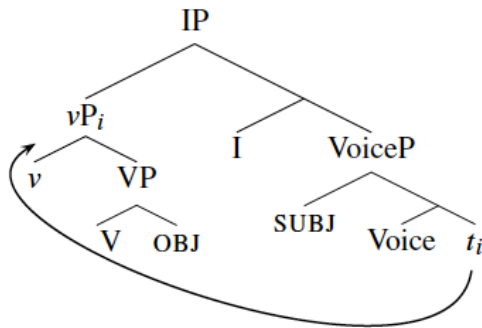
When the object is a full DP, it must evacuate the VP to a position below the subject—here labelled 'AbsP', since for Massam it is the locus of absolutive case—in a process akin to Object Shift in Germanic languages (Holmberg 1986). The remnant VP fronts, resulting in the VSO shown in 24.

(24)   Predicate-fronting VSO
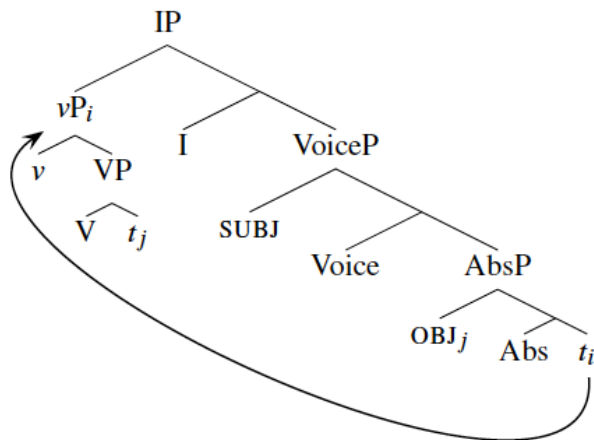
Coon (2010) uses the placement of adjuncts to demonstrate that NP objects and DP objects occupy different structural positions in Ch'ol. As shown in 25a, an adjunct like *abi* 'yesterday' can intervene between the verb and a full DP object, but it cannot intervene between the verb and an NP object, as in 25b. Instead, the adverb must follow the NP object, as in 25c. The placement of these adverbs is consistent with the fact that the verb and the object form a surface constituent in VOS clauses.[9]

(25) a. Tyi k-wuts'-u   **abi**   [DP ili   pisil   ].

PFV A1-wash-SS yesterday   DEM clothes

'I washed these clothes yesterday.'

b. *Tyi   k-wuts'-u   **abi**   [DP pisil   ].

PFV   A1-wash-SS yesterday   clothes

Intended: 'I washed clothes yesterday.'

c. Tyi   k-wuts'-u [DP pisil   ] **abi.**

PFV   A1-wash-SS   clothes yesterday

'I washed clothes yesterday.'   (Ch'ol; Coon 2010:367)

While this account provides a clear connection between the NP/DP status of the object and VOS/VSO word order, it—like the right-side-specifier account above—would be difficult to extend to a rigid-VSO language like Q'anjob'al or Mam. Specifically, it is unclear how children would acquire predicate-fronting if it were consistently REMNANT predicate fronting. This account also faces several additional problems, summarized here, which our head-movement account addresses.

First, as seen already in some of the examples above, verb stems across Mayan contain a series of suffixes, including voice and status suffixes, as shown by the Ch'ol verb forms in 26.

(26) a. Tyi wäy-**is-äñ-ty-i**   jiñi ñeñe'.

PFV sleep-CAUS-SUF-PASS-SS DET baby

'The baby was put to sleep.'

b. Tyi ch'äx-**beñ-ty-i**   ja'   aläl.

PFV boil-APPL-PASS-SS water child

'Water was boiled for the child.'   (Ch'ol; Vázquez Álvarez 2011:30)

Recall from 23 above that in order to derive VOS in Ch'ol, Coon (2010) excludes the external argument from the fronted XP predicate. To achieve this, she specifically locates the status suffix in *v*P (i.e. our SSP) BELOW the projection which introduces the subject (Spec,VoiceP). However, taking the order of suffixes on the stem to reflect the order of syntactic derivation, in accordance with the MIRROR PRINCIPLE (Baker 1985), there is reason to believe that the projection which

hosts the status suffix is located ABOVE the projection that introduces the external argument (Coon et al. 2014; Armstrong 2017).[10] Consider the unaccusative/transitive alternation in 27.

(27) a. Tyi wäy-**i** ñeñe'.
         PFV sleep-SS baby
         'The baby slept.'
      b. Tyi i-wäy-**is-ä**   ñeñe' x-k'aläl.
         PFV A3-sleep-CAUS-SS baby   CLF-girl
         'The girl put the baby to sleep.'   (Ch'ol)

A reasonable approach to deriving the causative in 27b would be to posit that the external argument is introduced in the specifier of the causative Voice head (per Pylkkänen 2002). Head movement of the verb root through Voice^0 to SS^0, as outlined in section 2 above, results in the correct order of morphemes on the stem, as shown in 28.[11] Following Coon to 2017b, we assume that ergative agreement prefixes arise via a local agreement relationship between the in-situ subject and a low functional head, i.e. Voice^0.

(28)   Head-movement to *v*P
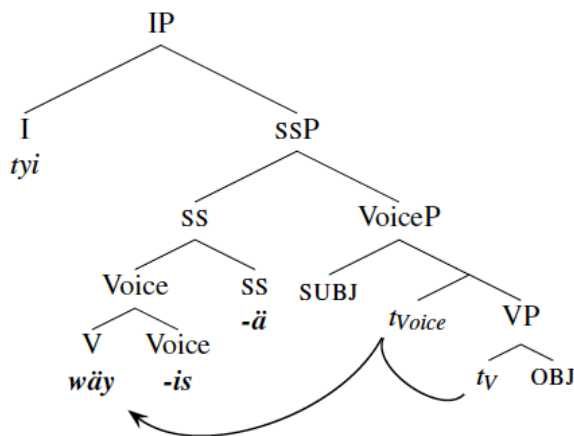
Now, however, we encounter a problem for a predicate-fronting account of word order. Note that in 28, there is no maximal projection XP containing the verb and the object but NOT THE SUBJECT, which could front to derive VOS. Furthermore, if head-movement is independently

necessary, i.e. to form the stem, it is not obvious what might then trigger XP-fronting of the verbal projection (to derive VOS) in the first place.

Second, in addition to the question of WHAT raises, it is also unclear WHERE the XP predicate raises to. Coon (2010) proposes that the predicate fronts to Spec,IP, but $Infl^0$ is typically taken to be occupied by a TAM marker which appears to the LEFT of the verb stem (Aissen 1992; see §2). Some TAM markers are clitics, and their ordering could perhaps be parameterized. Others TAM markers, however, are free-standing words that may themselves host clitics; in the Ch'ol example in 29, the free-standing perfective morpheme *tsa'* hosts second-position affirmative and reportative clitics.

(29) **Tsa'**=äch=bi   i-mel-e   waj   aj-Maria.
       PFV=AFF=REP   A3-make-SS   tortilla   CLF-Maria
       'Apparently Maria did indeed make tortillas.'   (Ch'ol)

Clitic placement in HIGH-ABS languages like Chuj (see 3b above) provides a similar kind of evidence. Recall that, in Ch'ol, the Set B clitic appears stem-finally, while in Chuj, it appears between the TAM marker and the verb stem.

The fact that clitics consistently intervene between TAM markers and the stem suggests that the verb stem is fronting to a position below $Infl^0$ (but above the subject). Under an XP-fronting account, the fronted predicate would have to raise to the specifier of some other position, below the TAM marker and above the subject. While this is in principle plausible, one of the original goals of Massam's (2001) and Coon's (2010) work was to connect predicate fronting to Spec,IP to an EPP feature on $Infl^0$ (which requires DPs in a language like English, but predicate XPs in Niuean and Ch'ol); this connection can no longer be maintained under a putative XP-fronting account. Our own proposal, on the other hand, represented in 28 above, posits head-movement of the verb stem to the position of the status suffix: the final suffix on the complex head that forms the verb stem. This proposal derives exactly the right configuration as predicted by morpheme order.

Finally, as discussed in Clemens 2014, 2017 it is difficult to reconcile a predicate-fronting approach of V1 with certain accounts of ergative extraction restrictions. For example, Coon, Mateo Pedro, and Preminger (2014) propose that, in languages in which the A'-extraction

of ergative subjects is restricted, objects raise to a position above the subject, which traps the subject inside the *v*P-phase, because by hypothesis, there is only ONE *v*P-phase escape hatch. If this is so, XP-fronting of a predicate should also trap subjects, because the fronted XP would also cycle through the one available escape hatch. Ch'ol, however, is a language which freely permits the extraction of ergative arguments. Again, the head-movement account outlined in section 2 and illustrated in 28 does not face this problem: the verb undergoes head movement up to the SSP phase edge and, in Ch'ol, the subject XP can still freely extract.

5. HEAD-RAISING AND VOS. Having reviewed problems with existing accounts, we now turn to a new approach to VOS/VSO alternations in Ch'ol that (i) accounts for the position of the verb via a series of head movements in the syntax (see §2) and (ii) motivates VOS in clauses with NP objects with a constraint on prosodic well-formedness that requires the verb and its complement to be phrased together. Because full DP complements are spelled out as phases, they are not subject to prosodic reordering.

Acoustic data from Ch'ol support our prosodically driven analysis. Clemens and Coon (2018) argue that verb-initial clauses in Ch'ol exhibit the prosodic constituency schematized in 30, where φ indicates a phonological phrase:

(30)   Prosodic phrasing of VSO and VOS clauses in Ch'ol
    a. (V)φ (S)φ (O)φ
    b. (V O)φ (S)φ

As 30 shows, the verb and the object form a prosodic unit in VOS clauses, whereas each of the major sentential constituents is parsed into a unique prosodic phrase in VSO clauses. This analysis holds for both unmodified arguments and those modified by prenominal adjectives and reduced relatives, such as *ch'äjyem* 'sad' and *jujp'em=bä* 'fat=REL' (Clemens & Coon 2018). No data has been collected on the prosodic realization of either post-nominal or stacked modifiers.

The analysis given in 30 is motivated in part by intonational differences between VSO and VOS clauses. Whereas verbs in VSO clauses exhibit pitch peaks, verbs in VOS clauses do not. Compare Figures 1 and 2, both taken from Clemens & Coon 2018.[12]

FIGURE 1. Pitch contour of a VSO clause

FIGURE 2. Pitch contour of a VOS clause

As high boundary tones (H%) mark the right edge of non-final φ-phrases in Ch'ol, the absence of a H% on the verb in cases where the clause surfaces in VOS order suggests that there is no φ-phrase boundary between the VOS verb and its object. Additional supporting evidence comes from duration and the distribution of pauses (see Clemens & Coon 2018 for more details).

In the remainder of this section, we argue that this prosodic phrasing provides important information about the derivation of V1 orders in Ch'ol. Then, in section 6, we discuss testable predictions made by our account and amass some support for our claims from existing data. We begin here in section 5.1 by framing our account with background on PSEUDO NOUN INCORPORATION (PNI), the original impetus for Clemens' (2014, 2017) prosodic analysis, on which our account draws. We discuss similarities and differences between traditional PNI constructions and Ch'ol VOS before establishing the prosodic background for our proposal in section 5.2. Sections 5.3 and 5.4 present our account of VOS and VSO in Mayan.

5.1. PNI BACKGROUND. The proposal developed here is based on Clemens' (2014, 2017) account of Niuean (a Polynesian language). As noted in section 4.2 above, Niuean, like Ch'ol, exhibits VOS with bare NP objects and VSO with full DP objects. Furthermore, though the acoustic cues differ, Niuean shows the same basic difference in prosodic phrasing between VSO and VOS illustrated for Ch'ol in 30 above (Clemens 2014, 2017). However, while Ch'ol is described as basically VOS (§3.4), Niuean is basically VSO (Massam 2001). A Niuean transitive VSO sentences is shown in 31a. VOS sentences arise in marked environments, in so-called pseudo-noun incorporation (PNI) structures (Massam 2001), as illustrated in 31b.

(31) a. Ne kai [₍S₎ he pusi] [₍O₎ ia e moa].
          PST eat ERG cat   that ABS bird
          'The cat ate the bird.'   (Niuean; Massam 2001:155)
       b. Ne inu [kofo kono] [₍S₎ e Mele].
          PST drink coffee bitter   ABS Mele
          'Mary drank bitter coffee.'   (Niuean; Massam 2001:158)

PNI constructions like 31b are formally INTRANSITIVE: the subject is marked as absolutive instead of ergative, while the incorporated element in PNI constructions—*kofe kono* in 31b—is interpreted as nonspecific and non-referential (Massam 2001).

The Niuean PNI construction is reminiscent of the INCORPORATION ANTIPASSIVE found in some rigidly VSO Mayan languages, including the Q'anjob'alan languages Popti' (Craig 1979), Akatek (Zavala 1992), Q'anjob'al (Mateo Toleo 2008), and Chuj (Maxwell 1976). Compare the Q'anjob'al transitive in 32a with the incorporation antipassive in 32b.

(32)   a. Max s-tzok' [$_S$ naq winaq] [$_O$ te' si'   ].
           PFV   A3-chop   CLF man   CLF wood
           'The man cut the wood.'
        b. Max tzok'-w-i   [si'   ] [$_S$ naq winaq].
           PFV   chop-AP-SS   wood   CLF man
           'The man cut wood.'   (Q'anjob'al)

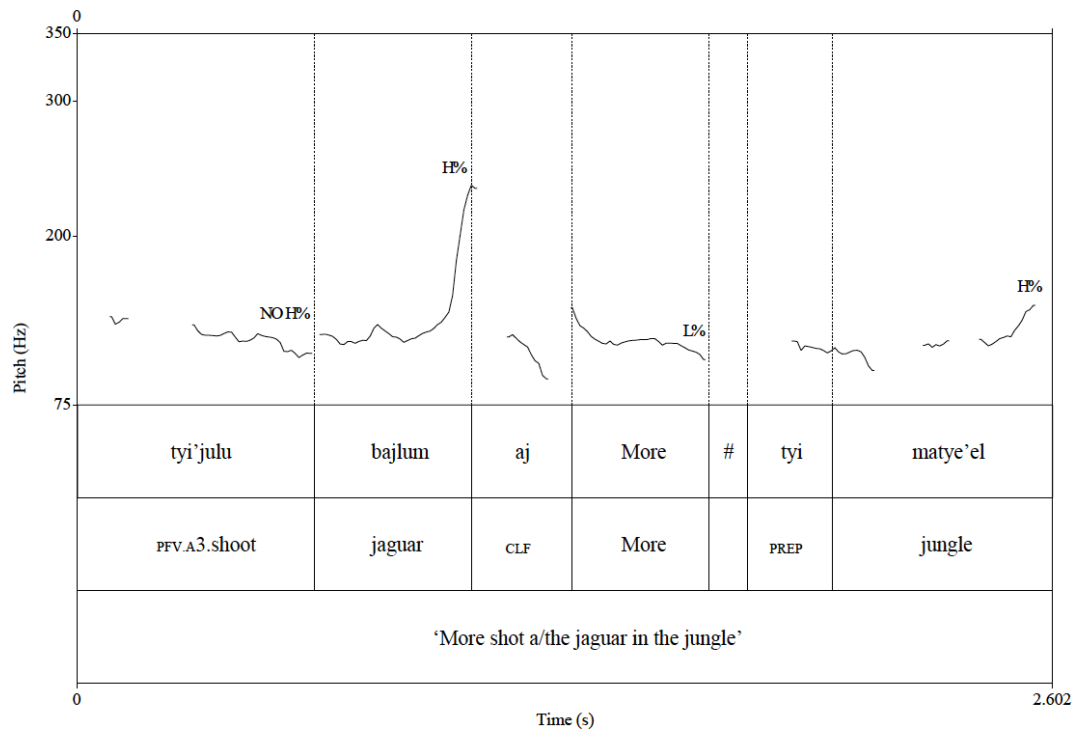As in Niuean PNI, the Q'anjob'alan incorporation antipassive in 32b occurs only with nonreferential, nonspecific objects (Maxwell 1976). The notional object must be adjacent to the verb, which is formally intransitive. In 32b, the verb appears with the intransitive status suffix *-i* and, as in Niuean PNI, the subject is absolutive (recall that third-person absolutive in Mayan is unmarked). Also as in Niuean, the incorporated element need not be a bare root, but may include certain modifiers, as discussed in detail by Maxwell (1976) for Chuj.

Both Niuean in 31 and Q'anjob'al in 32 are thus languages with basic VSO orders, in which VOS can be derived by pseudo-incorporating a non-referential phrasal NP object. The resulting constructions can be described schematically as VOS, since the notional patient appears immediately after the verb. However, simply labeling these as VOS misses the larger generalization that in both Niuean and Q'anjob'al constructions are formally intransitive. This configuration is UNLIKE the situation in Ch'ol, described in section 3.4 above, in which VOS is not pragmatically marked, the object may be referential and definite, and the subject patterns with other transitive subjects in triggering Set A (ergative) agreement on the verb. A Ch'ol VOS example is repeated in 33.

(33) Tyi y-il-ä   [_O x'ixik] [_S wiñik].
      PFV A3-see-TV woman   man
      'The man saw the woman.'   (Ch'ol; Vázquez Álvarez 2011:21)

The general picture is summarized in Table 1. What Ch'ol, Q'anjob'al, and Niuean all share in common is that word order alternates based on the status of the object: in all three languages, VOS order is found with bare NP objects, and VSO order is found with full DP objects. Variation is found in the status of the VOS "object": in Ch'ol, the postverbal NP behaves as a true argument of the verb, while in Q'anjob'al and Niuean it does not.

CH'OL	NIUEAN, Q'ANJOB'AL
VSO order • object = DP • formally transitive	VSO order (= "basic") • object = DP • formally transitive
VOS order (= "basic") • object = NP • formally **transitive**	VOS order • object = NP • formally **intransitive**
NP language • **allows** bare NPs as true arguments	DP language • **disallows** bare NPs as true arguments

TABLE 1. Word order and transitivity

Despite the differences between the Niuean PNI and Q'anjob'alan incorporation antipassive constructions, on the one hand, and Ch'ol VOS, on the other hand, we argue that the crucial factor underlying VOS order in all three languages is THE ABSENCE OF D^0-LEVEL MATERIAL ON THE OBJECT. We propose that the difference in transitivity lies in whether bare NPs may serve as true arguments of the verb; in other words, whether the language is an "NP language" or a "DP language" in the terminology of Bošković 2008 (see Chierchia 1998, Bošković 2008, and references cited therein on languages that allow bare NPs as true arguments).[13] In Ch'ol—as in many alternating VOS/VSO Mayan languages, including Tseltal in 13, discussed further in section 6—bare NPs occur frequently in both subject and object position and behave as true arguments of the verb (i.e. we assume they may be of type <e> and combine with the predicate via FUNCTIONAL APPLICATION). Unlike in Q'anjob'al and Niuean, bare NPs in

Ch'ol may be referential, individuated, and definite. Compare the Ch'ol example in 33 with the Q'anjob'al example in 34b, in which a bare object is judged ungrammatical in a full transitive construction (nominal classifiers CLF have an article-like function in Q'anjob'alan languages, see Craig 1986, Zavala 2000, Royer 2016).[14]

(34) a. Max s-be'   [s ix ix   ] [o ixim b'utx].
          PFV   A3-make   CLF woman   CLF   tortilla
          'The woman made the tortillas.'
      b. *Max   s-be'   [s ix ix   ] [o b'utx].
          PFV   A3-make CLF woman   tortilla
          Intended: 'The woman made tortillas.'   (Q'anjob'al)

Niuean and Q'anjob'al do not generally allow bare NPs as arguments, and we assume that unlike in Ch'ol, the bare-NP complements in Niuean in 31 and Q'anjob'al in 32 combine with their predicates via the mode of semantic composition known as RESTRICT (Chung & Ladusaw 2003); the so-called objects in these constructions are not true arguments of the verb (hence the intransitive verb morphology), but serve to restrict the denotation of the predicate, rather than saturate an argument slot (see Coon 2017c on Chuj). What is crucial from the point of view of the current paper, is that the NPs in question are nonetheless syntactic complements which are selected by the verb, and thus may be subject to the ARGUMENT-φ constraint introduced below.

Though a full account of PNI/incorporation-antipassive constructions is beyond the scope of this paper (and see also Mithun 1984, Rosen 1989, Dayal 2011), we suggest that this proposal has the potential to explain variation in transitivity and semantic status of the apparent internal argument, while providing a unified account of word order alternations. It also makes the following prediction, to be tested in future work: all else being equal, whether or not PNI-type constructions alter the transitivity of the predicate should correlate with whether bare NPs may serve as true arguments. We return to further predictions of this proposal in section 6, after describing the derivations of VOS and VSO structures, below.

5.2. MATCH CONSTRAINTS AND ARGUMENT-φ. Our account of Ch'ol VOS finds its basis in MATCH THEORY (Selkirk 2011), an indirect-reference theory of the syntax-phonology interface.

Indirect-reference theories maintain that phonological rules apply to prosodic domains built on syntactic structures, as opposed to applying to syntactic domains directly. MATCH THEORY addresses positive evidence for the existence of recursion in prosodic structure building (Elfner 2015; Féry 2011; Féry and Truckenbrodt 2015; Itô and Mester 2010; Wagner 2005, 2010) using syntax-prosody isomorphism (enforced via MATCH Constraints) as a springboard. MATCH Constraints are input-output correspondence constraints (McCarthy and Prince 1995) that call for a correspondence between syntactic constituents (the input) and prosodic constituents (the output) at the three levels specified in 35.

(35)   a. MATCH-ι:

CP/IPs correspond to intonational phrases (ι-phrases) and vice versa.

b. MATCH-φ:

Syntactic XPs correspond to phonological phrases (φ-phrases) and vice versa.

c. MATCH-ω:

Syntactic X^0s correspond to prosodic words (prosodic-ωs) and vice versa.

Selkirk's MATCH constraints are construed as violable in the context of OPTIMALITY THEORY (Prince and Smolensky 1993), which allows MATCH THEORY to capture instances where syntactic and prosodic structure fail to correspond. For example, if a constraint pertaining to prosodic well-formedness outranks a MATCH constraint, syntax-prosody nonisomorphism is a likely result.

Following from our proposal that all V1 structures are derived via head-raising, surface VSO word order is necessarily more isomorphic to the syntactic input than surface VOS order. Therefore, in order for VOS order to surface, VOS order must satisfy a prosodic well-formedness constraint that outranks at least one of the series of MATCH constraints. Under our account, the relevant prosodic well-formedness constraint is ARGUMENT-φ (Clemens 2014, 2017), which requires that the verb and its complement be phrased together.[15]

(36)   ARGUMENT CONDITION ON PHONOLOGICAL PHRASING (to be revised):

A head and its internal argument(s) must be adjacent sub-constituents of a phonological phrase (φ-phrase).

ARGUMENT-φ captures the intuition that head-argument pairs should be phrased together. This intuition about the relationship between syntactic and prosodic structure is found in a variety of constraints throughout the prosodic literature including Selkirk's (1984) SENSE UNIT CONDITION, Truckenbrodt's (1999, 2007) WRAP-XP constraint, Henderson's (2012) COMPLEMENT-φ constraint, and Richards' (2016) SELECTIONAL CONTIGUITY. See Clemens (2014) for a discussion about the relationship between ARGUMENT-φ and these other proposals.

Before implementing the basic intuition that head-argument pairs should be phrased together in the context of our particular framework, we need to address a foundational question: how does the prosodic component of the grammar recognize that a verb and an object are members of a head-argument pair, especially since they do not form a syntactic constituent in the input (since the verb has undergone head movement)?[16] This issue is discussed at length in Clemens 2014, 2017 where it is resolved by (i) treating CATEGORIAL SELECTION (C-SELECTION) as an instance of AGREE (Emonds 2000; Adger and Svenonius 2011, a.o.) and (ii) adopting a feature-sharing approach to AGREE (Pesetsky and Torrego 2007). Adopting this AGREE framework allows the prosodic grammar to reference head-argument pairs via lexical class features (which many scholars argue the prosody must be able to 'see' in any case, e.g. Kaisse 1985; Nespor and Vogel 1986; Smith 1997, 2011; see also Clemens 2014, 2017 for a more detailed discussion of this solution).[17,18]

With these technologies in place, we can revise the definition of ARGUMENT-φ as in 37 to allow the prosodic component of the grammar to make reference to head-argument pairs, even when the selecting head has moved out of the position in which it selected its internal arguments.[19]

(37)   ARGUMENT CONDITION ON PHONOLOGICAL PHRASING (final version):
   A head H^0 with a categorial feature [C] and head C^0 with the same [C] feature must
       constitute a φ-phrase.

The next section demonstrates how ARGUMENT-φ interacts with the series of MATCH constraints in such a way that causes the object to shift to a position where it can be pronounced in the same φ-phrase as the verb. As we discuss in more detail in the following sections,

ARGUMENT-φ only applies to bare NP objects; DPs are assumed to be phases and are sent to SPELL-OUT before ARGUMENT-φ would apply (see §5.4).

5.3. DERIVING VOS. By hypothesis, all verb-initial clauses in Ch'ol result from head-movement of the verb. As such, VSO is shown as the input to the prosodic component of the grammar in the tableaux below. Any time the verb selects a bare NP, the output is a VOS clause with the basic prosodic structure of 30b, namely (V O)φ (S)φ. Example 38 shows a side-by-side comparison of the underlying syntax (input) and corresponding prosodic structure (output) of a VOS clause.

(38)   Syntactic input and prosodic output of VOS order[20]
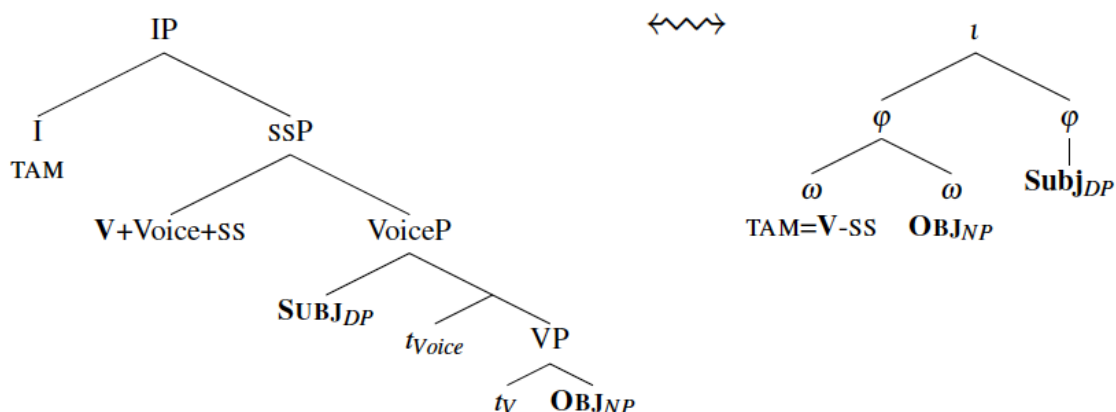
The first step in accounting for the difference between the input and the output of VOS clauses is to appeal to ARGUMENT-φ, given in 37 above. The tableau in 39 illustrates the role of ARGUMENT-φ in deriving VOS order, putting aside (for the moment) the different ways a VOS clause might be assigned prosodic structure. More specifically, 39 includes two versions of the output of a Ch'ol sentence with a bare NP object: the first candidate 39a shows a strictly isomorphic representation of the input (VSO) while the second candidate 39b shows an alternative, non-isomorphic structure that satisfies ARGUMENT-φ by shifting the object to the input location of the verb (VOS).[21]

(39)

Input: [$_{vP}$ Verb [$_{VoiceP}$ [$_{DP}$ Subject] [$_{VP}$ [$_{NP}$ Object]]]]	ARG φ	MATCH (φ, XP)	MATCH (XP, φ)
a. (Verb (Subject)φ(Object)φ)ι	*!		
b. ☞ ((Verb Object)φ(Subject)φ)ι		*	*

ARGUMENT-φ is ranked higher than the MATCH constraints in 39, so the strictly isomorphic VSO output is correctly ruled out.[22]

Now that we have shown how ARGUMENT-φ rules out VSO order when the object is an NP, we turn our attention to alternative ways of prosodifying a VOS clause. In addition to the prosodic phrasing illustrated by the attested candidate 39b, it is also possible to satisfy ARGUMENT-φ with nested prosodic constituents, as shown in 40.

(40)

Input: $[_{vP}$ Verb $[_{VoiceP} [_{DP}$ Subject$]$ $[_{VP} [_{NP}$ Object$]]]]]$	ARG φ	MATCH (φ, XP)	MATCH (XP, φ)
a. ☹ ((Verb Object)φ(Subject)φ)ι		*	*!
b. (((Verb)φ (Object)φ)φ(Subject)φ)ι		**!	
c. ☞ ((Verb (Object)φ)φ(Subject)φ)ι		*	

For candidate 40c, the object corresponds to a φ-phrase nested inside another φ-phrase containing the verb and the object. Here, nesting the object does not incur a violation of MATCH (XP, φ): bare objects are phrasal in Ch'ol and XPs are predicted by MATCH THEORY to correspond to φ-phrases. The same is true for candidate 40b. However, candidate 40b incurs an additional violation of MATCH (φ, XP), because the verb does not correspond to an XP-constituent in the syntax.

In contrast, the attested phrasing of candidate 40a violates MATCH (XP, φ) because the object is not realized in its own φ-phrase. However, unlike the winning candidate 40c, the attested candidate 40a satisfies an additional eurythmic constraint known to be high-ranked in many languages: STRONG START (Bennett et al. 2016; Elfner 2012, 2015; Selkirk 2011; Werle 2009).

(41)   STRONG START (Selkirk 2011):
        A prosodic constituent optimally begins with a leftmost daughter constituent which is not lower in the prosodic hierarchy than the constituent that immediately follows.

Candidate 40c violates STRONG START: because the φ-phrase comprising the verb and the object contains two prosodic sub-constituents, the first of which is lower on the prosodic hierarchy than the second (ω < φ). The prosodic structure of candidate 40c is shown below:

(42) Prosodic structure of candidate c from 40

φ-phrase violating ⟶ STRONG START

```
                          ι
                    ┌─────┴─────┐
                  [φ]           φ
               ┌───┴───┐        │
               ω       φ      Subj_DP
           TAM=V-SS  OBJ_NP
```
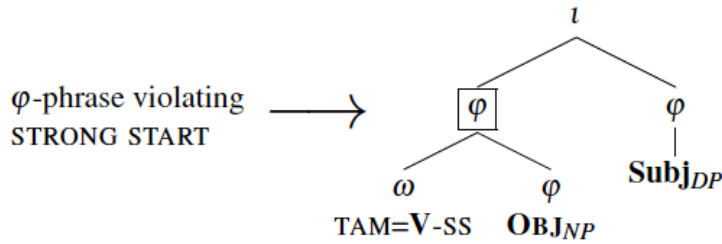
Candidate 40a does not incur a violation of STRONG START: the two prosodic constituents corresponding to the verb and the object in this candidate are equal on the prosodic hierarchy (ω = ω). Likewise, candidate 40b also satisfies STRONG START, because the verb and the object are realized as equal prosodic constituents (φ = φ).

(43) Prosodic structure of candidates a and b from 40

```
a.                ι                    b.                ι
            ┌─────┴─────┐                         ┌─────┴─────┐
            φ           φ                         φ           φ
        ┌───┴───┐       │                     ┌───┴───┐       │
        ω       ω     Subj_DP                 φ       φ     Subj_DP
     TAM=V-SS OBJ_NP                       TAM=V-SS OBJ_NP
```
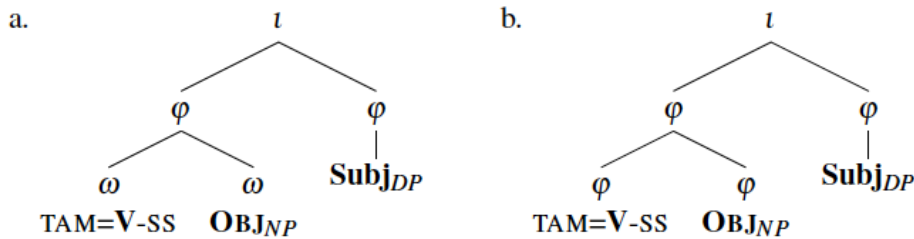
Putting it all together, when STRONG START is added to the analysis, the candidate with the fewest MATCH violations–candidate 44c–is ruled out, correcting the problem with the tableau in 40. Neither candidate 44a nor candidate 40b violate STRONG START, but candidate 44b incurs one more violation of MATCH (φ, XP) than candidate 44a does. Thus, with the addition of high-ranked STRONG START, the constraints and their relative ranking correctly predict that the VOS clause with the attested prosodic structure will surface.

(44)

Input: [$_{vP}$ Verb [$_{VoiceP}$ [$_{DP}$ Subject] [$_{VP}$ [$_{NP}$ Object]]]]]	STR START	ARG φ	MATCH (φ, XP)	MATCH (XP, φ)
a. ☞ ((Verb Object)φ (Subject)φ)ι			*	*
b. (((Verb)φ (Object)φ)φ (Subject)φ)ι			**!	
c. ((Verb (Object)φ)φ (Subject)φ)ι	*!		*	

Support for the fact that STRONG START is highly ranked in Ch'ol comes from the fact that it is also satisfied in VSO constructions, where the prosodic constituents corresponding to the verb and the subject are equal on the prosodic hierarchy ($\varphi = \varphi$), as shown in 30 above. The fact that the verb in VSO clauses constitutes its own φ-phrase was illustrated by the H% in Figure 1. This observation about the prosodic realization of VSO clauses brings us to the question of why VSO ever surfaces in a language where ARGUMENT-φ is highly ranked.

5.4. VSO REVISITED. Recall that a successful account of the Mayan data must allow VSO to surface when an object contains D^0-level material. In other words, ARGUMENT-φ fails to affect the output of a transitive clause with a DP object.

In accounting for the fact that underlying VSO is allowed to surface with DP objects, we appeal to MULTIPLE SPELL-OUT (Uriagereka 1999); specifically, we adopt the proposal that the syntactic derivation is transferred to the interfaces in stages. We articulate this proposal according to PHASE THEORY (Chomsky 2000, 2001), which maintains that phase heads determine the process of syntactic transfer to the interfaces. We adopt the position that minimally D^0, v^0 and C^0 are phase heads (Chomsky 2001; Dobashi 2003; Svenonius 2004; Hiraiwa 2005).[23] Subsequently, our account treats clausal complements like DP complements, correctly predicting that they can be separated from their selecting head by the matrix subject.[24]

When a phase head enters the derivation, a portion of the derivation—the SPELL-OUT DOMAIN—is sent to the interfaces. The spell-out domain consists of a phase head and its complement (Svenonius 2004) and is transferred to the interfaces when the next phase head enters the derivation (Chomsky 2001).

One of the things that happens at spell-out is that syntactic constituents are assigned prosodic structure (Ishihara 2007; Kahnemuyipour 2004; Kratzer & Selkirk 2007). This process involves evaluating prosodic constraints; we assume that constraints on prosodic well-formedness are evaluated at each spell-out cycle. For example, a syntactic phrase might map onto a φ-phrase in one spell-out cycle, but then be reassigned prosodic-ω status in a subsequent cycle, in order to repair a new violation of a eurythmic constraint like STRONG START.

Prosodic well-formedness may be reevaluated every time new material spells out, but the fact that syntactic features become INVISIBLE after prosodic structure is FIRST assigned crucially affects the way certain prosodic constraints influence the surface form of an utterance. Take

ARGUMENT-φ as an example: in the previous section, we argued that the prosodic component of the grammar references lexical category features when evaluating compliance with ARGUMENT-φ. Prosodic constraints that reference syntactic features, like ARGUMENT-φ, will not be able to see the potentially relevant syntactic features once prosodic structure has been assigned. The consequence of deleting syntactic features at spell-out is that if a head and its internal argument are spelled-out in different spell-out cycles, ARGUMENT-φ will only be able to see ONE instantiation of the relevant lexical feature at a time. In order for ARGUMENT-φ to be active, two syntactic heads with the same categorial feature [C] must be SIMULTANEOUSLY visible to PF.

NP objects, unlike DP objects, do not include a phase head, so their spell-out is not triggered until C^0 enters the derivation. As a result, both instantiations of the categorial feature relevant to ARGUMENT-φ (one associated with the object and one with the verb root) are visible to PF during the same spell-out cycle. The tableau in 45 indicates how the timing of spell-out cycles influences the presence or absence of lexical features relevant to the assessment of ARGUMENT-φ in a VOS clause. Note that output material that was assigned prosodic structure BEFORE completion of the derivation is crossed out (in this case, the subject DP). Lexical features—relevant to the evaluation of ARGUMENT-φ—are shown in bold subscript in the input. These lexical features are also indicated in the output candidates, but ONLY if they were not deleted in an earlier spell-out cycle.

(45)

Input: $[_{vP}$ Verb$_N$ $[_{VoiceP}$ $[_{DP}$ Subject$_D$] $[_{VP}$ $[_{NP}$ Object$_N$]]]]]	STR START	ARG φ	MATCH (φ, XP)	MATCH (XP, φ)
a. $\quad$ ((Verb$_N$)φ (~~Subject~~)φ (Object$_N$)φ)ι		*!	*	
b. $\quad$ ((Verb$_N$ (Object$_N$)φ)φ (~~Subject~~)φ)ι	*!		*	
c. $\quad$ (((Verb$_N$)φ (Object$_N$)φ)φ (~~Subject~~)φ)ι			**!	
d. ☞ $\quad$ ((Verb$_N$ Object$_N$)φ (~~Subject~~)φ)ι			*	*

In contrast, clauses that surface as VSO contain DP objects. Because DP objects include a phase head, their spell-out is triggered earlier than NP objects. Specifically, the spell-out of DP objects is triggered by the introduction of the next phase head v^0. This means that in clauses with a DP object, the two instantiations of the relevant categorial feature are never visible to PF at the same time. This is shown in 46, where, as before, material that has already been assigned

prosodic structure is crossed out. Lexical features that would have been relevant to the evaluation of ARGUMENT-φ had they been visible to PF are not shown.

(46)

Input: [$_{vP}$ Verb$_D$ [$_{VoiceP}$ [$_{DP}$ Subject$_D$] [$_{VP}$ [$_{DP}$ Object$_D$]]]]]	STR START	ARG φ	MATCH (φ, XP)	MATCH (XP, φ)
a. (Verb$_D$ (~~Subject~~)φ (~~Object~~)φ)ι	*!			
b. ☞ ((Verb$_D$)φ (~~Subject~~)φ (~~Object~~)φ)ι			*	
c. ((Verb$_D$ ~~Object~~)φ (~~Subject~~)φ)ι			*	*!

The constraints STRONG START, ARGUMENT-φ, and the relevant MATCH constraints as ranked in (45) and (46) above—in coordination with a feature-sharing approach to CATEGORIAL SELECTION and MATCH THEORY—result in the attested prosodic phrasing of both VOS and VSO.

5.5. INTERIM SUMMARY. In the preceding sections, we argued for a consistent syntactic derivation of Mayan V1, with a particular focus on Ch'ol: we proposed that the verb undergoes head movement up through Voice^0 and any other stem-forming heads (e.g. valence-related heads), landing in the specifier of the projection that hosts the status suffix, SS^0. This places the verb stem above the transitive subject and below the TAM marker, deriving TAM–V–S–O order. This syntax, we propose, underlies both VSO and VOS clauses.

We also argued that, at least for Ch'ol VOS, the bare NP object is reordered post-syntactically to satisfy a high-ranked prosodic constraint—ARGUMENT-φ—which requires that the verb and its selected object be pronounced in the same phonological phrase. DP objects have been spelled out as phases, and are thus not subject to ARGUMENT-φ. This analysis provides a natural account of the fact that objects in Ch'ol VOS constructions must be bare NPs, while objects in VSO are full DPs. At the same, the analysis presented here formalizes both (i) the commonly expressed intuition that head-argument pairs comprise a prosodic unit and (ii) the well-established pattern among Mayan and Polynesian languages that NP arguments, as compared to DP arguments, display a particularly close relationship to the predicate (see Massam 2001 for Niuean; Ball 2009 for Tongan; Chung 1978 for Samoan).

Though the sections above have touched on a number of languages in the Mayan family, our primary data have come from our own fieldwork on Ch'ol. Next, we turn our attention to the possibility of extending our account to other Mayan languages.

6. VOS ACROSS LANGUAGES. In this section, we examine data from the major sub-families of Mayan: Yucatecan, Ch'olan–Tseltalan, Q'anjob'alan, Mamean, and K'ichean.[25] We focus especially on those languages with VSO/VOS alternations. Though time and space prevent a full examination of all of these languages, we will provide enough evidence to suggest that it is possible to maintain an underlying VSO syntax while allowing multiple paths to VOS. The possible routes to VOS were foreshadowed in 1 above and are repeated here in 47.

(47)   Paths to VOS
    a. subject in high right-side topic position   §6.3
    b. heavy-NP shift of phonologically heavy subjects   §6.2
    c. prosodic re-ordering of bare NP objects   §6.1

The prosodic reordering of bare NP objects was outlined in section 5. We predict that prosodically derived VOS should be possible only with D^0-less NP objects. This prediction is examined in section 6.1. If prosody were the only factor governing postverbal order in Mayan languages, we might expect all VOS sentences to have bare NP objects. However, other independently motivated factors come into play as well. In particular, we discuss heavy-NP shift in section 6.2 and right-side subject topicalization in section 6.3; both of these configurations result in the possibility of VOS with full DP objects. In section 6.4, we outline the various testable prosodic predictions that these different paths to VOS make. These predictions should prove especially useful for future work, since our account allows for the fact that a single language may have multiple paths to VOS, each of which should have distinct consequences for prosodic constituency.

Although the primary objective of this paper is to account for word order variation in Mayan languages, none of 'paths to VOS' given in 47 are unique to the Mayan family. Right-side topicalization is found in many of the worlds languages (see Lambrecht 1981, 1995 for English and French; Saito 2012 for Japanese; Pearson 2005 for Malagasy; and Polinsky 2016 for Tongan), as is Heavy-NP shift (see Ross 1967 and Wasow 2002 for Germanic; Cinque 1994 for Romance and Belletti & Shlonsky 1995 for Italian and Hebrew). Clemens (2014, 2017) argues for the prosodic re-ordering of bare NP objects in Niuean. V1 languages comprise a sizable

minority of the worlds languages—as many as 19% (Van Everbroeck 2003; Dryer 2005)—and many V1 languages display some type of VSO/VOS alternations (Carnie & Guilfoyle 2000; Clemens & Polinsky 2017). Subsequently, the word order and prosodic predictions discussed in this section are widely applicable beyond languages of the Mayan family.

6.1. NP OBJECTS AND PROSODIC REORDERING. The majority of the Mayan languages that are described as basically VOS, or VOS/VSO alternating, are languages which permit bare NP arguments and for which D^0-level material associated with the object appears to play a role in conditioning VOS/VSO alternations. These include languages from the Yucatecan and Ch'olan–Tseltalan families, as well as some K'ichean languages. Given the dearth of information on prosodic constituency in Mayan languages more generally, our aim here is merely to address the potential we see for extending the account presented in section 5 to other VOS/VSO-alternating languages.

Hofling (1984) compares word order across the Yucatecan branch, providing a useful jumping off point for the discussion here:

> In Lacandon and Classical Yucatec, the first NP of VOS sentences is typically
> unspecified [i.e. bare]...while the second is specific. In the other dialects, the
> relationship of specificity to word order may be stated more precisely: the first NP
> is of lower specificity than the second and is not topicalized, while the second is
> specified, often by a topic marker (Hofling 1984:44)

Compare the Lacandon examples in 48: in the VOS sentence 48a, the object is a bare NP argument. In the VSO example 48b, it is a proper name (i.e. a DP).[26]

(48) a. T-u-kin-s-a   [$_O$ balum] [$_S$ K'ak'].
          PFV-A3-die-CAUS-SS   jaguar   K'ak'
          'K'ak' killed the jaguar.'
      b. Paytan t-u-yil-a   [$_S$ nukuch winik] [$_O$ Kanank'ax].
          first   PFV-A3-see-SS   old   man   Kanank'ax
          'First, the ancestors saw Kanank'ax.'   (Lacandon; Hofling 1984:41–43)

In more recent work, focusing on the Yucatecan language Itzaj, Hofling (2000:190) writes that VOS is the basic order and 'VOS order commonly has an unmodified, indefinite object NP' (based on examples like 49, we assume he uses 'indefinite' to describe determinerless NPs; see discussion §5.1 and below in this section). A naturally-occurring example from Itzaj is shown in 49; as in Ch'ol in section 3.4, we assume that possessors sit below DP.[27]

(49)   Ii   t-u-p'ät-aj   b'in [O u-tzimin] [S a'   winik-ej   ].
       and PFV-A3-leave-SS REP   A3-horse   DET man-TOP
       'And the man left his horse, they say.'   (Itzaj; Hofling 2000:191)

In a similar vein, Bohnemeyer (2009) discusses Yucatec word order in detail, noting that in VOS, it is ungrammatical for the object to be definite if the subject is indefinite; Tonhauser (2004) describes a similar restriction. Though naturally-produced examples are not provided by these authors, we assume that the relevance of subject definiteness is connected to topicality, addressed in section 6.3.[28] If our assumption is correct, then another way to conceive of Tonhauser's generalization is that DP objects surface in VOS contexts only when the subject is a right-side topic.

Within the Ch'olan–Tseltalan branch, the fact that bare NPs may serve as arguments has already been demonstrated for Ch'ol (§3.4) and Tseltal (example 14). Robinson's (2002) corpus study of Tseltal gives eight naturally-occurring VOS sentences, seven of which have D^0-less objects. An example is shown in 50. The one exception, discussed in section 6.2 below, features a phonologically heavy subject.

(50)   … la laj s-ta-ik   [O ti'   uk'um] [S te   j'uch-etik-e   ].
          PFV HS A3-find-PL   edge   river   DET possum-PL-ENCL
       '… the possums reached the riverbank.'   (Tseltal; Robinson 2002:67)

As noted in section 3.3 and in the preceding descriptions here, many studies conflate the semantic notions of DEFINITENESS and SPECIFICITY with the presence of D^0-level material. However, in many cases it is clear that the word order alternations in Mayan are influenced not by definiteness or specificity per se, but rather the presence vs. absence of D^0-level material (and

thus under our account, syntactic PHASEHOOD of the object). Take Tsotsil, another Ch'ol–
Tseltalan language, for instance. Aissen (1987) describes Tsotsil as VOS. The example provided
in 51 suggests that bare NPs in this language may receive a definite interpretation, while sill
appearing as VOS objects.

(51) I-s-pet   lok'el [O antz   ] [S ti   t'ul=e   ].
      PFV-A3-carry away   woman   DET rabbit=ENCL
      'The rabbit carried away the woman.'   (Tsotsil; Aissen 1987:1)

A clear discussion of the distinction between D^0-level material and definiteness is found in
Dayley 1985 for the K'ichean language Tz'utujil. Dayley notes that VOS is the basic or
unmarked order in Tz'utujil, but that the object may not appear with the definite article, as shown
by the pair of sentences in 52. He continues: 'However, the patient may be "understood" as
definite when no article occurs with it' (Dayley 1985:304).

(52) a. X-kee-tij   [O tzyaq] [S ch'ooyaa'].
         PFV-A3P-ate   clothes   rats
         'Rats ate (the) clothes.'
      b. * X-kee-tij   [O ja tzyaq] [S ch'ooyaa'].   (Tz'utujil; Dayley 1985:305)

Larsen (1988:342) provides a detailed discussion of word-order alternations in K'iche',
demonstrating that VOS is acceptable when the subject is definite and the object is 'unmarked'
(i.e. a bare NP), as in 53.

(53) X-u-q'aj   [O chee'] [S lee   kaqiiq'].
      PFV-A3-break   tree   DET wind
      'The wind broke trees.'   (K'iche; Larsen 1988:342)

Echoing the discussion of Yucatec above, Larsen states that full DP objects are only
possible in K'iche' VOS if the subject is both definite and animate; DP objects in VOS are

otherwise judged ungrammatical. Below, we will argue that this behavior is suggestive of topicality effects.

Finally, DuBois (1981) lists VOS as the basic order in Sakapultek, and provides a single example with a bare object:

(54)   R-tix   [$_O$ kinaq'] [$_S$ l   achen].
         A3-eat   bean   DET   man
         'The man ate beans.'   (Sakapultek; DuBois 1981:239)

In sum, all of the languages discussed in this section allow bare NPs to serve as arguments and all are described as basically VOS or alternating VOS/VSO in the works cited above and in England's (1991) survey article. A clear pattern emerges in naturally occurring examples of VOS and in the description of word order alternations by individual authors: these languages prefer NP arguments in VOS clauses (VO$_{NP}$S). Moreover, even languages described as rigidly VSO require the notional object to appear immediately after the when it is a bare NP (though recall from section 5.1 that for these languages the bare NP does not behave as a true argument). Under our proposal, bare NPs do not include a phase head and are thus sent to spell-out in the same cycle as their selecting head. When ARGUMENT-φ is ranked above the constraints that prevent prosodic restructuring, this results in the reordering of the object to a position where it can be pronounced in the same φ-phrase as the verb. Of course, this type of account makes very specific predictions for prosodic constituency, which we address in section 6.4.

Mayan VOS examples that depart from the VO$_{NP}$S pattern have either (i) heavy subjects or (ii) full DP subjects; we turn to the latter cases next.[29]

6.2. HEAVY-NP SHIFT. As noted above, all else being equal, we might expect that naturally-occurring instances of VOS should always have bare NP objects. Indeed, this holds true for many examples of VOS, but counterexamples with DP objects are not difficult to find. One type of counterexample occurs in cases of heavy-NP shift. Heavy-NP shift results in non-canonical word order in a wide variety of languages. In Mayan languages, as in English, heavy NPs tend to shift towards clause-final position, although this tendency is not universal (see Chang 2009 for Japanese).

A full account of heavy-NP shift is outside the scope of this paper (see however Ross 1967; Rizzi 1990; Staub et al. 2006) and we remain agnostic as to whether heavy-NP shift should receive a syntactic, prosodic, or processing-based account. Indeed, at this time, it is not even possible to give a precise definition of 'heavy'; phonological weight, syntactic complexity, or both of these factors may determine whether a given Mayan NP is heavy enough to shift.[30]

Still, there is substantial evidence that word order in Mayan languages is subject to heavy-NP shift. Maxwell (1975), discussed by Norman and Campbell (1978), proposes a 'complex object constraint' for San Mateo Chuj that would ban complex objects from VOS configurations; see also Quizar 1979. In a similar vein, Norman (1977) proposed that VOS is the underived or 'basic' order in K'iche', but that heavy objects must undergo an operation of heavy-shift, resulting in VSO, as in (55). The K'iche' facts are discussed in detail in Larsen 1988.

(55) K'a tee   ka-r-il   [S lee achi] [O rii jun keej xaa maa
      until suddenly IPFV-A3-see   DET man   DET one horse just EXCL
      pwaq k-uu-kisiij   ].
      money IPFV-3A-shit
      'Suddenly the man sees a horse that is just shitting money.' (K'iche; Mondloch 1978:18)

Additional examples of VSO sentences with heavy object are given for Tseltal in 56 and for San Mateo Chuj in 57; both of these languages are described as basically VOS:

(56) K-ich'-oj   niwan bel [S jo'tik   ] [O jo'-winik rosina a   te
      A1-receive-SS perhaps DIR 1PL.PRON   five-score dozen DEM DET
      karchucha nichim=e   ].
      cartucha   flower=ENCL
      'We had brought perhaps one-hundred dozen cartucha flowers.'
      (Tseltal; Robinson 2002:76)

(57) Ix-s-milcham [S eb' winak] [O cha'-wan eb' winh k-et'   b'ey-um   ].
      PFV-A3-kill   PL   man   two-CLF PL   CLF A1P-RN walk-NML
      'The men killed two of our companions.'   (Chuj; Buenrostro 2013:109)

Relatedly, Aissen (1992) notes that CP complements to transitive verbs in basic-VOS Tsotsil must appear extraposed to the right of the subject.

On the head-movement account of V1 developed in this paper, VSO is straightforwardly derived in the syntax whether or not the object is heavy. More relevant to us is the observation that heavy SUBJECTS also appear in clause-final positions. In his corpus study of Tseltal word order, Robinson (2002) provides eight naturally occurring VOS sentences; as noted in section 6.1, all but one of these sentences has a bare NP object. The one VOS example with a DP object has a coordinate phrase as its subject. Examples like the one in (58) demonstrate that heavy-NP shift is one avenue to VOS.[31]

(58)　Ja'-uk　　me　to jajch me　　s-ti'-ik　　[O te　　k'ulub-etik=e] [S te
　　　EMPH-IRR DES　still AUX　DES　　A3-eat-PL　　DET locust-PL-ENC　　DET
　　　mut-etik=e,　　　te tz'i'-etik=e,　te　　mis-etik=e　　].
　　　chicken-PL=ENCL DET dogs-PL=ENCL DET　cats-PL=ENCL
　　　'Chickens, dogs, and cats ate locusts.'　　　　　　　(Tseltal; Robinson 2002:55)

By hypothesis, if the subject of a clause is heavy and the object is bare, then heavy-NP shift and ARGUMENT-φ conspire to produce a VOS clause. However, as 58 shows, VOS may arise even when the object is associated with D^0-level material—provided that the subject is heavy. In such cases, it is the shifting of the subject, not the object, that results in VOS. Thus, a DP object may surface in the position determined by the syntax, and the result may still be VOS.

The next section brings us to the final way in which Mayan languages arrive at VOS: postverbal topics.

6.3. PERIPHERAL TOPICS. Recall from the discussion in section 3 that generalizations about word order in Mayan languages can be problematic when based on elicited examples. If an elicitation setting does not provide a context that allows for information structural considerations to be taken into account, such factors may be overlooked. This section focuses on positive evidence that some VOS subjects occupy a high right-side topic position. We suspect that right-side topics are more prevalent in Mayan languages than the literature suggests, in part because right-side

subject topics do not result in a 'marked' word order in VOS languages and may thus be less apparent than preverbal topics. Because topics are generally subjects, we suspect that the type of analysis presented here is particularly applicable to languages with a strong tendency to realize subjects on the periphery of the clause (i.e. SVO/VOS).

The discussion of Tojolab'al in Curiel 2007 provides important support for the idea that Mayan languages have a postverbal topic position, in addition to the well-documented preverbal topic position (see §3.1). Curiel demonstrates that topics in Tojolab'al appear not only clause-initially, but also CLAUSE-FINALLY: that is topics may occupy either extreme of the clause. This is especially apparent in Tojolab'al, which possesses the option of overt topic morphology, although the use of topic morphology is optional.[32]

Compare the two naturally produced Tojolab'al examples in 59. In both, we find a transitive verb followed by two full DP arguments. The sentence in 59a shows the VSO expected under our analysis, while 59b is VOS despite having a full DP object. Note, however, that in the VOS example, the subject is explicitly marked with topic morphology, while the VSO clause lacks topic marking.[33]

(59) a. S-mak'-a-ta   [$_S$ ja 'epra   ] [$_O$ ja   men marya].
         A3-hit-SS-EMPH   DET Ephraín   DET FEM María
         'Efraín hit María.'

      b. S-mak'-unej   [$_O$ ja   jorje] [$_S$ ja   jwano='i].
         A3-hit-PERF   DET Jorge   DET Juan=TOP
         'Juan hit Jorge.'   (Tojolab'al; Curiel 2007:74)

Five other naturally-produced VOS sentences occur in Curiel's thesis; of these, the NP is a bare object in four. In the fifth, the object is a full DP but the subject again appears with topic-marking (Curiel 2007:67), on par with 59b.

Polian (2013) provides a similar discussion in support of a general peripheral topic effect in Oxchuc Tseltal, where it is also possible to find examples of VOS with an unmarked topical subject. Polian (2013:65) provides two naturally occurring VOS sentences, reproduced in 60 and 61c below.

(60) La   y-ich'   [_O nujk'ul] [_S te   kerem=e].
      PFV   A3-receive   rope   DET   boy=DET
      'The boy received rope.'   (Tseltal; Polian 2013:65)

(61) a. [Q:] The teacher in primary school didn't teach you anything?

      b. [A:] He never taught well, never, it was a mess. . .

      c. . . . ma s-bijtes   lek [_O te   indigena-etik] [_S te   kaxlan-etik namey   ].
            NEG A3-teach   well   DET indigenous-PL   DET ladino-PL   long.ago
         '. . . the LADINOS (teachers) didn't teach the indigenous people well.'
         (Tseltal; Polian 2013:66)

In 60, the object is a bare NP and thus compatible with either our prosodic account of VOS or
our right-side-topic account. The object in the VOS sentence in 61c is a full DP. Here, however,
Polian provides a context which clarifies that the subject—LADINO—is the topic. The sentence is
taken from an interview in which the interviewer asks about teachers 61a. The speaker responds
with the sequence in 61b–64c.

Polian (2013:66) discusses pragmatic prominence as a contributing factor to postverbal
order in Tseltal, writing that 'VSO order is used particularly when the patient is pragmatically
more prominent than the agent.' This generalization suggests that while topics tend to be
subjects, objects may also occupy a high right-side topic position.

(62) a. Ma   x-y-ich'   bel [_S winik-etik] [_O me   pantalon-to].
         NEG   MOD-A3-take   DIR   man-PL   DEM pants-FEM
         'The men don't wear those pants.'

      b. Ja'   ya   x-kuch [_S k-inam-tik] away ts'in [_O te   j-mats'-tik-e   ].
         FOC   IPVF A3-carry   A1-wife-PL   PART well   DET   A1-pozol-PL-DET
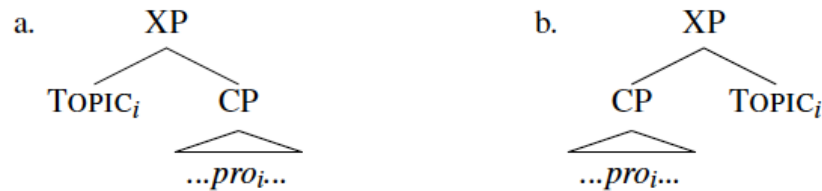   'Our wives carry our POZOL.'   (Tseltal; Polian 2013:66)

Further evidence that clause-final objects can be inconspicuous postverbal topics comes from
Can Pixabaj's 2004 study of topicalization patterns in K'iche'. Can Pixabaj finds that topics
surface most commonly in preverbal position, but that they occur frequently in postverbal

position as well. Based on examples from the texts analyzed in Can Pixabaj 2004, postverbal topics appear to be particularly common in constructions in which topics are updated or introduced for the first time, as in illustrated by the new topic, *tz'unun* 'the hummingbird' in example 63.

(63) Tonse   k'a te   ka-r-il   [_O jo-sin   tz'unun   ].
      entonces PART PART INC-A3-see   DET-AFF hummingbird
      'Suddenly he saw a HUMMINGBIRD.'   (K'iche'; Can Pixabaj 2004:115)

Turning to Yucatecan, as discussed above, Hofling (1984) notes a strong preference for bare NPs in VOS object position. He provides one textual example from Classical (16th century) Yucatec which appears to counter-exemplify this claim, but again, the subject appears with explicit topic marking:[34]

(64) Ka   u-ch'a-ah   [_O ix   yaxun   ] [_S Chakan-e   ] .
      CONJ A3-receive-SS   FEM queztal   Chakan-TOP
      'And the Chakans received the quetzal.'   (Classical Yucatec; Hofling 1984:40)

One final observation in support of our proposal comes from England 1991, who writes that, for most languages with a high occurrence of VOS clauses, SVO is also a strong candidate for 'basic' word order. This observation leads us to suggest that a subset of Mayan languages makes frequent use of a structural topic position, whether that position is clause-initial or clause-final. Such languages might be described as 'peripheral-topic languages.

Topics tend to be grammatical subjects, so if a language is a peripheral-topic language, it seems natural that this fact would emerge through tracking the location of the subject in the clause. Languages with a tendency to locate designated topics on the periphery of the clause include Ch'orti', Kaqchikel, and Yucatec. Word order in these languages is somewhat contentious: they are often described as predominantly VOS, although some researchers contend that SVO is somehow more basic (Clemens 2013; Gutiérrez Bravo & Monforte y Madera 2008, 2010; Gutiérrez Bravo 2011; Quizar 1979). This disagreement suggests to us that word order in these languages might be best described by preference for peripheral topics.

In order to account for clause-final topics, we combine Aissen's (1992) account of INTERNAL and EXTERNAL TOPICS with her right-side specifier account of Mayan VOS. Recall that Aissen places the subjects of VOS clauses in a right-side specifier of the verbal complex, while specifiers for higher topic and focus positions are ordered to the left (§4.1). Our analysis maintains that subjects are uniformly base-generated in left-side specifier positions (i.e. Spec,VoiceP), but that higher topic positions may be alternately ordered either to the left or to the right, as shown in 65 and 66.

(65)   Internal topics

a.
```
          CP
        /    \
   TOPIC_i    IP
             /  \
           ...t_i...
```

b.
```
          CP
        /    \
      IP      TOPIC_i
     /  \
   ...t_i...
```

(66)   External topics

a.
```
          XP
        /    \
   TOPIC_i    CP
             /  \
           ...pro_i...
```

b.
```
          XP
        /    \
      CP      TOPIC_i
     /  \
   ...pro_i...
```

Focusing on Tsotsil, Popti', and Tz'utujil, Aissen (1992) provides a number of diagnostics that allow her to distinguish between (i) internal topics like those in 65, which arrive in their high CP-internal position via movement, and (ii) external topics like those in 66, which are adjoined to a CP-external position and co-indexed with a null pronominal. While the structure of clause-initial topics is relatively well-understood, less is known about the structure of clause-final topics (although see Aissen 2016 for an account of right-side topics Tsotsil). Outstanding questions include whether clause-final topics can be either internal or external, and whether the full range of diagnostics for clause-initial topics—including intonational phrases and the distribution of intonational phrase clitics—are useful in identifying clause-final topics as well. In the next section we turn to our account's predictions for prosodic boundary marking and prosodic constituency more generally.

6.4. PREDICTIONS. Thus far, we have provided an in-depth discussion of postverbal word order alternations in Ch'ol and a basic discussion of word order variation in a handful of languages primarily from the Yucatecan, Ch'olan–Tseltalan, and K'ichean branches of the Mayan family. Our preliminary investigation demonstrates that a unified derivation of V1 in the Mayan family is possible. On our account, VSO is derived in the syntax via head-movement, while VOS—described as 'basic' in many languages—is the result of orienting subject-topics to the right side of the clause, shifting heavy subjects towards clause-final position, and the post-syntactic reordering of NP objects into a position where they can be pronounced with the verb.

We have also argued, following discussion in Minkoff 2000, Robinson 2002, and Skopeteas & Verhoeven 2005, that apparent animacy effects on Mayan word order should not receive a syntactic treatment; rather, we believe this is fundamentally a PROCESSING effect that arises in cases where speakers are asked to interpret potentially ambiguous clauses. At this point, we also set aside cases of heavy-NP shift, a phenomenon which we suspect to be so prevalent in Mayan languages that it does not contribute much more to understanding patterns in word order variation across the family.

The remainder of this section focuses on the intersection of two factors (i) the ranking of ARGUMENT-φ (high or low) and (ii) the availability of a high right-side topic position. Again, setting aside the effects of heavy-NP shift, we predict four basic types of Mayan languages.[35]

(67)   Mayan word order typology
    a. ARGUMENT-φ: low; right-side topic position: ✗   VSO
    b. ARGUMENT-φ: low; right-side topic position: ✓   VSO/VOS
    c. ARGUMENT-φ: high; right-side topic position: ✗   VSO/VOS
    d. ARGUMENT-φ: high; right-side topic position: ✓   VSO/VOS

Below, we explore the implicit predictions of 67 in the areas of word order and prosodic constituency.

LANGUAGES WITH LOW RANKING ARGUMENT-φ. For languages with low-ranking ARGUMENT-φ, which do not make use of a right-side topic position, as in 67a, VSO is the predicted word order, regardless of whether the object is associated with D^0-level material, as shown in 68.

(68)   Low ARGUMENT-φ without right-side topic position

    a. VSO$_{DP}$

    b. VSO$_{NP}$

Languages of this type are most likely to be found in the Q'anjob'alan and Mamean branches of the Mayan family, as England (1991) reports that rigid adherence to VSO is only found in these families (see also sources cited in England 1991).

    A language with low-ranking ARGUMENT-φ may also make use of the right-side topic position, as in 67b. In this case, we predict that VSO will be able to surface with NP, DP, and topical objects, as in 69a–69c. In contrast, we predict VOS ONLY in cases where the subject is the topic of the clause, as in 69d.

(69)   Low ARGUMENT-φ with right-side topic position

    a. VSO$_{DP}$

    b. VSO$_{NP}$

    c. VSO$_{TOP}$

    d. VOS$_{TOP}$

Both context and the presence of topic morphology should give clear indication that a VOS subject is also the topic. Additionally, distinct prosodic structure is a likely corollary of the expression of a right-side topic.

    Work on the prosodic properties of preverbal topic constructions has consistently found that topicalized constituents are associated with specific intonational patterns. Boundary tones and the distribution of pauses may indicate that an intonational phrase boundary (or some other higher-order prosodic boundary) delimits the topic from the rest of the clause (see Aissen 1992 for Tsotsil and Popti'; Berinstein 1991 for Q'eqchi'; and Nielsen 2005 for K'iche'); designated pitch accents may also be associated with topicalized constituents (see Avelino 2011, Kügler & Skopeteas 2007, and Kügler et al. 2007 for Yucatec). Although perfect symmetry between the prosodic realization of preverbal and postverbal topics is unlikely—languages often mark the right and left edges of prosodic constituents differently—the prosodic cues to preverbal topics

are a good place to start looking for prosodic evidence for the topical status of peripheral arguments.

One additional prediction for languages with low-ranking ARGUMENT-φ and a designated postverbal topic position pertains to the prosodic expression of the object. For this type of VSO/VOS language, the object in a VOS$_{TOP}$ clause may be either a bare NP or a full DP; in either case, we predict that the object will be realized in the position determined by the underlying syntax. As such, we do not predict the prosodic structure associated with the object to be affected by the presence or absence of D^0-level material.

LANGUAGES WITH HIGH RANKING ARGUMENT-φ. Turning to languages with high-ranking ARGUMENT-φ and no right-side topic position, as in 67c above, we expect to find a strict correlation between word order and the presence of D^0-level material on the object in these languages. Specifically, in VOS clauses, the object should be a bare NP; while in VSO clauses, the object should be a full DP, as shown in 70.

(70)　　High ARGUMENT-φ without right-side topic position
　　　　a. VSO$_{DP}$
　　　　b. VO$_{NP}$S

In the VOS clauses of these languages, we expect the object and the verb to be realized as subconstituents of a unique phonological phrase. For some languages, conditions on prosodic well-formedness may require that a given prosodic constituent (e.g. a prosodic phrase), may have a limited number of immediate subconstituents, (e.g. prosodic words) (de Lacy 2004; Ketner 2006; Itô & Mester 2007). We do not necessarily expect this type of constraint to directly influence the prosodic phrasing of objects in the VOS clauses of high-ranking ARGUMENT-φ languages, given the availability of heavy-NP shift. If a bare NP object is large enough to influence prosodic structure assignment, it may instead shift towards the periphery of the clause (see §6.2).

The final language type to consider is one with high-ranking ARGUMENT-φ AND a designated topic position, as in 67d. In this case, we predict VSO with DP and topical objects,

VOS with NP objects and either non-topical or topical subjects, as in 71c–71d, and VOS with DP objects and topical subjects, as in 71e.

(71) High ARGUMENT-φ with right-side topic position

    a. VSO$_{DP}$

    b. VSO$_{TOP}$

    c. VO$_{NP}$S

    d. VO$_{NP}$S$_{TOP}$

    e. VO$_{DP}$S$_{TOP}$

From the perspective of prosodic predictions, this is the most interesting type of language under consideration. As discussed in the context of low-ranking ARGUMENT-φ with right-side topics, we expect topicalized constituents to have distinct prosodic properties and/or consequences for clause-level prosody.

However, with high-ranking ARGUMENT-φ, we DO expect to see a difference between the prosodic constituency of VOS clauses with NP objects, as in 71c and 71d, and VOS clauses with DP objects and topicalized subjects, as in 71e. For examples like 71c and 71d, we predict that the verb and the NP object will be parsed into a common φ-phrase, whereas for examples like 71e, we do not.

In the section on peripheral topics above (§6.3), we suggested that Yucatec is a possible exemplar of a SUBJECT-PERIPHERY language, i.e. a language in which clauses generally have a designated topic, found either to the left or right of the clause. We also hypothesized that Yucatec is a high-ranking ARGUMENT-φ language, according to our system (§6.1). These two factors make Yucatec an exemplar of the type schematized in 67d: a high-ranking ARGUMENT-φ language with a designated topic position. Anecdotal evidence from the prosodic domain is consistent with this hypothesis.

The Yucatecan literature is unique among Mayan languages in containing studies of sentential phonology, including those by Avelino (2011), Kügler & Skopeteas (2007), and Kügler et al. (2007). These studies were designed to investigate the prosodic correlates of preverbal topic and focus, but the discussion and examples found in these papers are relevant to postverbal word-order variation as well. Avelino (2011), for example, finds that a LH* pitch

accent is aligned with the right edge of three kinds of clause-initial constituents: (i) nominals in preverbal topic position, (ii) nominals in preverbal focus position, and (iii) the verb in VOS constructions (cf. Kügler et al. 2007; Kügler & Skopeteas 2007). Avelino (2011) also identifies an alternative phrasing, in which the LH* pitch accent is aligned to the right edge of the second constituent rather than the first. He illustrates these two patterns with examples of VOS word order, in which the LH* pitch accent is either realized on the right edge of the verb (e.g., see Figure 2 in Avelino 2011), or on the object (e.g., see Figure 6 in Avelino 2011).

Although Avelino (2011) does not address whether postverbal objects plays a role in determining the prosodic phrasing of the clause, in the examples he provides, a familiar pattern emerges: the relevant LH* pitch accent is realized on the verb when the object is a full DP and on the object when the object is a bare NP. In other words, anecdotal evidence suggests that the verb and the object are phrased together when the object is an NP, but phrased separately when the object is a DP. This pattern is exactly what our account predicts for the prosody of these clauses. We leave it to future work to determine whether (i) the subjects in the VOS examples with DP objects are postverbal topics and (ii) our observation about the correlation between object type and prosodic constituency in Yucatec extends beyond the examples provided in Avelino 2011.

Finally, although we have not been able to locate any prosodic data of the relevant kind, we suspect that a systematic study of transitive clauses with one *pro*-dropped nominal—VO$_{NP}$ examples with a *pro*-dropped subject, as in 72a, VO$_{DP}$ examples with a *pro*-dropped subject, as in 72a, or VS examples with a *pro*-dropped object, as in 72c—would be extremely useful for testing the prosodic predictions of high-ranking ARGUMENT-φ (with and without a high right-side topic position). This type of study would be particularly informative because clauses with a single postverbal argument are far more common than those with two overt postverbal arguments. If our predictions hold, we should expect VO$_{NP}$ examples to display different prosodic constituency than VO$_{DP}$ examples, which should look more like VS examples, as schematized in 72:

(72)   High ARGUMENT-φ: prosodic predictions

    a. V O_{NP} *pro*   ⇝ (V O)φ

    b. V   *pro* O_{DP} ⇝ (V)φ (O)φ

    c. V   S   *pro*   ⇝ (V)φ (O)φ

Care must be taken when interpreting prosodic data, because multiple constraints on prosodic well-formedness may be simultaneously active. By means of illustration, consider the potential effects of BINARITY (Bennett et al. 2016; Elfner 2015; Itô & Mester 2007; Inkelas & Zec 1990), a constraint that privileges prosodic constituents consisting of exactly two sub-constituents. If, contrary to our prediction, each clause type in 72 were parsed into a single φ-phrase, it would be important to consider whether BINARITY were affecting the prosodic constituency of the clause. If it were, then the verb and the subsequent constituent would be parsed into a φ-phrase, without consideration for whether the immediately postverbal constituent were an NP object, DP object, or non-c-selected subject.[36]

SUMMARY OF PREDICTIONS. In this section, we have explored the predictions of our account with respect to possible word order permutations and their implications for prosodic structure. Specifically, we have considered the intersection of two factors—(i) the ranking of ARGUMENT-φ (high or low) and (ii) the availability of a high right-side topic position—resulting in the recognition of four language types, each of which we considered in turn. In addition to the prosodic predictions discussed here, our account also predicts that it should not be possible to find naturally occurring examples of VOS in cases where the object is a DP and the subject cannot be characterized as a topic (or a heavy NP). Furthermore, it should not be possible to find a language that has naturally occurring examples of both (i) VOS clauses with NP objects, for which the subject is neither heavy nor a topic, AND (ii) VSO clauses with NP objects. On our account, this sort of situation would cause an ARGUMENT-φ ranking paradox.

7. SUMMARY AND CONCLUSIONS. This paper has examined a complex set of factors governing constituent order in the Mayan language family, with a particular focus on variation between VSO and VOS. We highlighted certain challenges for existing accounts of Mayan V1 and presented evidence in favor of a uniform syntax underlying Mayan V1, in which the verb stem is

formed by successive head-raising to a position just above the transitive subject, but below the TAM marker in Infl^0. To our knowledge, this is the first explicit head-raising account proposed for VSO in Mayan.

Head movement of the verb provides a natural explanation for VSO; having developed this proposal, our next challenge lay in accounting for VOS in languages described as either basically VOS, or VOS/VSO-alternating. As the discussion in section 3 demonstrated, the literature suggests a variety of influences on postverbal order, including specificity, definiteness, phonological weight, discourse prominence, and animacy. One important contribution of this paper has been to whittle down this long list of factors. Following discussion in previous work, we provided evidence that the effects of animacy arise in elicitation contexts, and should be considered a processing phenomenon. We further demonstrated that it is not the semantic properties of definiteness or specificity that affect postverbal word order alternations, but rather the presence of a DP layer (including determiners, demonstratives, proper names, and pronouns).

Having reduced the factors governing postverbal order to three, we argued in sections 5 and 6 for three avenues to VOS from an underlying VSO syntax: (i) prosodic restructuring of bare NP objects; (ii) heavy-NP shift; (iii) right-side topics. While the second two have been independently proposed within Mayan, the first claim—drawing on Clemens's (2014, 2017) account of Niuean—is new and is supported not only by prosodic evidence found in Clemens & Coon 2018 for Ch'ol and Avelino 2011 for Yucatec, but also by the fact that languages which are described as VOS or VOS/VSO-alternating languages are overwhelmingly languages that allow bare NPs to serve as arguments in a transitive frame.

We concluded our discussion of the Mayan family as a whole by proposing a typology of word-order variation reflecting two of our three proposed paths to VOS: (i) prosodic restructuring of bare NP objects and (ii) right-side topics. We determined that the heavy-NP shift phenomenon should be considered together with preverbal topic and focus as factors too wide-spread to be helpful in explaining differences among individual Mayan languages.

Our analysis of Mayan V1 and the typology we propose produce testable predictions. In the final section of this paper, we worked through predictions in two lines of research that we hope will serve as a basis for future work: (i) prosodic constituency in different types of VSO/VOS-alternating languages and (ii) the syntax and information structure of naturally occurring examples of VSO and VOS. For example, naturally occurring examples of VOS in

cases where the object is a DP and the subject is neither a topic nor a heavy NP would constitute counter-evidence to our claims, as would naturally occurring examples in a single language of (i) VOS with NP objects and non-topicalized, light subjects and (ii) VSO clauses with NP objects.

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[1] Abbreviations used in glosses are as follows: A – Set A (ergative, possessive); ABS – absolutive; AFF – affirmative; AP – antipassive; APPL – applicative; B – SET B (absolutive); CAUS causative; CLF – classifier; DEIC – deictic; DEM – demonstrative; DES – desiderative; DET – determiner; DIR – directional; ENC – enclitic; EMPH – emphatic; FOC – focus; HS – hearsay; IRR – irrealis; MOD – modal; PART – particle; PASS – passive; PERF – perfect; PFV – perfective; PL – plural; PLUR – pluractional; PRON – pronoun; PST – past tense; REP – reportative; SS – "status suffix"; TOP – topic. In some cases, glosses, transcriptions, or the spelling of language names have been modified from the original source for consistency and in accordance with revised conventions (see discussion in Mateo Toledo 2003 and Bennett et al. 2016). Examples without citations are from our own elicitation work and translations from Spanish sources are our own.

[2] We assume that the presence of an orthographic word boundary does not necessarily reflect a syntactic difference with respect to the head movement proposal here, but rather reflects differences in the constraints governing the formation of prosodic words in the language (following Bennett et al. 2018) and/or in language-specific orthographic conventions.

[3] Even 'rigidly VSO' languages may display VOS in special circumstances, discussed further in sections 5 and 6 below. For example, VSO Q'anjob'al displays non-canonical VOS order in reflexives, the incorporation antipassive (see §5.1), and with topicalized first- and second-person pronominal subjects (see §6.3) (Mateo Toledo 2008).

[4] The projection SSP corresponds to the projection labeled vP by Coon and colleagues (2014) (see also Armstrong 2017). While these authors stress that the vP label should not be taken to imply that this head has all the properties associated with v^0 heads elsewhere (e.g. categorization and case-assignment; see Harley 2017 for an overview), here we have chosen a more neutral label for clarity. A closer parallel to SSP may be Halpert's (2015) L(ICENSING)P, although we leave the exact nature of this projection to future work. Crucially, ss^0 is a head at the edge of the extended verbal projection that sits above the subject and hosts the status suffix.

[5] By deriving VSO and VOS orders via syntactic head movement of the verb and VOS order in particular via prosodic restructuring of the object, our account makes the prediction that the subject should c-command the object even in VOS contexts, because the underlying syntax of a VOS clause is VSO. This prediction is indeed borne out, as even VOS subjects bind into objects (see e.g. Vázquez Álvarez 2011 and Coon & Henderson 2011). Assuming the availability of

reconstruction, this prediction is shared by all of the competing accounts of Mayan word order (see §2), and so it does not serve to differentiate between proposals. Thanks to John Beavers for pointing out a second, related prediction that does differentiate our account from the ones before it. For us, the object never c-commands the subject (unless the object is a topic), whereas for both the right-side specifier and XP-fronting accounts, the object c-commands the subject ex-situ. We know of no such data, but if it could be shown that VOS objects ever bind into the subject, this would constitute support for XP-fronting, whereas if VSO objects ever bind into the subject, this would support the right-side specifier account. In contrast, our account predicts that non-topic objects never bind into subjects.

[6] Proto-Mayan allowed both VSO and VOS orders (Campbell & Kaufman 1985; Norman & Campbell 1978), and England (1991) concludes that rigid VSO order is an innovation in modern Mayan languages like Q'anjob'al. Though our focus here is on the synchronic facts, note that the proposal that rigid VSO is innovative in the family is not incompatible with the proposal advanced here, in which an underlying VSO syntax may give rise to both VOS and VSO orders.

[7] This is not, of course, to say that animacy plays no role at all in the grammars of these languages. A range of work in the Mayan family has documented effects of the relative animacy of two arguments (along with definiteness, specificity, topicality, etc.) in the choice between active transitive constructions, on the one hand, and marked (e.g. passive, antipassive, or Agent Focus) constructions, on the other; see e.g. Aissen 1997, Zavala 2007, Vázquez Álvarez & Zavala 2013, and Pérez Vail 2014. In some languages, the use of an active transitive construction is restricted to contexts in which the subject outranks the object, and a marked construction is used otherwise. These works relate these effects to systems of OBVIATION cross-linguistically (Wolfart 1973; Dahlstrom 1991; Klaiman 1992).

Importantly, our claim is only that animacy does not play a grammatical role in the relative ordering of two postverbal arguments if a transitive construction is used. Indeed, if transitive constructions are either dispreferred or ungrammatical when the object outranks the subject, this is unsurprising.

[8] Aissen posits right-side specifiers for lexical categories V, N, Adj, and does not assume VP-external subjects; we, on the other hand, show subjects as occupying Spec,VoiceP (e.g. Kratzer

1996). Aissen's parameterization could be maintained by dividing thematic positions (ordered to the right), from specifier positions which are the landing site for movement (ordered to the left).

[9] While the verb and a bare NP object must be adjacent, we know that VOS clauses in Ch'ol are not instances of head incorporation, because the object in a VOS clause can be modified, as in i.

(i)   Tyi i-mäñ-ä   [NP pejtyelel tyumuty] jiñi alob.

      PFV A3-buy-SS   all   egg   DET boy

      'The boy bought all the eggs.'   (Ch'ol; Coon 2010 :360)

[10] There is Ch'ol-internal support for believing that the linear order of morphemes reflects the order of syntactic derivation; for example, passive morphology appears after transitivizing causative morphemes, as in 26a.

[11] Note that our trees do not include a verbalizing v^0 under $Voice^0$. We assume following Coon and Preminger 2013 and Harley 2017 that v^0 and $Voice^0$ are bundled together into a single head in Ch'ol (and perhaps Mayan more generally); see Pylkkänen 2002 and Harley 2017 for extensive discussion.

[12] In spoken Ch'ol, the aspect marker concatenates with the following Set A marker; in this case 3rd person Set A i- is realized as a glottal stop on the perfective tyi. See Vázquez Álvarez 2011 for details.

[13] In this paper we do not commit to specific details regarding the semantics of NP and DP languages, nor to which other properties should correlate with this difference (see discussion in the Chierchia and Bošković works cited above). We focus instead on the observable fact that the three languages in question show a difference in whether bare NPs are generally permissible as arguments, leaving the details for future work.

[14] As described by Craig (1986) and others, certain nominals in Q'anjob'alan languages are 'unclassified', and never appear with a nominal classifier. These include nouns referring to abstract entities, as well as entities made of 'an unidentified substance or undifferentiated mixture of substances' (Craig 1986: 252).

[15] We assume that the syntactic relationship of selection under sisterhood is the crucial factor here, not 'objecthood' or 'argumenthood', per se. That is, though we proposed in §5.1 above that bare NP complements in Niuean PNI and Q'anjob'alan incorporation antipassives do not

combine semantically as true arguments, they are nonetheless subject to ARGUMENT-φ by virtue of being selected by the head.

[16] As a reviewer notes, Clemens (2014, 2017) solves this problem by appealing to a predicate-argument relation that does not rely entirely on surface constituency, which bears some resemblance to comparable notions in lexicalist frameworks, such as the ARG-STR list of HPSG (Pollard & Sag 1994) and the f-structures of LFG (Kaplan & Bresnan 1982).

[17] Recall from section 2 that external arguments are merged outside of the VP proper, and thus not subject to ARGUMENT-φ.

[18] We articulate argument-φ as in 37 without stipulating that the entire phrase–as opposed to just the head of the phrase–must be parsed with the selecting head. We assume that each head's features are shared with its phrase, which is a fairly standard assumption in the context of e.g. bare phrase structure (Chomsky 1995 et seq.) or given a theory of feature percolation (Sells 1985; Pollard & Sag 1994).

[19] Levin 2015 proposes an alternative account of the linearization of objects in PNI constructions of the type discussed in section 5.1 above. Like Clemens 2014, Levin 2015 proposes that the adjacency requirement between the verb and its complement is post-syntactic. However, for Levin, the position of the PNI object is a matter of morphological LOCAL DISLOCATION (Embick and Noyer 2001) in a DISTRIBUTED MORPHOLOGY framework.

There are three reasons to prefer an ARGUMENT-φ analysis. First, ARGUMENT-φ makes testable prosodic predictions, which are borne out in Ch'ol. Second, Levin's analysis focuses specifically on 'intransitive' cases of PNI, as found in Niuean and Q'anjob'al. As discussed above, Ch'ol does not exhibit PNI in this strict sense (contra Coon 2010): unlike Niuean and Q'anjob'al, VOS clauses in Ch'ol are transitive, because the language generally allows bare NP arguments. The prosodic proposal in Clemens 2014 connects word order directly to the NP vs. DP status of arguments, thus making it possible to capture the ordering commonalities found in PNI constructions (Q'anjob'al, Niuean) and VOS in bare-NP argument languages (Ch'ol). Finally, a stated virtue of Levin's proposal is that it requires head-head adjacency between the verb head and the head of the pseudo-incorporated object. However, it is unclear how this account could be extended to any of the Mayan languages he discusses, because modifiers in these languages consistently precede the 'incorporated' noun, thus violating head-head

adjacency. A Ch'ol example was shown in above; a Q'anjob'al example is given below (see also Maxwell 1976 and Coon 2017c for Chuj).

(i)　　Max　tsok'-w-i　[yax　si'　　] [naq winaq　].

　　　　PFV　chop-AP-IV　green wood　　CLF　man

　　　　'The man chopped green wood.'　　　　　　　　　　　　　　　　(Q'anjob'al)

[20] For a more detailed illustration of complex verb stem formation, see examples 6 and 28. The prosodic structure illustrated in 38 represent the Ch'ol data presented in Clemens and Coon 2018, where all of the examples included TAM markers in their proclitic forms (e.g. perfective *tyi*). TAM markers also come in CVC varieties that are themselves hosts for second position clitics (e.g. perfective *tsa'*, see §4.2 and discussion in Vázquez Álvarez 2011).

[21] Following OT convention, the symbol ☞ identifies candidates that are predicted to surface based on a particular constraint ranking. If, in a single tableau, two candidates are preceded by ☞, the particular constraint ranking does not distinguish between them. The symbol ☹ identifies an attested candidate that a particular constraint ranking fails to predict.

[22] SVO clauses have the same potential as VOS clauses for realizing the verb and the object as a single φ-phrase and satisfying ARGUMENT-φ. While SVO sentences are quite common in Mayan languages, including Ch'ol (see §3.1), to our knowledge, SVO-repairs of ARGUMENT-φ are unattested. We follow Clemens (2014) in appealing to INITIAL POSITION FAITHFULNESS to explain why a structure that needs to satisfy ARGUMENT-φ surfaces as VOS instead of SVO.

[23] Recall that v^0 is bundled together with Voice^0; we assume that the head we have labeled Voice^0 in the Mayan derivations above is a phase head.

[24] We will not weigh in on whether P^0 is a phase head, either in the abstract or for Ch'ol in particular. Verbs do not select PP complements in Ch'ol (Coon 2013), so it is also not possible to leverage word order variation in determining whether P^0 marks a phase boundary.

[25] We omit discussion of the most divergent language, Huastec—classified in its own sub-family, and geographically distant from the others—due to a lack of available information.

[26] The examples in Hofling 1984 generally conform to this pattern, with the exception of some examples which are clearly elicited (e.g. reporting on possible interpretations of *kill–[man]–[jaguar]* in different languages). For the reasons discussed in section 3.3, we set such examples aside here.

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[27] Note the position of reportative *b'in* in 49, which indicates that at least a subset of discourse particles in Itzaj can surface between a verb and a bare NP object. The same is true for closely related Yucatec (Scott AnderBois p.c.). Given our limited understanding of the syntax and prosody of this type of discourse particle, we simply flag this example as illustration of an empirical fact that would need to be addressed in the context of an ARGUMENT-φ account of VOS for these languages.

[28] DuBois (1987), discussed by England (1991), describes a universal discourse constraint against introducing new information in the subject of a transitive clause. It is thus unsurprising, from a discourse point of view, that the transitive subjects here and below are frequently definite.

[29] Note that we have not discussed languages described as 'rigidly VSO' here. Under the head-raising syntax developed above (§2), VSO is straightforwardly derived in the syntax. Ultimately, we may wish to distinguish between (i) VSO languages in which arguments are always full DPs (and so ARGUMENT-φ does not affect word order), and (ii) those in which arguments may be bare NPs, but ARGUMENT-φ is ranked below the relevant MATCH constraints, allowing VSO$_{NP}$ to surface.

[30] As the purpose of section 6 is to discuss postverbal word-order variation in the Mayan family more generally, it is also worth noting that we know of no evidence that heavy-NP shift affects one branch of Mayan languages more than any other, nor can we think of any principled reason why it should.

[31] According to an anonymous reviewer, heavy-NP shift does not condition the prosodic phrasing that would allow an enclitic to surface after the object in a VOS clause in closely related Tsotsil. As such, the reviewer wonders whether the presence of the enclitic *=e* on the right edge of the DP object *te k'ulubetik=e* 'the locusts=ENC' in the Tseltal example, is not an example of heavy-NP shift, but is instead an example of an 'afterthought' subject. In other words, perhaps example 58 should be translated as 'They ate locusts. The chickens, dogs and cats.' Although we represent the example as it is found in the original source, the reviewer's specific question as well as the diagnostic properties of enclitics in Tsetltal more generally warrant further probing.

[32] The enclitics glossed as topic markers in the examples in this section and elsewhere in this paper are cognate with what are often treated as definite markers in related languages. As such,

care should be taken to distinguish between topic- and definiteness-marking in the individual languages in which these enclitics appear.

[33] Curiel (2007) notes that that 59a has an alternative VOS interpretation, which we would treat as involving an unmarked, right-side subject topic.

[34] We assume that the feminine *ix* preceding the object has a D^0-like function, as it does in other languages of the family (Craig 1986).

[35] Recall that we are focusing exclusively on order of postverbal arguments here; of course, we expect that PREVERBAL topicalized and focused arguments will be derivable, either by A' movement or high base-generation (Aissen 1992), irrespective of the ranking in (67).

[36] Investigating the prosody of clauses with modified nominals should help us control for this type of confound. For example, Elfner (2012) demonstrates for Irish that the verb and the subject in a VSO clause are phrased together unless the subject is modified, in which case the verb and the subject are phrased separately. For us, ranking ARGUMENT-φ above BINARITY predicts that both modified and unmodified objects should be phrased with the verb in VOS constructions with NP objects, whereas only unmodified subjects in VSO constructions and unmodified DP objects in VOS constructions should be phrased with the verb. At least for Ch'ol, we see no evidence that BINARITY is even a factor in how prosodic constituency is assigned; both modified and unmodified NP objects are pronounced with the verb in VOS constructions, while neither modified nor unmodified subject are pronounced with the verb in VSO constructions (Clemens & Coon 2018). However, due to the potential effects of eurhythmic constraints like BINARITY, it is important to stress that the prosodic predictions we have outlined in this section should be tested in the context of a general understanding of a given language's prosodic system as much as possible.