Syntactic Ergativity as a Constraint on Crossing Dependencies: The Perspective from Mayan

Rebecca Tollan
Lauren Clemens

This article presents an account of syntactic ergativity based on the grammaticalization of a processing-based preference for nested as compared with crossing dependencies. We propose that ergative subject extraction restrictions arise because such movement would cross the prior Ā-movement path of the absolutive object and create an illicit crossed dependency. Our account predicts that arguments merged between the A-movement tails of the absolutive DP cannot extract, whereas arguments merged above or below them can. In developing an approach to syntactic ergativity grounded in sentence processing, we highlight the need for deeper conversation among formal, typological, and processing-driven syntax.

Keywords: ergativity, Mayan, *wh*-dependencies, sentence processing

1 Introduction

A well-established finding from the typological literature is that nested dependencies are more common crosslinguistically than crossing dependencies (Hays 1964, Shieber 1985, Levy and Manning 2004, Ferrer i Cancho, Gómez-Rodríguez, and Esteban 2018). A/Ā-chains—representing the dependency relation between positions in the clause—are described as crossing when there is overlap between them, as shown in (1a). In nested dependencies, the A/Ā-chains do not overlap, as shown in (1b).

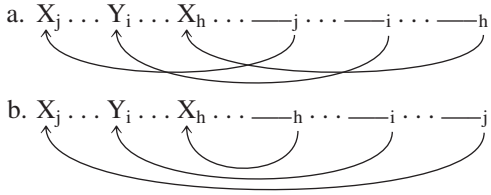
We extend our sincerest thanks to Vera Gribanova, Daphna Heller, Robert Henderson, Diane Massam, Pedro Mateo Pedro, Keir Moulton, Omer Preminger, Rodrigo Ranero, and Leah Velleman for incisive feedback at various points of this project. We would also like to thank the members of the University of Delaware Syntax-Semantics Lab and the UPenn Syntax reading group for valuable conversation, as well as three anonymous WCCFL 38 reviewers and three anonymous reviewers for *Linguistic Inquiry*.

Abbreviations used in the glosses: 1 = first person, 2 = second person, 3 = third person, ABS = absolutive, AF = agent focus, AP = antipassive, APPL = applicative, BEN = benefactive, CAUS = causative, CL = classifier, CPL = completive, DAT = dative, DEM = demonstrative, DET = determiner, ERG = ergative, EP = epenthetic, FOC = focus, HON = honorific, ICP = incompletive, INCL = inclusive, INTRANS = intransitive, ITV = intransitive suffix, LOC = locative, PERF = perfect, PFV = perfective, PL = plural, POSS = possessive, PREP = preposition, REL = relative, RN = relational noun, SG = singular, SS = status suffix, TOP = topic, TRANS = transitive, TV = transitive suffix.

Linguistic Inquiry, Volume 53, Number 3, Summer 2022
459–499

https://doi.org/10.1162/ling_a_00421

(1) *Crossing and nested dependencies*



By way of possible explanation, the literature on sentence processing offers evidence that crossing dependencies incur a greater cost than nested dependencies (Fodor 1978, Frazier and Fodor 1978, Rochemont and Culicover 1990, Pickering and Barry 1991). From here, we pursue the hypothesis that processing constraints like the one that disfavors crossing dependencies can be transposed into a grammar such that they become categorical features of individual languages. In particular, we propose that the inability of an ergative argument to undergo Ā-movement (a manifestation of "syntactic ergativity") in a subset of ergative-absolutive languages arises from a restriction on certain types of movement trajectories. This proposal calls for a reconsideration of pre-Minimalist theories that appeal to contrasts between different configurational paths of movement (e.g., Kayne 1981, Pesetsky 1982) and the surface outputs yielded by those paths (e.g., Hankamer 1973) in accounting for syntactic phenomena. Notably, Kayne (1981) proposed that certain structural relations (e.g., between an antecedent and an anaphoric pronoun) be considered in terms of pathways from one syntactic node to another; couched within this framework, Pesetsky's (1982) Path Containment Condition later posited that two (or more) overlapping movement paths must be configured such that each one (except the outermost) is contained within another (see again (1b)). Another proposal intended to account for the crosslinguistic dispreference for crossing dependencies is the Constraint on Crossing Dependencies (CCD; Kuno and Robinson 1972, Steedman 1985), which is stated in (2).

(2) *Constraint on Crossing Dependencies*
No movement dependency may cross another movement dependency.

While there is robust crosslinguistic evidence for the CCD, certain languages tolerate crossing dependencies in some contexts. Dutch, for example, is well-known for exhibiting crossing dependencies in clause-final verb clusters (Bach, Brown, and Marslen-Wilson 1986). On our view, the CCD is a prime example of a language-processing constraint that presents itself differently in the grammars of specific languages. In this article, we explore the idea that certain ergative-absolutive languages have a fully grammaticalized version of the CCD. The consequence is that, in the subset of ergative languages in which the absolutive object A-moves past the ergative subject, the ergative subject is prevented from extracting. In other words, one instantiation of the well-documented phenomenon of *syntactic ergativity*, in which ergative subjects—in contrast to absolutive arguments—are unable to undergo Ā-movement, is the result of a ban on crossing dependencies.

Our starting point is a proposal that syntactic ergativity arises from the movement of the absolutive object to a position above the Merge site of the ergative subject (e.g., Murasugi 1992, Bittner and Hale 1996, Aldridge 2004, Coon, Mateo Pedro, and Preminger 2014, Coon, Baier,

and Levin 2019). Known as *absolutive inversion*, this account is termed the "standard theory" of syntactic ergativity in Deal 2016, insofar as it has been implemented to account for ergative extraction restrictions in unrelated ergative-absolutive languages such as Dyirbal (Bittner and Hale 1996), Seediq and Tagalog (Aldridge 2004), Tongan (Clemens and Tollan to appear), Mayan (Coon, Mateo Pedro, and Preminger 2014, Coon, Baier, and Levin 2019), and West Circassian (Ershova 2017). Our goal is to build upon this proposal by revisiting the question of *why* absolutive inversion results in the inability of the ergative argument to undergo Ā-movement. In short, we develop a proposal that this movement is restricted because it would create an ill-formed crossing dependency, based on grammaticalization of the CCD.

We examine this issue through the lens of a language family that has received considerable attention in research on syntactic ergativity: the Mayan family. Mayan languages have been a particularly compelling testing ground for theories of syntactic ergativity because, while all of them exhibit ergative-absolutive marking, only some exhibit syntactic ergativity. For example, Q'anjob'al does not allow the ergative subject to be directly extracted (3), while Ch'ol does (4) (see Coon, Mateo Pedro, and Preminger (CMP) 2014).

(3) *Q'anjob'al*
*Maktxel$_i$ max-Ø y-il-a' ___$_i$ ix ix?
who CPL-3ABS 3ERG-see-TV CL woman
'Who saw the woman?'
(Grammatical as: 'Who did the woman see?')
(CMP 2014:193)

(4) *Ch'ol*
Maxki$_i$ tyi y-il-ä-Ø jiñi wiñik ___$_i$?
who CPL 3ERG-see-TV-3ABS DET man
'Who saw the man?/Who did the man see?'
(CMP 2014:193)

Beyond Q'anjob'al and Ch'ol, the Mayan language family allows for a rich microcomparative analysis (e.g., Kayne 2005), in which the grammars of individual languages can be compared while controlling as much as possible for many of the extraneous factors that often complicate the comparison of unrelated languages. We therefore develop our proposal by examining Mayan languages, beginning with the question of how languages like Q'anjob'al and Ch'ol are differentiated such that the former exhibits syntactic ergativity, whereas the latter does not. Along these lines, Tada (1993) influentially noted that syntactic ergativity in Mayan languages correlates with the linear position of the absolutive marker in the verb stem.[1] This finding is now known as Tada's Generalization: the absolutive marker follows the verb stem in the Mayan languages that

[1] Following CMP (2014), we assume that the correlation between the position of the absolutive marker and the presence of syntactic ergativity is the consequence of a single source phenomenon; however, see Aissen 2017 for an argument (addressed in section 2.2) that it is the result of areal diffusion.

do not display syntactic ergativity, such as Ch'ol (5). In the majority of syntactically ergative languages, the absolutive marker precedes the verb stem, as in Q'anjob'al (6).[2]

(5) *Ch'ol*
Tyi y-il-ä-**yety**.
CPL 3ERG-see-TV-2ABS
'She saw you.'
(CMP 2014:190)

(6) *Q'anjob'al*
Max-**ach** y-il-a'.
CPL-2ABS 3ERG-see-TV
'She saw you.'
(CMP 2014:190)

CMP refer to the syntactically ergative Mayan languages (e.g., Q'anjob'al) as *HIGH ABS*, because the label evokes the preverbal position of the absolutive marker; CMP posit that the object A-moves to a position higher than the transitive subject in Q'anjob'al and other HIGH ABS languages, and ultimately that syntactic ergativity in HIGH ABS languages arises as a consequence of absolutive inversion.

In accounting for the highlighted difference between (5) and (6), CMP argue that absolutive case is assigned in situ for languages that pattern with Ch'ol, resulting in a lack of A-movement. CMP refer to these languages as *LOW ABS*, because the position of the absolutive marker is relatively low, as is the locus of case assignment (Voice^0). The contrast between LOW ABS languages and HIGH ABS languages is schematized in (7).

(7) *Absolutive case assignment in Mayan (based on CMP 2014)*[3]
a. HIGH ABS: $[_{IP}\ I^0 \ldots$ OBJECT $\|\ [_{VoiceP}$ SUBJECT Voice $[_{VP}$ V ~~OBJECT~~$]]]$
b. LOW ABS: $[_{IP}\ I^0 \ldots$ ___ $\|\ [_{VoiceP}$ SUBJECT Voice $[_{VP}$ V OBJECT$]]]$

Here, we offer a new account of Tada's Generalization, by revisiting the question of *how* the ergative subject becomes trapped in syntactically ergative Mayan languages. We adopt CMP's account of absolutive inversion in HIGH ABS languages.[4] We propose that syntactic ergativity in Mayan arises because the relevant movement would create a crossing dependency, analogous to that of (1): the ergative argument, situated between the tails of a prior absolutive A-movement dependency, cannot move beyond the upper tail (i.e., to the left periphery), as in (8).[5]

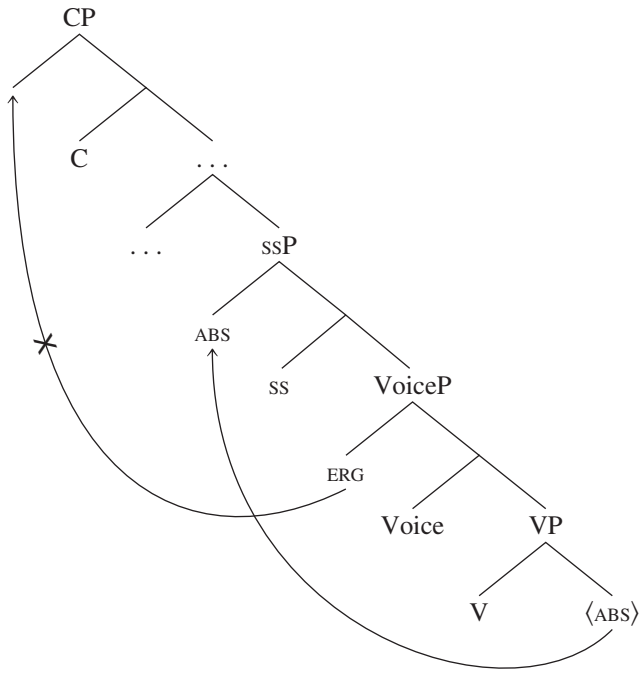
[2] One exception occurs in certain Q'anjob'alan languages in which the marker appears low in the absence of an overt host in I^0, suggesting that I^0 is responsible for generating the morpheme in addition to triggering the A-movement.

[3] For the sake of simplicity, no verb movement is shown; however, we follow Clemens and Coon 2018 with regard to derivation of the verb stem.

[4] Accounts of syntactic ergativity that do not rely on absolutive inversion—namely, those of Assmann et al. (2015), Erlewine (2016), Polinsky (2016), and Deal (2017)—are discussed in section 4.

[5] In order to highlight the relative positions of the absolutive and ergative arguments, we do not show the X^0-raising of the verb into initial position. See Clemens and Coon 2018 for more on word order and verb stem derivation in the Mayan family, and see footnote 19 for further remarks on head movement.

(8) *Crossing dependencies in syntactically ergative Mayan languages*



This account correctly predicts that (a) arguments merged below the lower or above the higher A-movement tail of the absolutive DP may be extracted, while (b) no argument merged between the absolutive DP's A-movement tails may be extracted (cf. CMP 2014; see section 4).

The structure of this article is as follows. Section 2 provides additional background on syntactic ergativity from a crosslinguistic perspective and outlines how syntactic ergativity is parameterized within the Mayan family. Section 3 presents the core proposal, along with data that it straightforwardly explains and data that are more challenging. Section 4 focuses on previous accounts of syntactic ergativity in Mayan—including those that rely on absolutive inversion and those that follow a different approach—and discusses the empirical challenges for these accounts. Section 5 moves beyond the ergative-absolutive languages to examine an extraction asymmetry in double object passives in a number of nominative-accusative languages and multiple *wh*-questions in Bulgarian. Section 6 concludes.

2 Syntactic Ergativity

Syntactic ergativity has received considerable attention in both the syntactic and the processing literature; see Deal 2016, Longenbaugh and Polinsky 2017, and Polinsky 2017 for overviews of work in both of these subdisciplines. Mayan languages have been a particular focus of recent discussion (besides the just-mentioned works, see CMP 2014, Assmann et al. 2015, Clemens et al. 2015, Erlewine 2016, Heaton, Deen, and O'Grady 2016, Aissen 2017, Henderson and Coon

2018, and Coon, Baier, and Levin (CBL) 2019, among others). In this section, we discuss syntactic ergativity from a crosslinguistic perspective before narrowing our focus to restrictions on Ā-movement of the ergative argument in a subset of Mayan languages.

2.1 Crosslinguistic Context

The most familiar way in which a morphologically ergative language reveals itself to be syntactically ergative is by disallowing Ā-movement of the ergative argument (i.e., in relative clauses, *wh*-questions, and fronting constructions).[6] In contrast, absolutive arguments (whether subject or object) can be freely extracted. In West Greenlandic, for example, both absolutive subjects and absolutive objects undergo relativization (9a–b), whereas ergative subjects cannot (9c).

(9) *West Greenlandic*

a. miiqqa-t_i [___$_i$ sila-mi pinnguar-tu-t]
child-PL.ABS outdoors-LOC play-REL.INTRANS-PL
'the children who are playing outdoors'

b. miiqqa-t [Juuna-p ___$_i$ paari-sa-i]
child-PL.ABS Juuna-ERG look.after-REL.TRANS-3SG.PL
'the children that Juuna is looking after'

c. *angut$_i$ [___$_i$ aallaat tigu-sima-sa-a]
man-ABS gun.ABS take-PERF-REL.INTRANS-3SG
Intended: 'the man who took the gun'
(Bittner 1994:55, 58)

The intended meaning of (9c) is instead expressed via an antipassive construction, discussed in the context of Mayan languages in the next section.

2.2 Ergative Alignment in Mayan Languages

The Mayan language family consists of about thirty languages, spoken primarily in Guatemala and Mexico by more than six million people. Mayan languages exhibit ergative-absolutive alignment, expressed via head marking on the main predicate. Ergative markers (Set A) cross-reference the subjects of transitive predicates, and absolutive markers (Set B) index the objects of transitive predicates and intransitive subjects.[7] Mayan languages are verb-initial in discourse-neutral contexts, and the preverbal position is associated with topic and focus (England 1991, Aissen 1992, Clemens and Coon 2018).

[6] Some ergative languages are known to exhibit syntactic ergativity in only a subset of Ā-environments (e.g., in *wh*-questions, but not in relative clauses, or vice versa; see, e.g., Polinsky 2016, Deal 2017, Douglas, Ranero, and Sheehan 2017). One factor that may give rise to this variation is the possibility that some types of (apparent) Ā-movement involve a covert biclausal structure, as proposed by Henderson and Coon (2018) for certain types of *wh*-questions in Kaqchikel. In this way, instances of "partial" syntactic ergativity may be due to structural differences across different types of Ā-constructions.

[7] The terms *Set A* (ergative) and *Set B* (absolutive) are preferred by some authors, in part because these markers do more than index verbal arguments. Set A markers index the complement of relational nouns and possessors, and Set B markers index the subject of nonverbal predicates and are related to the freestanding pronouns in many languages (see, e.g., England 2001).

A pair of sentences from K'iche' (Central K'ichean) is given in (10). The 3rd person plural ergative marker *k-* indicates the person and number of the (pro-dropped) transitive subject in (10a). The 1st person plural absolutive clitic *=oj* cross-references the (pro-dropped) transitive object in (10a) and the intransitive subject in (10b).

(10) *K'iche'*
  a. X-oj-k-il-o.
     CPL-1PL.ABS-3PL.ERG-see-SS
     '(They) saw (us).'
  b. X-oj-b'iin-ik.
     CPL-1PL.ABS-walk-SS
     '(We) walked.'
     (Can Pixabaj 2017:466)

Throughout the Mayan family, the ergative marker precedes the verb root. In contrast, the position of the absolutive marker can vary. The fixed vs. variable distribution of the ergative and absolutive markers, respectively, is consistent with the fact that the ergative marker is an agreement prefix, whereas the absolutive marker is a clitic in most Mayan languages (e.g., see Coon 2016, 2017, and sources therein for arguments that the absolutive marker is a pronominal element). Therefore, we adopt the formal Mayanist literature's standard position that the absolutive clitic in (10) is derived via A-movement, whereas the ergative agreement prefix represents agreement between a DP argument and v (contra Erlewine 2016).[8]

In a subset of languages, especially those found in the K'ichean-Mamean and Greater Q'anjob'alan families, the absolutive marker surfaces before the verb stem; recall that these are known as the HIGH ABS languages. In the K'iche' examples in (10), the absolutive marker *=oj* follows the tense/aspect/mood marker, precedes the ergative marker on a transitive stem (10a), and precedes the verb stem directly when no ergative marker is present (10b). In both cases, the absolutive marker surfaces before the verb stem.

On the other end of the spectrum are LOW ABS languages like Mopan (Yucatecan), where the absolutive marker follows the verb stem. In both transitive and intransitive clauses (11), the absolutive marker *=e(e)ch* follows the stem. Languages with this distribution include those in the Yucatecan family and Greater Tseltalan families (e.g., see CMP 2014 for Ch'ol).

(11) *Mopan*
  a. Tiw-il-aj-ech.
     1PL.ERG-see-SS-2SG.ABS
     '(We) saw (you).'

[8] Overt absolutive markers that cooccur with coreferential DPs are rare in Mayan languages. First, the 3rd person absolutive marker is null. Second, not all Mayan languages have freestanding 1st and 2nd person pronouns, and they are discourse-marked in those languages that do have them. One exception to the stated generalization occurs in K'ichean languages that have a dedicated 3rd person plural marker; in such languages, it is possible to find an absolutive clitic and coreferential DP. Here, we assume that the absolutive marker is doubling an in-situ argument.

b. Jok'-eech.
went.out-2SG.ABS
'(You) went out.'
(Hofling 2017:711, 729)

The intrafamily variation in the position of the absolutive clitic serves as a core building block of the account of case assignment in Mayan advanced in CMP 2014, which we adopt.

As mentioned in section 1, all Mayan languages are morphologically ergative, but only some display syntactic ergativity. As in West Greenlandic (9), in a number of Mayan languages including Q'anjob'al and K'iche', absolutive arguments can undergo Ā-movement, whereas ergative arguments cannot, a pattern captured by the Mayan Ergative Extraction Constraint (EEC; Aissen 2017). A focus movement paradigm in K'iche' is given in (12). One focus construction in K'iche' involves the fronting of an *aree*-marked constituent. This is shown to be possible for a transitive absolutive object in (12a) and for an intransitive absolutive subject in (12b). Note that (12c) is ungrammatical; the transitive ergative subject cannot be extracted in the same way as the absolutive arguments.

(12) *K'iche'*

a. Aree le al Mari'y$_i$ x-tze'n-ik ___$_i$.
FOC DET HON Maria CPL-laugh-SS
'[Maria]$_{FOC}$ laughed.'

b. Aree le ichaj$_i$ k-Ø-u-tij ___$_i$ le al Mari'y.
FOC DET vegetables INCL-3ABS.SG-3ERG.SG-eat:TV DET HON Maria
'Maria will eat [the vegetables]$_{FOC}$.'

c. *Aree le al Mari'y$_i$ k-Ø-u-tij le ichaj ___$_i$.
FOC DET HON Maria INCL-3SG.ABS-3SG.ERG-eat:TV DET vegetables
Intended: '[Maria]$_{FOC}$ will eat the vegetables.'
(based on Velleman 2014:220, 224)

K'iche' has two options for expressing the meaning intended by (12c): (a) one of two antipassive constructions or (b) use of a Mayan-specific strategy known as the Agent Focus (AF) construction, illustrated in (13a–b), respectively.

(13) *K'iche'*

a. Aree ri a Xwaan$_i$ x-Ø-tob'an chw-ee ___$_i$.
FOC DET CL Juan CPL-3SG.ABS-help:AP POSS.1SG-RN
'[Juan]$_{FOC}$ helped me.'

b. Aree ri a Xwaan$_i$ x-in-to'w-ik ___$_i$.
FOC DET CL Juan CPL-1SG.ABS-help:AF-SS
'[Juan]$_{FOC}$ helped (me).'
(Velleman 2014:21)

Both antipassive and AF constructions result in a scenario where the notional subject—no longer ergative, because the predicate is intransitive—can Ā-move. In the examples above, intransitivity

is evidenced by the absence of ergative agreement, the fact that the person and number features of the theme are realized on an oblique relational noun in (13a), and the presence of the intransitive status suffix on the verb stem in (13b). Note that the antipassive construction crucially differs from the AF construction in that the object is not demoted in the latter: it is not marked as oblique, and in most cases it is the argument that is cross-referenced by absolutive person marking on the verb.

For the sake of comparison, Mopan is a Mayan language that does not show the EEC: no special verb morphology is required to extract ergative subjects. Furthermore, the verb in such constructions remains fully transitive as indicated by the presence of the ergative agreement marker, as shown in (14).

(14) *Mopan*
A winik-i_i walak u-kin-s-ik-Ø b'alum ___$_i$.
DET man-TOP ICP 3ERG-die-CAUS-ITV-3SG.ABS jaguar
'[The man]$_{TOP}$ kills a jaguar.'
(Hofling 1984:46)

Influentially, Tada (1993) observes a correlation between the position of the absolutive clitic relative to the verb stem and the presence of the EEC; CMP expand on the languages originally surveyed. In languages with the EEC, the absolutive clitic is preverbal; languages of this type are listed in (15a).[9] In languages without the EEC, the clitic is consistently postverbal; these languages are listed in (15b).

(15) *Typology of absolutive case and syntactic ergativity (Tada 1993, CMP 2014)*[10]
a. HIGH ABS and EEC: Akatek, Awaktek, Chuj, Kaqchikel, K'iche', Mam, Poqomam, Poqomchi', Popti', Q'anjob'al, Q'eqchi, Sakapultek, Sipakapense, Tz'utujil, Uspantek
b. LOW ABS and no EEC: Ch'ol, Chontal, Itzaj, Lancandon, Mopan, Tojolabal, Tseltal

Aissen (2017) suggests that both the placement of the absolutive clitic and the presence or absence of syntactic ergativity vary as a result of areal diffusion and are not causally correlated. The HIGH ABS syntactically ergative languages belong to the Greater Q'anjob'alan and K'ichean-Mamean subfamilies, and all of the LOW ABS languages belong to the Greater Lower Mayan subfamily, with the exception of Tojolabal, which is spoken in the same region as the Greater Lower Mayan languages. Aissen (2017) is further motivated to abandon a case-based approach

[9] The names of the Mayan languages listed in (9) follow conventions established by the Academia de Lenguas Mayas de Guatemala (ALMG) and the Instituto Nacional de Lenguas Indígenas (INALI).

[10] Including Ixil and Yucatec, but excluding Tsotsil and Huastec (see below in the text and footnotes 11–12), the correlation between the presence vs. absence of syntactic ergativity and the position of the absolutive clitic is highly significant according to Fischer's exact test ($p_{\text{two-tailed}} < 0.001$): languages with syntactic ergativity have preverbal absolutive, while languages without syntactic ergativity have postverbal absolutive.

to deriving the EEC by the outliers to Tada's Generalization and the diversity of ways in which different languages maintain the EEC.

The languages that do not (neatly) conform to Tada's Generalization are shown in (16). These include two LOW ABS languages that are syntactically ergative (16a) and two languages that are difficult to classify (16b). There are no HIGH ABS languages in the Mayan family that are not syntactically ergative.

(16) *Apparent outliers to Tada's Generalization*
  a. LOW ABS and EEC: Ixil, Yucatec
  b. Unclassifiable: Tsotsil,[11] Huastec[12]

We note two objections to ruling out a causal correlation between the EEC and absolutive case (contra Aissen 2017). First, it is possible that both syntactic ergativity and preverbal absolutive placement result from a single underlying phenomenon, which itself might be an areal property, but still warrants a meaningful explanation. Second, it is noteworthy that the presence of AF morphology correlates with the presence of the EEC: within the Mayan family, most syntactically ergative languages have AF marking, and all non–syntactically ergative languages lack it. In particular, the two LOW ABS languages that exceptionally have the EEC—Ixil and Yucatec—both also have AF marking. Notably, these two languages are from different subfamilies: Ixil belongs to the same subfamily grouping as the syntactically ergative languages, and Yucatec belongs to the same subfamily grouping as the LOW ABS languages. Thus, as CMP argue, there is reason to believe that preverbal absolutive placement, syntactic ergativity—and, crucially, AF marking—all arise from a single underlying phenomenon, which casts doubt on areal diffusion as a satisfactory explanation for Tada's Generalization.

In the next section, we address the primary question of the article: *why* does A-movement of the absolutive argument render the ergative argument inaccessible for Ā-movement? We propose that because the ergative argument in HIGH ABS languages is situated between the tails of the absolutive A-movement dependency, Ā-movement of the ergative argument would give rise to an unparsable crossing dependency.

3 Syntactic Ergativity as a Manifestation of the CCD

In this section, we develop an account in which ergative extraction restrictions in Mayan languages do not result directly from the high syntactic position of the absolutive object relative to the ergative subject, as in earlier instantiations of the "standard theory" of syntactic ergativity (termi-

[11] Tsotsil has both high and low absolutive markers and while it has an AF construction, it allows ergative arguments to be extracted in environments typically disallowed by the languages in (15a). For more discussion of Tsotsil in the context of syntactic ergativity, see Aissen 1987, 1999a, Woolford 2006, 2011, CMP 2014, CBL 2019, and especially Aissen 2017.

[12] Huastec has a completely divergent head-marking system; see discussion in CMP 2014.

nology from Deal 2016 for accounts based on absolutive inversion; e.g., Bittner and Hale 1996, Aldridge 2004, CMP 2014, CBL 2019); rather, they result from the fact that the absolutive object moves past the ergative subject to reach its higher position. This A-movement means that the ergative subject—indeed, any DP between the Merge site and the landing site of the absolutive object—cannot undergo Ā-movement without creating an illicit crossing dependency. Thus, our account of the EEC is grounded in the body of pre-Minimalist syntactic literature that advocates for the relevance of path trajectories, as opposed to merely c-command relations, in determining the well-formedness of structural outputs (e.g., Hankamer 1973, Kayne 1981, Pesetsky 1982). We appeal to one particular constraint, which states that movement pathways must be *nested*: the Constraint on Crossing Dependencies (CCD; Kuno and Robinson 1972, Steedman 1985), repeated in (17). Note that the CCD dovetails with Pesetsky's (1982) Path Containment Condition, given in (18).

(17) *Constraint on Crossing Dependencies*
No movement dependency may cross another movement dependency.
(based on Kuno and Robinson 1972:476)

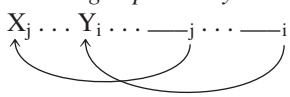
(18) *Path Containment Condition*
If two paths overlap, one must contain the other.
(Pesetsky 1982:309)

We further note that both (17) and (18) invoke Hankamer's (1973) Structural Recoverability in deletion rules (see (19)), in the sense that movement dependencies that are crossed (i.e., overlapping paths) yield the same linear and c-command relations between the relevant moved elements as in their premovement configuration.

(19) *Structural Recoverability*
[A] deletion rule would have to be so formulated or so constrained that it could never map two distinct inputs into the same output.
(Hankamer 1973:39)

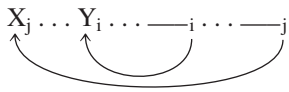
Crossing dependencies violate (19) insofar as the c-command relations between the relevant DPs are identical both before and after movement, as in (20).

(20) *Crossing dependency: X c-commands Y in base and surface positions*



In contrast, nested dependencies do not violate (19), since pre- and postmovement c-command relations are the inverse of each other, as illustrated in (21).

(21) *Nested dependency: Y c-commands X in base but not surface position*



In what follows, we show how the availability of movement pathways in Mayan languages is captured by the CCD and related constraints. In particular, in one movement pathway that results in an ill-formed crossing dependency, an ergative subject moves past an A-moved absolutive object, giving rise to syntactic ergativity.

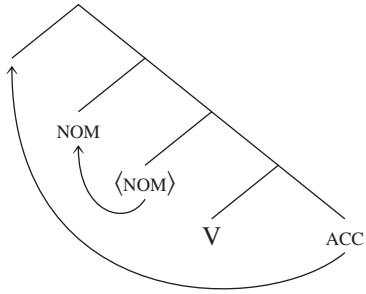
We take as our jumping-off point CMP's account of absolutive case assignment.[13] Recall from section 1 that in HIGH ABS languages, absolutive case is assigned by I^0, which requires A-movement of the absolutive argument. In LOW ABS languages, absolutive case is assigned in situ by $Voice^0$. Ergative case, meanwhile, is assigned to a transitive subject via inherent Agree with a lower Voice head.

The remainder of this section is organized as follows. We present the core details of our analysis in section 3.1 and discuss the AF construction in section 3.2. Then, focusing primarily on prepositional goals and applicatives, we address the empirical predictions of our proposal in section 3.3. In section 3.4, we consider cases in which the ergative argument may, exceptionally, extract.

3.1 Proposal

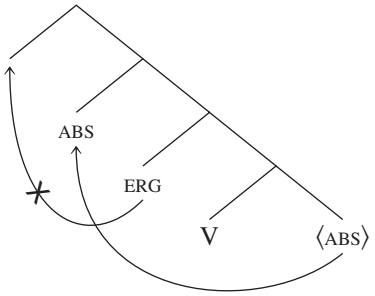
The trees in (22) offer a highly schematized portrayal of accusative object extraction in a nominative-accusative language, in which the unmarked argument undergoes A-movement and the marked argument undergoes Ā-movement, as compared with a comparable sequence of movements in an ergative-absolutive language. Although restrictions on the extraction of an ergative argument are overwhelmingly more common crosslinguistically than restrictions on the extraction of an accusative argument (see section 4), in many respects the movement path in nominative-accusative languages is very similar to that of the path in ergative-absolutive languages: the unmarked (nominative or absolutive) argument first A-moves into a position more local to its case assigner, after which Ā-movement of the marked (accusative or ergative) argument is attempted.

(22) a. *Movement of ACC: Nested dependency*



[13] In contrast, CBL propose that A-movement in HIGH ABS languages is motivated by an an EPP feature rather than by a case feature. Here, we follow CMP instead of CBL, but nothing crucial hinges on that decision; our account succeeds no matter what motivates the movement of the absolutive argument.

b. **Movement of ERG: Crossing dependency*



We note one crucial difference between the movement patterns shown in (22): in nominative languages, the accusative argument Ā-moves around the prior movement path of the nominative argument, whereas in ergative languages, the ergative argument moves across the prior movement path of the absolutive argument. Thus, the nominative A-dependency and the accusative Ā-dependency in (22a) are nested: notice that the lower tail of the nominative dependency c-commands the lower tail of the accusative dependency. In contrast, the absolutive A-dependency and the ergative Ā-dependency in (22b) cross. In the crossing dependency, the lower tail of the absolutive dependency does not c-command the lower tail of the ergative dependency.

Crossing dependencies are typologically rarer than nested dependencies (e.g., Hays 1964, Kuno and Robinson 1972, Shieber 1985, Steedman 1985, Levy and Manning 2004, Levy et al. 2012, Ferrer i Cancho, Gómez-Rodríguez, and Esteban 2018, Yadav and Husain 2018). In English, for example, constructions that involve nested dependencies are typically judged far more acceptable than constructions that involve crossing dependencies; compare (23a) with (23b).

(23) *Crossing and nested dependencies*

a. *Which sonata$_j$ is this violin$_i$ easy to play ___$_j$ on ___$_i$?

b. Which violin$_j$ is this sonata$_i$ easy to play ___$_i$ on ___$_j$?

(Steedman 1985:35)

This insight resulted in research focusing on experimental support for the existence of the CCD (17) and in the development of language-processing theories seeking to explain why dependency crossing is more difficult to process than dependency nesting (e.g., Fodor 1978, Frazier and Fodor 1978, Rochemont and Culicover 1990, Pickering and Barry 1991). In particular, Frazier and Fodor (1978) propose that the CCD is a result of the storage and processing mechanisms by which filler-gap dependencies are formed: fillers are stored in a "first-in-last-out" (i.e., nested) manner, as opposed to a "first-in-first-out" (i.e., crossing) manner.

In a reaction time study, Frazier, Clifton, and Randall (1983) tested the hypothesis that when a gap site is encountered, the parser attempts to fill the gap with the most recently processed

filler. In their study, they presented participants with sentences like (24a–b). Both sentences involve the filler *who*, which must be associated with a gap site. In (24a), the gap site for *who* is at the end of the sentence, following *about.* However, since the matrix verb *want* functions in this environment as a control verb, there is a null PRO preceding the embedded infinitival marker, which must also be semantically associated with an antecedent. By contrast, in (24b) *want* selects for a complement with an exceptional-case-marked subject; thus, the gap site for the filler *who* is closer, directly following the matrix verb.

(24) a. Mary is the one student who$_i$ the teacher$_j$ wanted PRO$_j$ to talk to the principal about ___$_i$.
b. Mary is the one student who$_i$ the teacher wanted ___$_i$ to talk to the principal.

According to general principles of filler-gap dependency processing, (24a) should be more difficult to process than (24b): the gap site is farther from the filler in (24a) than in (24b) (see Frazier and Fodor 1978, Crain and Fodor 1985) and the filler-gap dependency in (24a) contains two intervening discourse referents—*the teacher* and PRO—whereas the filler-gap dependency in (24b) contains only one—*the teacher* (see Gibson 1998). However, Frazier, Clifton, and Randall found the reverse to be true: when presented visually with sentences like (24a) and (24b) word by word and asked to respond as fast as possible at the end of the sentence when they felt they had understood it, participants responded to (24a) more quickly than to (24b), indicating that they processed (24a) more easily than (24b).

Frazier, Clifton, and Randall propose that their finding is the result of the manner in which the parser stores fillers; namely, the most recently processed antecedent filler is activated when a null element such as a gap or PRO is encountered. Thus, in both sentences the most recent potential filler that can be semantically associated with the null element following the matrix verb *wanted* is *the teacher.* In (24a), this turns out to be correct, and no reanalysis is required. In (24b), however, this turns out to be incorrect: the correct filler is the more distal *wh*-phrase *who*, which requires reanalysis and results in a slower response time to (24b). Frazier, Clifton, and Randall conclude that upon finding a dependency site, the parser necessarily activates the most recently encountered potential filler.[14]

[14] In a later study, Bach, Brown, and Marslen-Wilson (1986) examined comprehensibility ratings for sentences involving clause-final verb clusters, comparing German (in which the dependencies in the clusters are nested) with Dutch (in which they are crossed). When the sentences involved a single dependency (i.e., two-verb clusters), the authors found no difference in acceptability between Dutch and German. However, when the sentences involved a dual dependency (i.e., three-verb clusters), the Dutch sentences were judged more easily comprehensible than their German counterparts. The authors take this finding as evidence against the "first-in-last-out" processing model. However, it is possible that the difference in ratings arose from an unrelated difference between Dutch and German in terms of the morphosyntactic form of the final verb: for Dutch this verb is infinitival, whereas for German there is lack of consensus among speakers as to whether the verb should be in its infinitival or participial form. In other words, the verb cluster in Dutch has only one possible morphosyntactic form, whereas in German it has two. Since it is well-known that any form of lexical, morphological, or syntactic ambiguity leads to increased processing difficulty (see, e.g., Trueswell and Tanenhaus 1994), the decreased comprehensibility of German as compared with Dutch could be construed as reflecting a difficulty posed by language-specific morphosyntactic ambiguity rather than greater difficulty of nested dependencies.

Connecting the discussion back to syntactic ergativity, we note that Ā-movement of an ergative argument in HIGH ABS languages like K'iche' and Q'anjob'al creates a crossing dependency, because the Ā-gap of the ergative argument is contained within the tails of the A-dependency of the absolutive argument; see again (22b). By contrast, Ā-movement of the accusative argument in a nominative-accusative language like English creates a nested dependency, because the Ā-gap of the accusative argument is located outside the tails of the A-dependency of the nominative argument; see again (22a).

Putting this observation into the context of Frazier, Clifton, and Randall's (1983) study means that when the gap site of the ergative argument is encountered, the parser would activate the most recently encountered filler, which would—incorrectly—be the A-moved absolutive argument and not the more distant Ā-moved ergative argument. By contrast, in a non–syntactically ergative language like Ch'ol, the absolutive argument does not A-move past the ergative and no multiple movement dependencies are created. We therefore propose that syntactic ergativity arises when movement of the ergative argument creates a crossed dependency; in other words, it triggers dependency formation within an incomplete A-dependency.

The final element of our proposal is grammaticalization: we propose that difficulty in processing a crossing dependency—as compared with a nested or disjoint dependency—has become a categorical constraint in Mayan languages. Crucially, we argue that the processing mechanisms that give rise to the CCD—and account for Frazier, Clifton, and Randall's (1983) finding—have become grammaticalized in Mayan languages. This view of grammaticalization is based on Hawkins's (2004) Performance-Grammar Correspondence Hypothesis (25), according to which processing-based preferences may become grammaticalized as categorical requirements in some languages.

(25) *Performance-Grammar Correspondence Hypothesis*
Grammars have conventionalized syntactic structures in proportion to their degree of preference in performance, as evidenced by patterns of selection in corpora and by ease of processing in psycholinguistic experiments. (Hawkins 2004:3)

While the primary objective of this article is to offer an account of syntactic ergativity grounded in insights from the language-processing literature and based on data from Mayan languages, we recognize that for many authors, the EEC and Mayan's AF construction—one particular strategy for circumventing the EEC—go hand in hand (Ordóñez 1995, Stiebels 2006, CMP 2014, Assmann et al. 2015, Watanabe 2017, CBL 2019, Ranero 2019). In the next section, we briefly consider two ways in which AF might be accounted for in the context of our proposal.

3.2 Agent Focus

Recall that speakers of Mayan languages utilize a number of strategies to circumvent the EEC, perhaps most famously the AF construction. AF involves a notionally dyadic predicate with intransitive person marking. In the following Q'anjob'al examples, note the presence of the ergative marker *s-* in (26a) but not in (26b). Also note that in (26b) the thematic agent appears in

preverbal position, which is associated with Ā-extraction in Mayan languages, and the predicate bears an AF marker (*-n* in (26b)).

(26) *Q'anjob'al AF*

a. Max-Ø s-tayne-j naq unin te na.
PFV-3ABS 3ERG-take.care-TV CL child CL house
'The child took care of the house.'

b. A naq unin max-Ø tayene-**n** te na.
FOC CL child PFV-3ABS take.care-AF CL house
'It is the child who took care of the house.'
(Mateo Toledo 2008:76)

AF constructions in individual languages differ with respect to several properties, including (a) whether the thematic agent or patient controls person marking on the verb, (b) whether or not the person hierarchy (1/2 > 3PL > 3SG) plays a role in the use and form of AF constructions, and (c) whether the use of AF morphology is obligatory everywhere it can occur (see, e.g., Aissen 2017).

We suggest that what all instances of AF share is that they allow a would-be ergative argument to be extracted by allowing it to Ā-move without creating an ill-formed crossing dependency. There are two ways this might be achieved in the context of our proposal. First, it is possible that in an AF construction the object does not undergo A-movement past the ergative subject at all, but remains in situ. This has been proposed by CMP, who argue that the AF morpheme acts as a low case licenser, meaning that the object can be licensed in situ.

A second, related possibility is that the AF morpheme functions as a resumptive pronoun for the absolutive clitic marker, and A-movement does not take place, as proposed by Tollan (2019). This would mean that the clitic is merged in situ (i.e., above the transitive subject) and coindexed with the lower AF marker. The resulting lack of absolutive A-movement means that movement of the ergative argument does not create a crossing dependency (as there is no other movement dependency in the structure) and is therefore licit.

In the next sections, we further test the predictions of our proposal by investigating the extraction of DPs situated between the Merge and landing sites of the absolutive object in HIGH ABS languages.

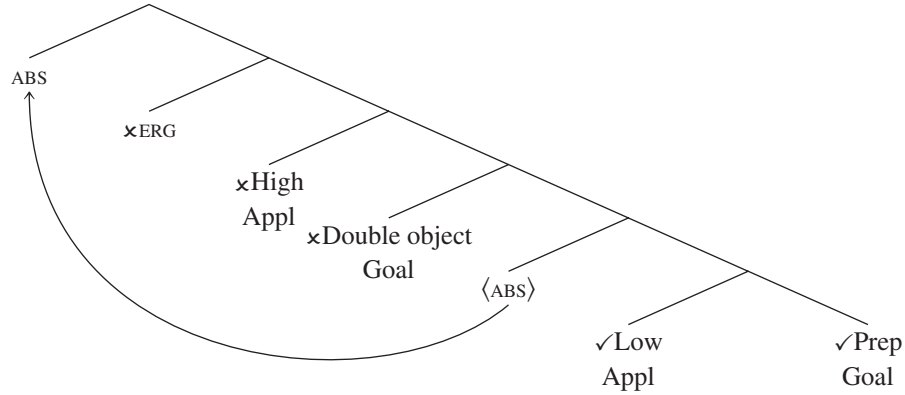
3.3 Beyond Absolutive and Ergative

Our proposal—that syntactic ergativity is the result of forming illicit crossing dependencies when trying to extract ergative arguments in HIGH ABS Mayan languages—predicts that the EEC in Mayan should not be limited to ergative arguments. Rather, no DP merged between the tails of the absolutive object A-dependency should be able to extract. There are two obvious candidates on which to test this prediction: double object constructions and high applicatives. A goal argument in a double object construction is standardly analyzed as being introduced by a high applicative phrase (e.g., Harley 1995, Anagnostopoulou 2003, Pylkkänen 2008, Holmberg, Sheehan, and Van

der Wal 2019); however, CMP note that Mayan languages generally lack double object constructions (see also Clemens and Polinsky 2017 for a broader verb-initial perspective). The second candidate is more promising: high applicatives are argued to be situated above the VP containing the direct object, such that the high applicative scopes over the verbal event (Pylkkänen 2002, 2008); and indeed, many Mayan languages have high applicative constructions (see Mora-Marín 2003 and sources therein).

Our account makes a second general prediction: any argument generated below the Merge position of the absolutive argument should freely extract. Prepositional dative goals are a good candidate for testing this prediction. Low applicatives would be as well, but we know of no instances of low applicatives in HIGH ABS Mayan languages.[15] The predictions of our account, in terms of which elements should and should not be able to extract, are schematized in (27).

(27) *Extraction predictions in HIGH ABS languages*

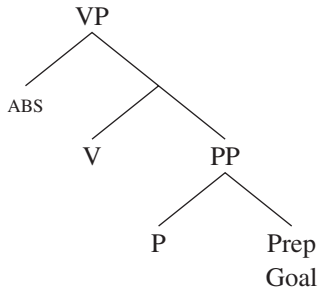


Working our way up the tree, we begin testing the predictions of our proposal with the extraction of prepositional dative goals in HIGH ABS languages (section 3.3.1). We then turn to an interesting asymmetry in Kaqchikel adjunct extraction (section 3.3.2) that allows us to test both of our general predictions. Finally, we discuss high applicatives in HIGH ABS languages (section 3.3.3).

3.3.1 Prepositional Dative Goal Extraction Here we address the extraction of prepositional dative goals in two HIGH ABS languages: Q'anjob'al and Kaqchikel. It is standardly assumed that prepositional ditransitive goals are structurally lower than direct objects (i.e., direct objects asymmetrically c-command ditransitive goals; e.g., Larsen 1988), as in (28).

[15] Low applicatives appear to be restricted to the Tseltalan branch languages within the Mayan family (Coon 2017 and sources therein), all of which are LOW ABS or unclassifiable (see section 2).

(28) *Prepositional ditransitive* (based on Holmberg, Sheehan, and Van der Wal 2019:685)



Thus, we predict that the prepositional goal arguments of ditransitive verbs should extract in the same way as absolutive arguments. In fact, in Q'anjob'al, prepositional goal arguments extract without AF or any other workaround. Each of the *wh*-questions in (29b–d) targets a different argument, but note that the AF construction is only used for extraction of the agent (29b); when either the direct object (29c) or the prepositional object (29d) is extracted, the form of the verb is the same as in the declarative (29a).

(29) *Q'anjob'al*

a. Max-Ø y-aq' naq Xhunik ixim nal b'ay ix Carla.
CPL-3ABS 3ERG-give CL Juan CL corn PREP CL Carla
'Juan gave the corn to Carla.'

b. Maktxel max-Ø aq'-**on** ixim nal b'ay ix Carla?
who CPL-3ABS give-AF CL corn PREP CL Carla
'Who gave the corn to Carla?'

c. Tzet max-Ø y-aq' naq Xhunik b'ay ix Carla?
what CPL-3ABS 3ERG-give CL Juan PREP CL Carla
'What did Juan give to Carla?'

d. Maktxel b'ay max-Ø y-aq' naq Xhunik ixim nal?
who PREP CPL-3ABS 3ERG-give CL Juan CL corn
'To whom did Juan give the corn?'
(Pedro Mateo Pedro, pers. comm.)

This means that, when a ditransitive goal is Ā-moved, the gap of the goal argument (unlike the would-be gap of an ergative argument) is situated below the lower tail of the absolutive A-dependency. Therefore, the dependency is nested and is thus permitted.

In terms of our proposal, the first gap site that the parser would encounter would be the gap of the A-moved absolutive object. The parser would then activate the most recently processed potential filler, namely, the absolutive object. This would indeed turn out to be the correct analysis; subsequently, on encountering the gap of the Ā-moved ditransitive goal, the parser would activate the only remaining active filler—the Ā-moved ditransitive goal. Thus, processing of this structure proceeds without problem.

By contrast, extraction of prepositional goals in Kaqchikel appears to pose a problem for our analysis, because it requires a dedicated construction used to focus (i.e., front) a certain type of adjunct (Henderson 2007; see Rizzi 1990 for more general discussion of adverb fronting). The data in (30) show a ditransitive baseline against which to compare a transitive subject, direct object, and prepositional goal under narrow focus in clause-initial position. Note that the clitic *wi* obligatorily follows the verb in (30d). To restate the problem, although two different strategies are used for fronting ergative subjects (i.e., AF in (30b) and prepositional goals (*wi*-construction) in (30d)), they are similar in that for both cases the relevant DP cannot Ā-move directly, as it can when an absolutive argument undergoes focus Ā-movement, as in (30c).

(30) *Kaqchikel*

a. X-Ø-in-löq' ri äk' chi a-te'.
CPL-3SG.ABS-1SG.ERG-give DEM chicken PREP 2SG.POSS-mother
'I gave the chicken to your mother.'

b. Ja yïn x-i-löq'*(**-o**) ri äk' chi a-te'.
FOC 1SG CPL-1SG.ABS-give-AF DEM chicken PREP 2SG.POSS-mother
'[I]$_{FOC}$ gave the chicken to your mother.'

c. Ja ri äk' x-Ø-in-löq' chi a-te'.
FOC DEM chicken CPL-3SG.ABS-1SG.ERG-give PREP 2SG.POSS-mother
'I gave [the chicken]$_{FOC}$ to your mother.'

d. Ja chi a-te' x-Ø-in-löq' *(**wi**) ri äk'.
FOC PREP 2SG.POSS-mother CPL-3SG.ABS-1SG.ERG-give WI DEM chicken
'I gave the chicken [to your mother]$_{FOC}$.'
(Robert Henderson, pers. comm.)

Henderson (2007) provides evidence demonstrating that, despite first appearances, prepositional dative goals in Kaqchikel are not situated below the theme, as we would expect given the structure in (28). Instead, he shows that they are generated in a position generally associated with high applicatives. Because we expect high applicatives to be generated between the tails of absolutive A-movement, as in (27), the extraction pattern in (30) is also straightforwardly explained by our analysis. We return to the apparent problem of prepositional goal extraction in Kaqchikel in the next section, once we have introduced the adjunct extraction paradigm.

3.3.2 Adjunct Extraction in Kaqchikel We now focus on an interesting case of asymmetrical adjunct extraction in Kaqchikel, which Henderson (2007) argues to be structurally similar to the difference between high and low applicatives in other languages. In fact, because we do not know of any clear examples of low applicatives in HIGH ABS Mayan languages, data from Kaqchikel's "low" adjuncts act as a stand-in for the purpose of testing the predictions in (27) pertaining to low applicatives; see Tollan 2019 for discussion of the connection between the Mayan EEC and differences in extraction possibilities between high and low applicative adjuncts.

Henderson (2007) observes that certain types of adjuncts can freely surface in this focus-sensitive position. In contrast, other types of adjuncts (including the prepositional goals discussed

above) cannot surface in initial position unless the verbal clitic *wi* surfaces in a lower, postverbal position. For example, when an adjunct of place is fronted, as in (31a), the clitic *wi* must follow the verb. However, when a benefactive is fronted, as in (31b), *wi* cannot occur. In other words, it is possible to directly extract a benefactive adjunct, but not a place adjunct.

(31) *Kaqchikel*
a. Pa k'ayb'al x-Ø-in-löq' *(**wi**).
PREP market CPL-3ABS-1ERG-buy WI
'In the market I bought it.'
b. R-ichin a-te' x-Ø-in-löq' (*__wi__) ri uq.
3SG.ERG-BEN 2SG.POSS-mother CPL-3SG.ABS-1SG.ERG-buy WI DEM corte
'For your mother I bought the corte.'
(Henderson 2007:1–4)

Henderson draws a parallel between high applicatives and *wi*-triggering adjuncts on the one hand and low applicatives and adjuncts that do not trigger *wi* on the other (see also discussion in Mendes and Ranero 2021, where these observations are situated within the theory of chain reduction). His argument is based on the semantic distinction between modifying events and modifying themes. He demonstrates that, like high applicatives, *wi*-triggering adjuncts modify the semantic event. For example, a *wi*-triggering adjunct, such as the place adjunct *pa ch'at* 'in bed', cannot combine with an individual-level predicate, which necessarily lacks a semantic event.

(32) *Kaqchikel*
*Nïm r-aqän rija' pa ch'at.
big 3SG.ABS-leg 3SG PREP bed
Intended: 'He is tall in bed.'
(Henderson 2007:11)

In contrast, adjuncts that do not trigger *wi*, such as the benefactive, combine freely with individual-level predicates, as shown in (33). The compatibility between this class of adjuncts and individual-level predicates is consistent with an account where these adjuncts combine directly with the theme, as in low applicatives (Pylkkänen 2002).

(33) *Kaqchikel*
Nïm r-aqän ri ch'at w-ichin.
big 3SG.ABS-leg DEM bed POSS-BEN
'My bed is tall.'
(Henderson 2007:11)

Further evidence that benefactives behave like low applicatives in Kaqchikel comes from the fact that the verb in a benefactive construction cannot antipassivize, as shown in (34). Henderson takes this to mean that the benefactive argument is structurally dependent on the (missing) theme argument, as would be true for a low applicative construction.

(34) *Kaqchikel*
*X-i-tz'i'b'a-n r-ichin nu-te'.
CPL-1SG.ABS-write-AP 3POSS-BEN 1POSS-mother
Intended: 'I wrote for my mother.'
(Henderson 2007:12)

The patterns in Kaqchikel adjunct extraction follow from a grammaticalized constraint against crossing dependencies. In terms that are relevant to the analysis (section 3.1), *wi*-triggering adjuncts are generated between the A-movement tails of the absolutive object. Their extraction thus creates an illicit, crossing dependency. Subsequently, an alternative strategy is required for these adjuncts to occur in initial position. In contrast, benefactives occupy the same position as low applicatives and are merged below the absolutive. Thus, they are not situated between the tails of the absolutive object A-movement dependency, and their extraction creates a nested dependency.

Returning to the question of why prepositional goals in Kaqchikel behave more like transitive subjects than like absolutive objects when it comes to extraction, Henderson (2007) also shows that, unlike the verb in a benefactive construction (34), the verb in a prepositional goal construction *can* antipassivize (35).

(35) *Kaqchikel*
X-i-tz'i'b'a-n chi r-e nu-te'.
CPL-1SG.ABS-write-AP PREP 3POSS-DAT 1POSS-mother
'I wrote to my mother.'
(Henderson 2007:12)

Following through with this line of reasoning, in Kaqchikel, prepositional goals modify the event and are generated higher than is typical of prepositional goals. In other words, prepositional object constructions in Kaqchikel are essentially analogous to double object constructions, at least with respect to the generation of core arguments.

This naturally prompts the question of whether the verb in Q'anjob'al's prepositional goal construction can also antipassivize. This does not appear to be the case, however, as the example in (36) shows.

(36) *Q'anjob'al*
*Max-Ø aq'-waj naq Xhunik b'ay ix Carla.
CPL-3ABS give-AP CL Juan PREP CL Carla
'Juan gave to Carla.'
(Pedro Mateo Pedro, pers. comm.)

Thus, Q'anjob'al's prepositional goal constructions are more typical of prepositional goal constructions crosslinguistically, as modeled in (28).

One final note with respect to the comparison between prepositional goal constructions in Q'anjob'al and Kaqchikel: unlike Henderson's Kaqchikel consultants (2007; also see (30)), Assmann et al. (2015) report that their consultants allow extraction of prepositional goals without

wi. Kaqchikel is spoken by over half a million people, and dialectal variation is understudied (although see Patal Majzul, García Matzar, and Espantzay Serech 2000). We predict that speakers who allow the extraction of prepositional goals without *wi* do not, in turn, allow the verb in prepositional object constructions to antipassivize. In other words, for some speakers of Kaqchikel, prepositional goal constructions are more in line with those found in Q'anjob'al and other languages.

To summarize what we have shown so far: Independent evidence indicates that prepositional object DPs in Q'anjob'al and benefactive DPs in Kaqchikel are merged below the absolutive object, and—as our proposal predicts—they extract unproblematically. In contrast, Kaqchikel prepositional object DPs behave like high applicatives: they are merged above the absolutive object and therefore require a special element (*wi*) in order to surface in a noncanonical position. Next, we consider the extraction of more prototypical high applicatives.

3.3.3 High Applicatives We expect that arguments introduced by a high applicative head should not be able to straightforwardly undergo Ā-movement in transitive constructions in HIGH ABS Mayan languages, because those DPs are located between the tails of the absolutive argument's A-dependency. To test this prediction, we consider the Mayan suffix *-b'e*, which is found in both high and low applicative constructions across the family (Mora-Marín 2003, Grinevald and Peake 2012, Coon 2016).

For most Mayan languages, *-b'e* is used in constructions that promote and/or focus indirect objects including instruments, locatives, and addressees, depending on the specific language (Mora-Marín 2003). Here, we focus on the Mayan *-b'e* construction in the HIGH ABS languages that have it, where it is also called the "instrumental voice" construction (Mondloch 1978a, Ayres 1983, Dayley 1985).[16] Note, however, that in the LOW ABS languages of the Ch'olan and Tseltalan branches, *-b'e* marks a low applicative construction that applies to transitive verbs in which an indirect object is promoted from oblique status (Aissen 1987, Vázquez Álvarez 2011, Shklovsky 2012, Polian 2013, Coon 2016).

In a number of HIGH ABS languages including Ixil, Kaqchikel, K'iche', Poqomam, Poqomchi, and Tz'utujil, the applicative suffix *-b'e* signals the promotion of an indirect object; however, the status of the promoted object varies a good deal. On one end of the continuum is K'iche', whose promoted object can be shown to control the person marking on the verb. On the other end is Kaqchikel, whose fronted indirect object still surfaces in a prepositional phrase. For some of these languages *-b'e* is optional when the indirect object occurs in its base position, but crucially, for all of these languages *-b'e* is required when the indirect object is focused, questioned, or relativized—that is, in Ā-contexts.

[16] Most Mamean languages, with the exception of Ixil, do not have an analogous construction, nor do the Q'anjob'alan languages (Mora-Marín 2003).

A pair of examples from K'iche' is given in (37). When the instrument is not fronted, as in (37a), it surfaces as an oblique, but when it is, it appears without a preposition and *-b'e* immediately follows the verb root, as in (37b).

(37) *K'iche'*

a. K-Ø-in-rami-j lee chee' chi ch'iich'.
ICP-3SG.ABS-1SG.ERG-cut-TV DET wood PREP machete
'I cut (habitually) the wood with a machete.'

b. Ch'iich' k-Ø-in-rami-b'e-j lee chee'.
machete ICP-3SG.ABS-1SG.ERG-cut-APPL-TV DET wood
'A machete is what I cut the wood with.'
(Kaufman 1990, via Mora-Marín 2003:202)

Mora-Marín (2003) provides evidence that *-b'e* specifically marks high applicatives as opposed to low applicatives: *-b'e* can also be used as a valency-changing operation whereby root intransitives become transitivized, as in (38).

(38) *K'iche'*
Lee achi'h u-q'ab' k-Ø-u-war-a-b'e-ej.
DET man 3POSS-arm ICP-3SG.ABS-3SG.ERG-sleep-EP-APPL-TV
'The man sleeps on his arm.'
(Kaufman 1990, via Mora-Marín 2003:203)

The fact that *-b'e* can be added to intransitive roots demonstrates that it is a high, as opposed to low, applicative marker: if it were a low applicative marker, it would be incompatible with intransitive predicates because low applicatives standardly combine with a direct object, which is absent in intransitive predicates such as *war* 'sleep' in (38).

Thus, we see evidence that in HIGH ABS Mayan languages, high applicative arguments—just like ergative arguments—cannot straightforwardly extract: the applicative suffix *-b'e* is required. We maintain that these arguments are inaccessible to Ā-movement because they are merged between the tails of the absolutive object A-dependency. From that position, extraction would create an unparsable crossing dependency, as illustrated in (22b). In section 4, we review previous accounts of how movement of the absolutive argument traps the ergative argument, thus preventing it from undergoing Ā-movement. We then outline some of the empirical problems that these accounts face. First, though, we discuss scenarios in which the ergative subject *can* extract.

3.4 Exceptional Extraction of the Ergative Argument

Under certain conditions, ergative subject extraction is exceptionally permitted in HIGH ABS Mayan languages. In this section, we discuss how these facts fit with our proposal. We focus first on the featural combinations of the subject and object (section 3.4.1), then on reflexive and extended reflexive objects (section 3.4.2), and finally on bare NP objects (section 3.4.3).

3.4.1 Person Features Syntactic ergativity in Q'anjob'al is voided when the ergative subject is a 1st or 2nd person pronoun (Stiebels 2006, Pascual 2007, CMP 2014, Aissen 2017, CBL

2019). In (39a), the 3rd person subject *Juan* cannot be extracted directly from the transitive clause; the AF construction is used instead. However, when the subject is a 1st person pronoun, it freely extracts, as the transitive verbal morphology indicates.

(39) *Q'anjob'al*

a. A Juan max-Ø maq'on-i no tx'i.
FOC Juan CPL-3ABS hit-AF-ITV CL dog
'It was Juan who hit the dog.'

b. Ay-in max-Ø hin-maq'-a' no tx'i.
FOC-1SG CPL-3ABS 1ERG-hit-TV CL dog
'It was me who hit the dog.'
(CMP 2014:223)

Craig (1979) reports the same pattern for Popti' (see also Stiebels 2006, Aissen 2017): 1st and 2nd person pronouns may extract, but all other types of nominals trigger syntactic ergativity. If we look beyond Q'anjob'al and Popti', the pattern across the Mayan family is more complex still. Aissen (1999a, 2017) reports that in Tsotsil, syntactic ergativity obtains only when both the subject and the object are 3rd person; if one of the two core arguments is 1st or 2nd person, extraction of the ergative argument proceeds straightforwardly. Furthermore, in certain dialects of K'iche', syntactic ergativity obtains unless both the subject and the object are 1st/2nd person (Mondloch 1978b, Stiebels 2006, Aissen 2017). Finally, in other languages the person features of the subject and the object have no bearing on whether the ergative subject can extract (e.g., Kaqchikel; see CMP 2014).

The generalization to be drawn here is that, to varying degrees across syntactically ergative Mayan languages, 1st/2nd person pronouns allow the ergative argument to be extracted, where extraction would otherwise not be possible. The strictest languages are those like Kaqchikel: the person features do not determine extraction possibilities. K'iche' is slightly less strict: if both the subject and the object are 1st/2nd person, the ergative argument may extract. Next come Q'anjob'al and Popti', where only the subject must be 1st or 2nd person in order for the ergative to extract. Finally, in Tsotsil, if either of the two core arguments is 1st or 2nd person, extraction of the ergative is unproblematic.

We maintain that even these facts can be explained under a processing-based account of syntactic ergativity. Since Warren and Gibson 2002, it has been well-established in the psycholinguistic literature that long-distance dependency structures involving 1st and 2nd person pronouns are processed more easily than those involving 3rd person nominals: they are read faster in self-paced reading settings and judged more acceptable in grammaticality-rating studies. Warren and Gibson propose that this is because 1st and 2nd person pronouns do not require the processor to build a new discourse referent: their reference is already given by virtue of any and every conversational environment (which necessarily involves a 1st person speaker and a 2nd person listener). In contrast, 3rd person nominals require a new discourse referent to be built, because they are not given entities. Under Gibson's (1998) Dependency Locality Theory, this means that 1st and 2nd person pronouns are less costly than 3rd person nominals to (a) store in working memory and (b) integrate into a construction.

Applying this finding to Mayan, we propose that syntactic ergativity is voided by the presence of a 1st or 2nd person pronoun—to different extents in different languages—because processing a structure involving such a nominal requires less effort than processing a structure involving a 3rd person nominal. This processing distinction has—again, to different degrees in different languages—prevented the CCD from being grammaticalized in contexts with 1st or 2nd person pronouns: Tsotsil has undergone CCD grammaticalization to the smallest extent. On the other end of the spectrum, languages like Kaqchikel have fully grammaticalized the CCD. Our proposal nonetheless makes the concrete prediction that the contrast between 1st/2nd and 3rd person nominals should obtain in a processing study: when the subject and/or the object is 1st or 2nd person, an Ā-dependency construction should be easier to process. We leave verifying this prediction to future work.

3.4.2 Reflexives It is widely recognized that restrictions on the extraction of ergative subjects in Mayan languages do not typically hold when the object is a reflexive pronoun. In Q'anjob'al, for example, the ergative subject can straightforwardly extract when the object is reflexive (40a), but not otherwise (40b).[17]

(40) *Q'anjob'al*

a. Maktxel max y-il s-b'a?
who CPL 3ERG-see 3POSS-self
'Who saw herself?'

b. *Maktxel max y-il-a ix ix.
who CPL 3ERG-see-TV CL woman
Intended: 'Who saw the woman?'
(Grammatical as 'Who did the woman see?')
(CMP 2014:225)

For our purposes, there is a crucial difference between reflexive objects and nonreflexive objects. Whereas Q'anjob'al word order is rigidly VSO with nonreflexive objects, reflexive objects must be adjacent to the verb, resulting in VOS word order (Pascual 2007, CMP 2014, Clemens and Coon 2018). Building on a proposal by CMP, who posit that reflexive objects are caseless NP objects, Tollan (2020) proposes that reflexives are in fact full DP objects, but are licensed via M-Merger with the verb (Baker 1988, Levin 2015, Van Urk 2020), as opposed to via absolutive case assignment; as a result, they must remain adjacent to the verb. It follows from this analysis that reflexive objects do not undergo case-driven movement above the ergative subject; therefore, the ergative subject can extract in such configurations without creating an illicit crossing dependency.

[17] See also Berinstein 1991 for Q'eqchi, Craig 1977 for Popti', Mondloch 1978a for K'ichee', and Henderson and Coon 2018 for Kaqchikel.

A similar configuration in which the ergative subject can unexpectedly Ā-move is the "extended reflexive" construction (e.g., Mondloch 1978a, Craig 1979, Aissen 1999b), again shown for Q'anjob'al in (41). Here, the ergative subject binds the possessor of the object.

(41) *Q'anjob'al*
Maktxel max s-b'on-o' s-na?
who CPL 3ERG-paint-TV 3POSS-house
'Who$_i$ painted his$_{i/*j}$ (own) house?'
(CMP 2014:227)

As CMP note, extended reflexive objects are unlike prototypical reflexive objects in that they do not have to remain adjacent to the verb. Thus, it would not seem that they are also licensed via M-Merger, and it is therefore entirely possible that they A-move past the ergative subject. The question remains, therefore, why such movement does not trap the ergative subject, which would otherwise be expected under an analysis based on the CCD.

CBL present evidence suggesting that an extended reflexive object is required to reconstruct to its base position—after having raised—in order for its possessor to be bound by the ergative subject. This result is the key to accounting for extended reflexives under our analysis. The ergative subject can extract across the A-movement path of the extended reflexive object because this path does not actually involve a prototypical A-dependency: the object is semantically interpreted not in its raised position but in its base position. This means that the A-movement path does not qualitatively figure into determining dependency paths and therefore is not visible as a movement path for the ergative subject to cross.

3.4.3 Bare NPs Aissen (2011) observes that K'iche' allows extraction of the ergative subject when the object is a bare NP (note the absence of a determiner in (42a)), as opposed to a full DP (note the presence of the determiner *rii* in (42b)).

(42) *K'iche'*
a. Jachiin x-Ø-u-loq' uuq?
who CPL-3ABS-3ERG-buy cloth
'Who bought cloth?'
b. *Jachiin x-Ø-u-loq' rii uuq?
who CPL-3ABS-3ERG-buy DET cloth
Intended: 'Who bought the cloth?'
(Aissen 2011:12)

One attractive way to account for this observation would be to posit that bare NP objects in K'iche' do not undergo A-movement as full DP objects do. This is the position taken by CMP, and our proposal would account nicely for it: if NP objects do not raise, then ergative subject movement does not result in a crossing dependency. Aissen (2017) points out, however, that the bare NP object still triggers a "high" preverbal absolutive, just as a full DP object does, so even the bare NP object has raised. As a result, movement of the ergative subject across the A-movement path of the NP object should create a crossing dependency and be illicit on our account (see also CBL 2019).

To account for (42a), we appeal to the contrast between dependencies of referential and nonreferential nominals. Crucially, Aissen (2011) reports a difference in the interpretations associated with objects that do not permit ergative subject extraction and with bare NP objects that do. She notes that when the object allows for extraction (as in (42a)), it necessarily "points to a discourse referent whose existence is already presupposed" (Aissen 2011:13). By contrast, when the object does not allow for ergative extraction (as in (42b)), the context associated with the utterance is "richer" and the object picks out a specific discourse referent whose existence is not presupposed.

We posit that this amounts to a contrast in whether or not a discourse referent associated with the object must be established by the sentence processor (see section 3.4). When the A-moved object is a full DP—such that the ergative subject cannot extract—the processor must contend with having to establish a new discourse referent and store it in working memory until the A-dependency gap can be found and the dependency can be formed. No other dependency can be formed during this process; a crossing dependency, like the one that results from ergative subject movement, is illicit. However, when the A-moved object is an NP—such that the ergative subject can extract—the burden on the parser is lighter, because the NP object does not require that a new discourse referent be established (see Gibson 1998). The storage and integration costs of an NP A-dependency are, then, sufficiently light that the parser has enough free resources to form a second dependency—such as an ergative subject Ā-dependency—during that process. That is to say, a crossing dependency is exceptionally permitted in this case.

4 Previous Accounts of Syntactic Ergativity in Mayan

In this section, we discuss previous accounts of syntactic ergativity. We consider accounts that, like ours, adopt an absolutive inversion approach (see CMP 2014, CBL 2019), as well as accounts outside this group, including Assmann et al.'s (2015) timing-based account, Erlewine's (2016) antilocality account, Deal's (2017) case discrimination theory, and Polinsky's (2017) PP vs. DP hypothesis.

4.1 Phase Boundaries

CMP propose that the phase boundary of the vP domain is responsible for preventing the ergative argument from extracting. Their account posits that A-movement of the absolutive argument targets the phase edge associated with the verbal domain, as shown in (43). Crucial to CMP's account is the proposal that the Mayan vP projects only one specifier position, meaning that once the object has A-moved, the ergative subject cannot escape the phase and is thus trapped.

(43) *Syntactic ergativity*
$[_{IP}\ I^0 \ldots \text{Obj}_{ABS} \parallel [_{VoiceP}\ \text{Subj}_{ERG}\ \text{Voice}\ [_{VP}\ V\ \sout{\text{Obj}}]]]$

This proposal faces two empirical problems. The first relates to the wider typology of DP-extraction restrictions. Taken at face value, a phase-based account of syntactic ergativity predicts that, in all nominative-accusative languages, the accusative object should be unable to extract: if A-movement of the absolutive argument to the phase edge in HIGH ABS Mayan languages indeed

traps the ergative subject in situ, then analogous A-movement of the nominative argument to the phase edge should consistently trap the accusative argument in situ, as schematized in (44).

(44) *Syntactic accusativity*
$[_{IP}\ I^0 \ldots \text{Subj}_{NOM} \parallel [_{VoiceP}\ \sout{\text{Subj}}\ \text{Voice}\ [_{VP}\ \text{V}\ \text{Obj}_{ACC}]]]$

However, syntactic accusativity is not particularly widespread (see discussion in Tollan 2019 and citations therein). CMP address this typological asymmetry by proposing that Mayan languages differ from nominative-accusative languages in terms of where the external argument is merged relative to the vP phase boundary. Following Chomsky (2000, 2001), Legate (2003), and Deal (2009), among others, they argue that the Merge position of a transitive subject is above the vP phase boundary in nominative languages and posit that it is below the phase boundary in Mayan languages. They note that their solution is stipulated. In contrast, the asymmetry between ergative-absolutive and nominative-accusative languages with respect to extraction restrictions falls out of our analysis; see the discussion around (22).

A second concern pertains to the extraction of nonergative DPs. As Assmann et al. (2015) note, CMP's phase-based account predicts that no DP below the vP phase boundary should be able to extract. In other words, the extraction restriction should not be specific to ergative arguments: ditransitive goals, for instance, should be equally unable to escape the vP phase. In section 3.3.1, however, we presented evidence from Q'anjob'al that this is not the case: prepositional goal arguments are readily able to undergo Ā-movement. Thus, the extraction of prepositional goals in Q'anjob'al provides further evidence that the vP phase boundary is not responsible for trapping the ergative argument in Mayan Ā-structures.

4.2 Locality

CBL argue that locality, rather than the nature of vP phase boundaries, gives rise to the Mayan restriction on extracting ergative arguments. Like CMP, they maintain that the absolutive object A-moves in HIGH ABS Mayan languages such as K'iche' and Q'anjob'al, but they remain agnostic as to the precise motivation for the movement, noting that it is unlikely to be due to case licensing.

CBL's account of the EEC proceeds as follows. Mayan Ā-probes are relativized to the feature [D]; consequently, Ā-heads probe simultaneously for Ā-features and for D-features. Thus, once the absolutive object has moved above the ergative subject in a HIGH ABS language, it becomes the most local match for the D-featural requirements of the Ā-probe. In absolutive object Ā-configurations, the object, bearing both Ā- and D-features, is both the best and the closest match for the featural requirements of the Ā-probe. Thus, object Ā-movement is unproblematic.

In ergative subject Ā-configurations, the subject is the best match for the Ā-probe; however, the moved object is the closest match for the D-featural requirements of the probe. The conflict between the closest match and the best match gives rise to "feature gluttony" (Coon and Keine 2020), wherein there is no way to optimally satisfy all the requirements of the Ā-probe. In this case, the result is syntactic ergativity.

Taken at face value, the locality-based account makes a problematic prediction for LOW ABS languages: just as ergative subjects are predicted to be unable to Ā-move in configurations where

the absolutive object intervenes between the Ā-head and the subject goal, absolutive objects are equally predicted to be unable to Ā-move in configurations where the ergative subject intervenes between the Ā-head and the object goal. This is precisely the configuration that obtains in LOW ABS languages such as Mopan and Ch'ol: because the object does not move past the subject (for case or any other reason), the ergative subject is the closest match for the D-featural requirements of the probe, while the absolutive object, bearing both the D- and Ā-features, is the better match. This, too, should give rise to feature gluttony, resulting in a restriction on extracting the absolutive object. This prediction turns out to be incorrect for Ch'ol, as shown in (45), and to our knowledge, no LOW ABS Mayan language exhibits a ban on extracting absolutive objects.

(45) *Ch'ol*

a. Tyi y-il-ä-yoñ jiñi wiñik.
CPL 3ERG-see-TV-1ABS DET man
'The man saw (me).'

b. Maxki$_i$ tyi y-il-ä ___$_i$ jiñi wiñik?
who CPL 3ERG-see-TV DET man
'Who did the man see?'
(CMP 2014:193)

CBL's account of syntactic ergativity, like CMP's, predicts that the extraction restriction in HIGH ABS Mayan languages should not be limited to ergative subjects. Rather, all DPs below the absolutive object should also be unable to undergo Ā-movement; thus, the Q'anjob'al data in (29), in which ditransitive goal arguments can Ā-move, are also problematic for a locality-based account.

4.3 The Timing of Case Assignment

Assmann et al. (2015) attribute syntactic ergativity to the timing of ergative case assignment relative to absolutive case. Under their account, movement of the ergative argument is itself unproblematic; rather, the resulting structures are ill-formed because the movement of the ergative argument through TP, en route to CP, bleeds absolutive case assignment from T. Constructions involving extraction of the ergative argument are therefore illicit because they render the object unlicensed. Thus, if the object does not require case, extraction of the ergative argument does not yield ungrammaticality.

At face value, Assmann et al.'s account predicts that *all* morphologically ergative languages should exhibit syntactic ergativity; that is, all Mayan languages should be syntactically ergative. However, the authors consider two possible ways in which, under their system, a language such as Ch'ol or Mopan (see earlier discussion) could allow the ergative subject to be extracted: either (a) movement of the ergative argument does not proceed through TP in these languages, and absolutive case assignment is not bled, or (b) movement of the ergative subject through TP does not bleed absolutive case (e.g., if ergative is assigned inherently, by v, and an argument cannot check more than one case, then movement through TP does not use up the case feature on T, which is free to be assigned to the absolutive object).

We note, however, that these options do not predict the morphological hallmarks of syntactic ergativity that are found in the Mayan language family: specifically, the account does not explain why languages in which T does not have its absolutive case feature bled should belong to the LOW ABS class, and languages in which T is unable to assign absolutive case in ergative extraction scenarios belong to the HIGH ABS class.

4.4 Antilocality

Erlewine (2016) proposes that syntactic ergativity in Kaqchikel (a HIGH ABS language) comes about because Ā-movement of ergative subjects is too short. On Erlewine's account, ergative subjects are distinguished from absolutive arguments in that they A-move to Spec,TP; this movement is signaled morphologically by the Mayan ergative agreement marker. Once in TP, the ergative subject cannot Ā-move to Spec,CP without violating Spec-to-Spec Antilocality (see Erlewine 2016:431), a constraint that prohibits Ā-movement that does not cross a maximal XP node. For a transitive subject to successfully extract, it must Ā-move directly from vP to CP, forgoing prior A-movement to TP and ergative alignment. This type of movement is signaled morphologically by the presence of the AF marker (coupled with the absence of ergative agreement). On the other hand, absolutive objects and absolutive subjects remain in vP and never A-move to TP; extraction of these arguments therefore does not violate Antilocality and AF morphology is never triggered.

Erlewine's account predicts that any ergative subject should be prohibited from extracting (in the absence of any interstitial phrasal material between TP and CP). As discussed in section 3.3, however, the Mayan EEC does not constitute a ban on extraction of *all* ergative subjects; rather, it is contingent on the properties of the object. Notably, when the object is bare or reflexive, extraction of the ergative subject is permitted, with regular ergative agreement and no AF morphology (recall that under Erlewine's account, the appearance of ergative agreement signals A-movement to TP). See Henderson and Coon's (2018) reply to Erlewine's article for further discussion of this and of other empirical problems for Erlewine's account.

4.5 Case Discrimination and the PP vs. DP Hypothesis

The final two accounts of syntactic ergativity that we discuss are Deal's (2017) case discrimination proposal and Polinsky's (2017) PP vs. DP hypothesis. These accounts are similar insofar as they place the burden of explanation on the properties of the ergative subject. Under Deal's account, C in syntactically ergative languages only probes for nominals bearing an unmarked (i.e., absolutive) case feature, and not for those bearing marked (i.e., ergative or accusative) or oblique (i.e., prepositional) cases. Deal's account builds upon Bobaljik's (2008) morphological case hierarchy, which posits that nominals bearing unmarked case are most commonly accessible as targets for syntactic probes, followed by nominals with marked case, and subsequently by nominals with oblique case. However, as far as Mayan languages are concerned, ditransitive prepositional goal arguments *are* able to extract, even in syntactically ergative languages like Q'anjob'al; thus, it

is not the case, as Deal's account would predict, that all nominals besides those bearing unmarked case are unable to extract.

For Polinsky, ergative languages are of two types: those in which the ergative subject is projected as a DP, and those in which it is projected as a PP. The latter type of language is predicted to exhibit syntactic ergativity: here, prepositional phrases are unable to undergo Ā-movement. However, like Deal's proposal, Polinsky's does not naturally extend to Mayan languages: as discussed, PP goals extract unproblematically; thus, these languages do not prohibit extraction of PPs per se.

5 Larger Implications

In the previous section, we considered alternative proposals aimed at accounting for syntactic ergativity, focusing on the shortcomings of these proposals in light of the Mayan data under discussion. In this section, we extend our proposal beyond the Mayan language family, and even beyond ergative languages more generally. We focus on how a constraint on crossing dependencies can explain an extraction asymmetry in the passives of double object constructions in nominative-accusative languages discussed by Holmberg, Sheehan, and Van der Wal (2019). We then consider an apparent problem for our analysis: multiple *wh*-movement in Bulgarian.

5.1 Extraction out of Double Object Passives

The distinction between crossing and nested dependencies can also be argued to play a role in Ā-movement in other types of constructions. Notably, Holmberg, Sheehan, and Van der Wal (2019) observe a distinction in several unrelated languages—Norwegian (illustrated in (46)), Swedish, Northwest British English, Zulu, Xhosa, and Lubukusu—with regard to passives of double object constructions. Unlike many others, these languages allow passivization of both a goal argument (46a) and a theme argument (46b).

(46) *Norwegian*
  a. Jon ble gitt boka.
     Jon was given book.DET
     'Jon was given the book.'
  b. Boka ble gitt Jon.
     book.DET was given Jon
     'The book was given to Jon.'
     (Lit. 'The book was given Jon.')
     (Holmberg, Sheehan, and Van der Wal 2019:678)

With regard to extraction from double object passives, however, an asymmetry arises. As a baseline, note that a goal can be extracted from a goal passive (47a) and a theme can be extracted from a theme passive (47b). Crucially, while a theme argument can be extracted from inside a goal passive (47c), a goal argument cannot be extracted from inside a theme passive (47d).

(47) *Norwegian*

a. Hvem$_i$ ___$_i$ ble gitt boka?
who was given book.DET
'Who was the book given to?'

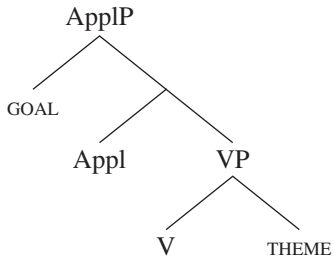
b. Hvilken bok$_i$ ___$_i$ ble gitt Jon?
which book was given Jon
'Which book was Jon given?'

c. Hvilken bok$_i$ ble Jon gitt ___$_i$?
which book was Jon given
'Which book was Jon given?'

d. *Hvem$_i$ ___$_i$ ble boka gitt?
who was book.DET given
Intended: 'Who was the book given to?'
(based on Holmberg, Sheehan, and Van der Wal 2019:680)

It is widely assumed that in a double object construction, the goal argument is introduced by an Appl(icative) phrase situated above VP, and thus c-commands the theme argument in VP (e.g., Harley 1995, Anagnostopoulou 2003, Pylkkänen 2008, Holmberg, Sheehan, and Van der Wal 2019; discussion in section 3.3), as in (48). In other words, the goal is structurally higher than the theme (note that this structure differs from that of the prepositional ditransitive construction, in which the theme c-commands the goal; see (28)).

(48) *Double object ditransitive* (based on Holmberg, Sheehan, and Van der Wal 2019:685)



Holmberg, Sheehan, and Van der Wal (2019) account for the asymmetry between (47c) and (47d) as follows: in a goal passive, Appl^0 assigns case to the lower theme via c-command. T^0 then agrees with the goal, assigns nominative case to it, and attracts it to Spec,TP. Crucially, though, the theme moves to the outer edge of the lower phase, because it has an unvalued [u*wh*] feature.[18] Once the higher phase head C^0 enters the derivation and phase transfer occurs, only the outer specifier of the lower phase is visible for subsequent syntactic operations. Since the theme occupies this exact position, it is able to extract. In a theme passive, however, Appl^0 assigns case to the higher goal via a Spec-head Agree relation. Now, because the theme has an unvalued [uCASE]

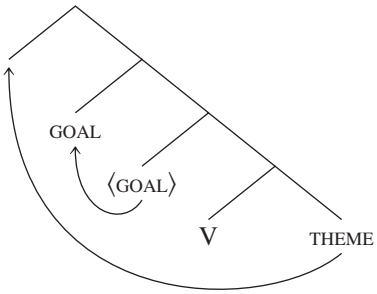
[18] Following Bošković (2007), who argues that any XP bearing an unvalued feature must raise to the phase edge if that feature cannot be valued phase-internally.

feature, it must move to the outer specifier of the lower phase. From this position, T^0 agrees with it, assigns case to it, and attracts it to Spec,TP. However, when phase transfer occurs, only this outer specifier is visible, so the goal, bearing a [u*wh*] feature, is trapped.

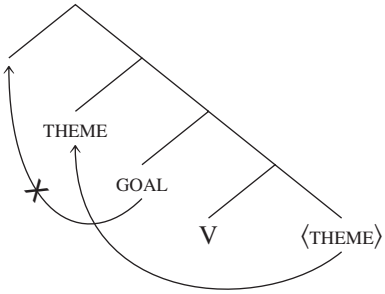
Holmberg, Sheehan, and Van der Wal's account leaves two issues unresolved. First, in view of the assumption that arguments bearing phase-internally unvalued features must move to the outer specifier of the lower phase edge, the goal argument in a goal passive like (47c) must occupy this position before being probed by T^0, just as the theme argument does in a goal passive. This movement should trap the theme argument in a goal passive, such that (47c) should be ruled out. Furthermore, this account predicts that accusative objects should also be unable to extract: because the subject in such configurations has a [uCASE] feature (eventually valued as [NOM] by T^0), then it too should have to occupy the outer specifier of the lower phase before being probed by T^0 and having case assigned. However, this is not so: unsurprisingly, accusative objects in Norwegian can extract.

The asymmetry between (47c) and (47d) can be explained by a theory based on the distinction between crossing and nested dependencies, as in section 3: in a goal passive, the goal A-moves from Spec,ApplP to Spec,TP. In a double object theme passive, the theme A-moves from VP—past the goal argument—to Spec,TP. As a result, a theme *wh*-dependency in a goal passive, as in (47c), is formed outside the tails of the A-movement of the goal argument; thus, the dependency is nested, and the structure is grammatical. Conversely, a goal *wh*-dependency inside a theme passive, as in (47d), is formed within the tails of the A-movement of the theme argument; thus, the dependency is crossed, and the structure is ungrammatical. This contrast is shown in (49).

(49) a. *Theme inside goal: Nested dependency*



b. *Goal inside theme: Crossing dependency*



In this way, constructions that involve a goal dependency formed within a theme passive, such as (47d), are analogous to an attempted ergative *wh*-dependency formation, as in (22b), within the A-movement tails of the absolutive object: both involve dependency crossing and are therefore ruled out.

Our proposal that the CCD is in effect a processing consideration that may or may not be transposed into the grammar of an individual language as a categorical constraint makes the prediction that there should be no instance of syntactic movement where crossing dependencies are categorically preferred over nested dependencies. In the next section, we present an apparent counterexample from multiple *wh*-movement.

5.2 Where Crossing Wins Out: Multiple Wh-*Movement*

Despite the typological abundance of nested dependencies as compared with crossing dependencies, it is not the case that crossing dependencies are nonexistent. Aside from clause-final verb clusters in Dutch (Bach, Brown, and Marslen-Wilson 1986), a subset of languages that allow for multiple *wh*-movement also require that such movement be crossed. One such language that is well-documented in the syntactic literature is Bulgarian (e.g., Rudin 1988, Richards 1997, Bošković 2002; see also Ortiz de Urbina 1989 and Jeong 2007 on Basque). Bulgarian exhibits superiority effects in *wh*-fronting contexts; as a consequence, the Ā-dependencies of a *wh*-fronted subject and a *wh*-fronted object cross, as evidenced by the fact that the *wh*-subject surfaces before the *wh*-object in (50).

(50) *Bulgarian*
Koj kogo običa?
who whom loves
'Who loves whom?'
(Bošković 2002:354)

We note that the structure in (50) involves three dependencies: (a) the EPP-driven A-movement of the nominative subject *koj* 'who' to the specifier of an inflectional projection, (b) the Ā-movement of the subject to the left periphery, and (c) the movement of the object to the left periphery, schematized in (51).

(51) *Bulgarian*
$\text{Koj}_i\ \text{kogo}_j\ \_\_{}_i\ \_\_{}_i\ \text{običa}\ \_\_{}_j$ [= (50)]

(Bošković 2002:354; see Rivero 2005:1089)

Potentially problematic for our proposal is the fact that the two Ā-dependencies themselves are crossed. Indeed, the *wh*-subject must precede (i.e., cross) the *wh*-object; the reverse (i.e., nested) order is ungrammatical (Rudin 1988, Richards 1997, Bošković 2002). Under Richards's (1997) proposal, Ā-dependency crossing arises as a result of two syntactic principles: Attract

Closest (Chomsky 1995) and Shortest Move. Attract Closest requires that the *wh*-probe on C^0 first attract the closest *wh*-element (i.e., the more local subject) to its specifier. When the object subsequently *wh*-moves, such movement must obey Shortest Move (i.e., it must cross the minimal number of nodes). This means that the object must "tuck in" below the subject (terminology from Richards 1997) into a lower specifier of the same projection that hosts the subject. The outcome of these principles is that the premovement superiority relation between the subject and the object that was established by their base positions (the subject asymmetrically c-commands the object) is maintained following movement.

There are at least two avenues for further exploring the Bulgarian data within the context of our proposal. Note that neither of the Ā-movement dependencies in (51) crosses the prior A-movement path of the subject. In other words, while Bulgarian exhibits crossing Ā-movement paths, Ā- and A-movement paths do not cross. This pattern is consistent with the movement patterns in Mayan languages and the languages discussed in the previous section. Thus, it is possible that where processing is concerned, a difference exists between Ā-dependencies and A-dependencies. Tollan (2019) proposes that Ā-dependencies are qualitatively different from A-dependencies in terms of the relationship between the filler and the gap: in the processing of Ā-dependencies, it is the presence of the Ā-filler that prompts the parser to actively seek a gap site in which to form the filler-gap dependency. In (52), for example, *what* is identified as a filler, prompting an active search for a gap site (i.e., at the direct object position of the verb *see*).

(52) *Ā-dependency: Filler-to-gap*
What$_i$ did Marisa see ___$_i$?

According to Tollan (2019), however, the processing of A-dependencies requires a reverse type of storage and search mechanism: here, it is the presence of the gap site that prompts the parser to identify the filler from the preceding word string. In the passive sentence in (53), for example, the subject *the ball* is not immediately identifiable as a filler. Later, however, the parser encounters the transitive verb *kicked*, prompting it to expect a direct object. When it instead encounters a gap, it actively probes the already-stored preceding sentence material to identify a filler (i.e., *the ball*) to associate with it.

(53) *A-dependency: Gap-to-filler*
The ball$_i$ was kicked ___$_i$.

In view of this contrast, it is possible that processing preferences with respect to crossing and nesting differ depending on the specific combinatorics of A- vs. Ā-dependencies. We leave this question for future research.[19]

[19] As a reviewer notes, our proposal raises the question of how other types of movement dependencies—for example, head movement—should pattern with respect to crossing and nesting. We leave this as an empirical question for future psycholinguistic and syntactic research; to our knowledge, there is currently no psycholinguistics literature dealing with how head movement dependencies are processed, and whether such processing proceeds in the same manner as with other types of dependencies.

Second, we again note that the existence of a processing-based constraint such as the CCD does not entail that the constraint is completely inviolable. The fact that the CCD is violable in a language like Bulgarian suggests that (a) it has not been grammaticalized in Bulgarian, as we have proposed for Mayan languages,[20] and (b) there is some other syntactic constraint—or, for that matter, processing constraint—that takes priority. In this case, it may be useful to conceive of syntactic architecture as subject to various "trade-offs" (e.g., Siewierska 1998), in which a constraint present in many languages may nonetheless be outcompeted in other languages by a different constraint or number of constraints. We acknowledge that the CCD may be outcompeted in languages like Bulgarian by principles such as Shortest Move (see again Richards 1997), but we crucially predict that because the CCD is a universal processing consideration, languages such as Dutch and Bulgarian should constitute a minority of the typological population (which they do), and even in these languages, constructions that violate the CCD should be fewer than those that satisfy it (which is also true).

6 Conclusion

Drawing on data from Mayan languages, we have developed an account of syntactic ergativity based on the grammaticalization of a constraint against crossing dependencies (Kuno and Robinson 1972, Pesetsky 1982, Steedman 1985; see also Hankamer 1973, Kayne 1981) that also accounts for Tada's (1993) Generalization that syntactically ergative Mayan languages are those with preverbal absolutive markers. We proposed that restrictions on the Ā-movement of the ergative subject arise because such movement would cross the prior A-movement path of the absolutive object, creating an illicit crossing dependency. We noted that our account extends beyond the extraction of ergative arguments to explain why the extraction of certain adjuncts in Kaqchikel requiring *wi*-indexing and the extraction of high applicatives in HIGH ABS languages requires *b'e*-indexing. We also argued that the cost of processing crossing dependencies can be mitigated when the parser does not need to establish a new discourse referent for one (or both) of the two antecedent fillers in question (Gibson 1998, Warren and Gibson 2002), as in (a) languages in which 1st and 2nd person ergative arguments can be exceptionally extracted (as in K'iche',

[20] If we consider multiple *wh*-movement in Mayan, we indeed predict the reverse pattern to Bulgarian; that is, multiple crossing should be illicit (because, under our proposal, Mayan languages have grammaticalized the CCD, whereas Bulgarian has not). This prediction is supported by data showing multiple Ā-movement in Kaqchikel (García Matzar and Rodríguez Guaján 1997). As shown in (ia), an ergative subject is able to be fronted *around* an Ā-moved object, in a nested manner, without utilizing the AF construction. However, an absolutive object cannot be fronted *across* an Ā-moved subject; this construction requires AF, as in (ib).

(i) a. *Kaqchikel nested multiple Ā-movement: No Agent Focus*
Ja ri utiwa' ja ri aq x-e-ki-tij.
FOC the coyotes FOC the pigs CPL-3PL.ABS-3PL.ERG-eat
'As for the coyotes, it's the pigs that they ate.'
b. *Kaqchikel crossing multiple Ā-movement: Agent Focus required*
Ja ri aq ja ri utiwa' x-e-tij-o.
FOC the pigs FOC the coyotes CPL-3PL.ABS-eat-AF
'As for the pigs, it's the coyotes that they ate.'

Q'anjob'al, Popti', and Tsotsil) and (b) languages in which bare NPs can be exceptionally extracted (e.g., K'iche').

We propose that the source of syntactic ergativity is a processing constraint (e.g., Fodor 1978, Frazier and Fodor 1978, Frazier, Clifton, and Randall 1983, Rochemont and Culicover 1990, Pickering and Barry 1991), which in the Mayan language family plays a categorical role. Our analysis therefore seeks to highlight the need for further dialogue between research in sentence processing and research in formal syntax. In proposing that syntactic ergativity can arise due to a constraint on crossing dependencies, we also aim to draw attention to a body of pre-Minimalist literature focusing on the explanatory power of movement pathways (e.g., Hankamer 1973, Kayne 1981, Pesetsky 1982), which was perhaps abandoned prematurely.

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Rebecca Tollan
Department of Linguistics and Cognitive Science
University of Delaware

rtollan@udel.edu

Lauren Clemens
Department of Anthropology
Program in Linguistics and Cognitive Science
University at Albany, SUNY

lclemens@albany.edu