

Syntactic ergativity as a processing-based constraint against crossing dependencies*

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Abstract

This paper presents an account of syntactic ergativity based on the grammaticalization of a processing preference for nested as compared to crossing dependencies (Kuno and Robinson 1972; Steedman 1985). We propose that restrictions on the A'-movement of the ergative subject arise because such movement would cross the prior A-movement path of the absolutive object creating an illicit crossed dependency. In contrast, the A'-movement of an argument whose merge position is lower than that of the absolutive object creates a licit nested dependency, as in the A'-movement of accusative objects in nominative-accusative languages. Our account further develops the 'standard theory' of syntactic ergativity (terminology from Deal 2016 for accounts based on absolutive inversion, e.g. Bittner and Hale 1996; Aldridge 2004; Coon et al. 2015, Coon et al. 2019) by strengthening its empirical foundation with insights from sentence processing and by increasing its empirical coverage within the Mayan language family and beyond. We correctly predict that i) no argument merged between the A-movement tails of the absolutive DP may be extracted, while at the same time ii) arguments merged either below or above the A-movement tails are able to undergo extraction. In addition, the proposed restriction on crossing dependencies accounts for related and unrelated cross-linguistic phenomena, such as syntactic ergativity and word order in Tongic Polynesian, as well as an asymmetry in the *wh*-questions derived from double object passives in a number of nominative-accusative languages (Holmberg et al. 2018)

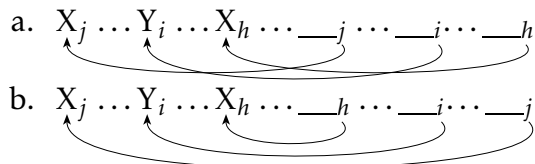
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1 Introduction

A well-established finding from the typological literature is that nested dependencies are more common cross-linguistically than crossing dependencies (Hays 1964; Shieber 1985; Kruijff and Vasishth 2003; Levy and Manning 2004; Ferrer i Cancho et al. 2018). A/A'-chains—representing the dependency relation between different positions in the clause—are described as crossing when there is overlap between them, as shown in (1a). In nested dependencies, the A'/A-chains do not overlap, as in (1b)

(1) Crossing and nested dependencies



By way of possible explanation, the literature on sentence processing offers considerable evidence that crossing dependencies incur a greater cost when compared to 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.

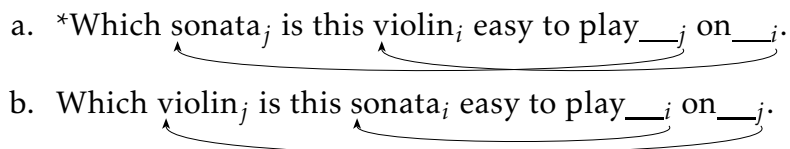
We begin by appealing to one particular formulation of the cross-linguistic dispreference for crossing dependencies, known as the CONSTRAINT ON CROSSING DEPENDENCIES (CCD; Kuno and Robinson 1972; Steedman 1985), which is stated in (2).

(2) CONSTRAINT ON CROSSING DEPENDENCIES:

No movement dependency may cross another movement dependency.

The CCD captures the fact that, in English, constructions which result in crossing dependencies are judged as less acceptable, as in (3a) than constructions which result in nested dependencies, as in (3b).

(3) Crossing and nested dependencies (Steedman 1985: 35)



While there is robust cross-linguistic evidence for the CCD, certain languages tolerate crossing dependencies in some contexts. Dutch, for example, is well-known for exhibiting crossed dependencies in clause-final verb clusters (Bach et al. 1986). On our view, the CCD is a prime example of a language processing constraint which presents itself differently in the context of the grammar of a specific language. In this paper, we explore the idea that the Mayan languages have a fully grammaticalized version of the CCD. The consequence of this is that, in the subset of Mayan 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 A'-movement, is the result of a ban on crossed dependencies.

While all Mayan languages display an ergative alignment, only a subset of these languages exhibit syntactic ergativity. For example, Q’anjob’al does not allow the ergative subject to be directly extracted (4), while Ch’ol does (5) (see Coon, Mateo Pedro, and Preminger 2014, hereafter CMP).

- (4) * Maktxel_i max-∅ 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?’)
 Q’anjob’al, CMP: 16

- (5) Maxki_i tyi y-il-ä-∅ jiñi wiñik ____i ?
 who CPL 3ERG-see-TV-3ABS DET man
 ‘Who saw the man?’
 Ch’ol, CMP: 16

Tada (1993) influentially noted that the presence of 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 do not display syntactic ergativity, such as Ch’ol (6). In the majority of syntactically ergative languages, the absolutive marker precedes the verb stem. An example of a preverbal absolutive maker, as in Q’anjob’al (7):

- (6) Tyi y-il-ä-**yety**.
 CPL 3ERG-see-TV-2ABS
 ‘She saw you.’
 Ch’ol, CMP: 13

- (7) Max-**ach** y-il-a’.
 CPL-WABS 3ERG-see-TV
 ‘She saw you.’
 Q’anjob’al, CMP: 13

CMP refers to the syntactically ergative Mayan languages, e.g. Q’anjob’al, as HIGH ABS, because the moniker evokes both the preverbal position of the absolutive marker as well as the locus of absolutive case assignment for these languages (I⁰). Following Aldridge (2004, 2008) and Legate (2002,2008), who argue that the locus of absolutive case assignment is a point of cross-linguistic variation, CMP posits that the object A-moves to a position higher than the transitive subject for the purpose of absolutive case checking in Q’anjob’al and other HIGH ABS languages.

In accounting for the highlighted difference between (6) and (7), CMP argues that absolutive case is assigned in situ for languages that pattern with Ch’ol. CMP refers to these languages as LOW ABS, because the position of the absolutive marker is relatively low, as is the locus of case assignment (Voice⁰). Thus, A-movement (or lack there of) is manifest in the linear position of the absolutive marker. Absolutive case assignment in LOW ABS languages compared to HIGH ABS languages is schematized in (8).

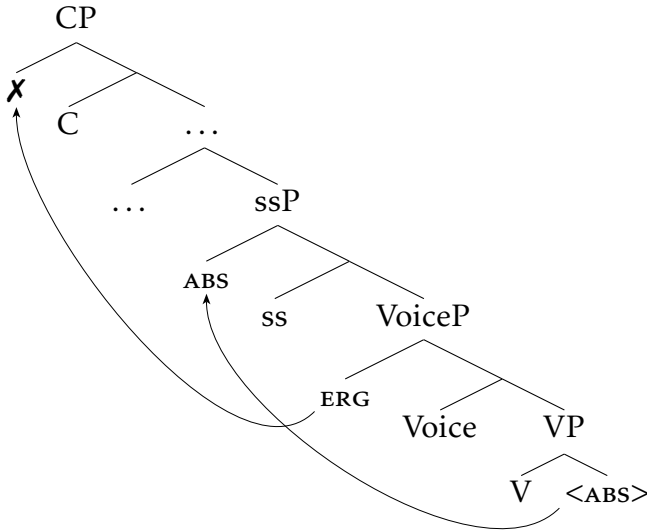
¹Following CMP, we assume the correlation between the position of the absolutive marker and the presence of syntactic ergativity is the consequence of a single source phenomenon; however, see Aissen 2017 for an argument (addressed in Section 2.2) that the result of areal diffusion.

(8) Absolutive case assignment in Mayan (based on CMP)²

- a. HIGH ABS: [IP I⁰ ... OBJECT || [VoiceP SUBJECT Voice [VP V OBJECT]]]
- b. LOW ABS: [IP I⁰ ... _____ || [VoiceP SUBJECT Voice [VP V OBJECT]]]

The goal of the current paper is to offer a new account of Tada’s generalization, by revisiting the question of how the ergative subject becomes trapped in its merge position in the syntactically ergative Mayan languages. We adopt CMP’s account of absolutive case assignment in HIGH ABS languages and argue that syntactic ergativity in Mayan arises because the relevant movement would create a crossed dependency, analogous to that of (3a): 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 (9).³

(9) Crossing dependencies in syntactically ergative Mayan languages



This account correctly predicts that i) arguments merged either below the lower or above the higher A-movement tail of the absolutive DP may be extracted, while at the same time ii) no argument merged between the absolutive DP’s A-movement tails may be extracted (cf. CMP, see §4).

Our account of syntactic ergativity in Mayan can be extended to related and diverse phenomena in other languages, including an asymmetry in the *wh*-questions derived from double object passives in a number of nominative-accusative languages (Holmberg et al. 2018). Our proposal raises typological questions that can be explored by examining situations in which crossed dependencies are preferred over nested dependencies, e.g. superiority effects in multiple *wh*-languages. Consequences of our proposal also include open theoretical questions, such as the status of crossed and nested dependencies in generative grammar. Not only is dependency-type not a primitive of any modern framework, it is not even clear that there is any derived notion that captures what it means for a dependency to be crossed as opposed to nested. So, in developing a novel approach to

²For the sake of simplicity, no verb movement is shown; however we follow Clemens and Coon 2018 in the derivation of the verb stem.

³We follow Clemens and Coon (2018) on the derivation of the verb stem in Mayan languages.

syntactic ergativity grounded in language processing, we seek to draw attention to the need for deeper conversation between formal, typological, and processing-driven syntax.

The structure of this paper is as follows: Section 2 provides additional background on syntactic ergativity from a cross-linguistic perspective as well as how syntactic ergativity is parametrized within the Mayan family. The core proposal is presented in Section 3, along with data that are straightforwardly explained by our analysis (§3.2) and data that are more challenging (§3.3). Section 4 focuses on two previous accounts of how the ergative argument becomes trapped in syntactically ergative Mayan languages and discusses the empirical challenges for these accounts. Section 5 moves beyond the Mayan languages to address syntactic ergativity in Tongic Polynesian, 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 a lot of attention in both the syntactic and processing literature; see Deal 2016, Polinsky 2017, Longenbaugh and Polinsky 2017 for overviews of work in both of these sub-disciplines. Mayan languages have been a particular focus of recent discussion, including the works mentioned above, as well as Aissen 2017, Assmann et al. 2015, Clemens et al. 2015, Coon et al. 2014, Coon et al. 2019, Heaton et al. 2016, Henderson and Coon 2018, Erlewine 2016, and others. This section discusses syntactic ergativity from a cross-linguistic perspective before narrowing our focus to restrictions on the A'-movement of the ergative argument in a subset of Mayan languages.

2.1 Cross-linguistic context

The most familiar way in which a morphologically ergative language reveals itself to be syntactically ergative is by disallowing A'-movement of the ergative argument (i.e. in relative clauses, *wh*-questions, and fronting constructions).⁴ 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 (10a–10b), whereas ergative subjects cannot (10c).

⁴Some ergative languages are known to exhibit syntactic ergativity in only a subset of A'-environments (for example, in *wh*-questions, but not in relative clauses, or vice-versa) (e.g. see Polinsky 2016, Deal 2017, Douglas et al. 2017). One factor which may give rise to this variation is the possibility that some types of (apparent) A'-movement involve a covert biclausal structure, as proposed by Henderson and Coon (2017) for certain types of *wh*-questions in Kaqchikel. In this way, instances of “partial” syntactic ergativity may arise due to structural differences across different types A'-constructions, such that movement does not actually take place in all relevant environments.

- (10) 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 man-ABS take-PERF-REL.INTRANS-3SG
 ‘the man who took the gun’ West Greenlandic, Bittner 1994: 55–58

The intended meaning of (10c) is instead expressed via use of an antipassive construction,⁵ as shown in (11). Antipassive predicates are formally intransitive—notice the use of the intransitive marker in the addition to the antipassive marker in (11)—but both a notional subject and object are present in the construction. The agent is absolutive, and the patient is expressed as an oblique object, which triggers no verbal agreement.

- (11) Angut_i [____i aallaam-mik tigu-si-sima-su-q].
 man-ABS gun.INS take.ANTIP-PERF-REL.INTRANS-SG
 ‘the man who took the gun’ West Greenlandic, Bittner 1994: 58

Typological evidence suggests that syntactic ergativity is fairly widespread among morphologically ergative languages: Polinsky (2016) reports data compiled by Comrie (2008) and Comrie and Kuteva (2008), listing 32 ergative languages of which 12 (37.5%) show no syntactic ergativity, while the remaining 20 (62.5%) are syntactically ergative. By this estimation, over half of all morphologically ergative languages are also syntactically ergative. Next, we consider syntactic ergativity in the context of Mayan languages.

2.2 Ergative alignment in Mayan languages

The Mayan language family consists of approximately 30 different languages, spoken primarily in Guatemala and Mexico by more than six million people.⁶ Mayan languages exhibit an ergative-absolutive case 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 subjects of intransitive predicates.⁷ Mayan languages are verb-initial in discourse neutral contexts

⁵Antipassives are only one of several strategies used to express the meaning that cannot be expressed through ergative A'-movement. Other strategies include use of a resumptive pronoun at the ergative gap site (see Otsuka 2000 for Tongan), nominalization of the *v*P (see Corston 1996 for Roviana), and antiagreement (Ouhalla 1993), whereby the argument-verb agreement pattern is altered when an ergative argument is displaced (see Wiltschko 2006 for Halkomelem Salish). Mayan languages also use a language-specific construction known as Agent Focus (to be discussed shortly). See Polinsky 2017 for a fuller discussion of the strategies languages use when A'-movement of is unavailable.

⁶Reference works on the Mayan language family include England 2001, 2017; Bennett et al. 2016; Aissen et al. 2017; Clemens to appear

⁷Deciding between using the terms Set A/Set B or ergative/absolutive is an expository as opposed to analytic choice. For some authors, especially those writing from a Mayanist perspective, the terms Set A

and the preverbal position is associated with topic and focus (England 1991; Aissen 1992; Clemens and Coon 2018).

A pair of sentences from K'iche' (Central Kichean) is given in (10): the third person plural ergative marker *k-* indicates the person and number of the (pro-dropped) transitive subject in (12a). The second person plural absolutive clitic *=oj* cross-references the (pro-dropped) transitive object in (12a) and the intransitive subject in (12b).

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

Throughout the Mayan family, the ergative markers precede the verb root. In contrast, there is a fair amount of variation with respect to the position of the absolutive marker.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 above, the absolutive marker *=oj* follows the TAM marker, precedes the ergative maker on a transitive stem (12a), and precedes the verb stem directly when no ergative marker is present (12b). 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) for which the absolutive marker follows the verb stem. In both transitive and intransitive clauses (13), the absolutive maker *=e(e)ch* follows the stem. Languages with this distribution include those in the Yucatecan family as well as the Greater Tzeltalan languages (e.g. see Coon et al. 2014 for Ch'ol).

- (13) a. Tiw-*il-aj-ech*.
 1PL.ERG-see-SS-2SG.ABS
 '(We) saw (you).'
- b. Jok-*eech*.
 went.out-2SG.ABS
 '(You) went out.' Mopan, Hofling 2017: 711, 729

The intra-family 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, which we adopt.

and Set B are preferred in part because these markers are found in a fairly diverse set of syntactic contexts. Set A (ergative) markers index the complement of relational nouns, and possessors, in addition to the subject of transitive clauses, and the subject of some intransitive clauses. Set B markers index the subject of non-verbal predicates and are related to the free standing pronouns in many languages in addition to marking the object of transitive clauses and the subject of most intransitive clauses.

⁸The fixed vs. variable distribution of the ergative and absolutive markers, respectively, is consistent with the fact that the ergative marker is a prefix, whereas the absolutive maker is a clitic in most Mayan languages.

As mentioned in the introduction, all Mayan languages are morphologically ergative, but only a subset of Mayan languages display syntactic ergativity, termed by Aissen 2017 as the Mayan ERGATIVE EXTRACTION CONSTRAINT or EEC. As was shown for West Greenlandic (10), in a number of Mayan languages including Q'anjob'al and K'iche', absolutive arguments can undergo A'-movement, whereas ergative arguments cannot. An exemplar paradigm of focus movement in K'iche' is given in (14). One focus construction in K'iche' involves the fronting of an *aree*-marked constituent. This is shown to be possible for an intransitive absolutive subject in (14b) and for a transitive absolutive object in (14a). Note that (14c) is ungrammatical; the transitive ergative subject can not be extracted in the same way as the absolutive arguments.

- (14) a. *Aree le al Mari'y_i x-tzen-ik ____i.*
 FOC DET HON Juan CPL-laugh-ss
 '[Maria]_F laughed.'
- b. *Aree le ichaj_i k-u-tij ____i le al Mari'y.*
 FOC DET vegetables INCL-3ABS.SG-3ERG.SG-eat:TR DET HON Maria
 'Maria will eat [the vegetables]_F.'
- c. * *Aree le al Mari'y_i k-u-tij le ichaj ____i.*
 FOC DET HON Maria INCL-3SG.ABS-3SG.ERG-eat:TR DET vegetables
 'Intended: [Maria]_F will eat the vegetables.'

K'iche', based on Velleman 2014: 220, 224

K'iche' has two options for expressing the meaning intended by (14c): i) one of two antipassive constructions—similar to that shown for West Greenlandic in (11)—or ii) use of a Mayan-specific strategy known as the Agent Focus (AF) construction. An example of a K'iche' antipassive is shown in (15a) and the K'iche' AF construction is shown in (15b).

- (15) 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]_F 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]_F helped (me).'

K'iche', 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 A'-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 (15a), and the presence of the intransitive status suffix on the verb stem in (15b). Note that, the antipassive construction crucially differs from the AF construction in that the object is not demoted in AF constructions: it is not marked as oblique and it is, in most cases, the argument that is cross-referenced by absolutive person marking on the verb.

For the sake of comparison, Mopan is an example of a Mayan language which does not show the EEC: no special verb morphology is required to extract ergative subjects. Furthermore, the verb is fully transitive as indicated by the presence of the ergative agreement marker, as shown in (16).

- (16) A winik-i; walak u-kin-s-ik-∅ b'alum __j.
 DET man-TOP ICP 3ERG-die-CAUS-ITS-3SG.ABS jaguar
 '[The man]_{TOP} kills a jaguar' Mopan, 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 expands on the languages originally surveyed. In languages with the EEC, e.g. K'iche' and Qanjobal, the absolutive clitic is preverbal; languages of this type are given in (17a).⁹ In languages without the EEC, e.g. Ch'ol and Mopan, the clitic is consistently postverbal; these languages are listed in (17b).

- (17) Typology of absolutive case and syntactic ergativity (Tada 1993; CMP)¹⁰
- a. HIGH ABS and EEC:
 Akatek, Awaktek, Chuj, Kaqchikel, K'iche', Q'anjob'al, Q'eqchi, Mam, Poqomam, Poqomchi', Popti', 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 Qanjobalan and Kichean-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 to deriving the ECC 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 below. These include two LOW ABS languages that are syntactically ergative (18a), as well as two languages that are difficult to classify (18b). There are no examples in the Mayan family of HIGH ABS languages that are not syntactically ergative.

- (18) Apparent outliers to Tada's generalization
- a. LOW ABS and ECC: Ixil, Yucatec
 - b. Unclassifiable: Tsotsil,¹¹ Huastec¹²

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

⁹The names of the Mayan languages listed below, follow conventions established by the Academia de Lenguas Mayas de Guatemala (ALMG) and the Instituto Nacional de Lenguas Indgenas (INALI).

¹⁰Including Ixil and Yucatec, but excluding Tsotsil and Huastec (see below and fts 11–12, the correlation between the presence vs. absence of syntactic ergativity and the position of the absolutive clitic is highly significant according to a Fischers Exact Test ($p_{\text{two-tailed}} < .001$): languages with syntactic ergativity have preverbal absolutive, while languages without syntactic ergativity have postverbal absolutive.

¹¹Tsotsil has both high and low absolutive markers and while it has an agent focus construction, it allows for the extraction of ergative arguments in environments typically disallowed by the languages in 17a. For more discussion of Tsotsil in the context of syntactic ergativity see CMP; Aissen 1987, 1999; Woolford 2006, 2011; and especially Aissen 2017

¹²Huastec has a completely divergent case marking system; see discussion in CMP.

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 Agent Focus morphology (see again 15b) correlates with the presence of the EEC: most syntactically ergative languages have Agent Focus 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 Agent Focus 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 argued by CMP, there is reason to believe that preverbal absolutive placement, syntactic ergativity, and crucially—Agent Focus marking—all arise from a single underlying phenomenon, which casts serious doubt on whether areal diffusion could offer a satisfactory explanation for Tada’s Generalization.

The next section addresses the primary question of the paper: *why* does A-movement of the absolutive argument render the ergative argument inaccessible for A'-movement? We propose that the ergative argument in HIGH ABS languages is situated between the tails of the absolutive A-movement dependency, such that A'-movement of the ergative argument would give rise to an unparseable crossed 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 (terminology from Deal 2016 for accounts based on absolutive inversion, e.g. Bittner and Hale 1996; Aldridge 2004; Coon et al. 2015, Coon et al. 2019), but rather, 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—or indeed any DP between the merge site and the landing site of the absolutive object—cannot undergo A'-movement without creating an illicit crossed dependency. Thus, our account of the EEC is grounded in the body of literature that supports constraints such as the CONSTRAINT ON CROSSING DEPENDENCIES (CCD; Kuno and Robinson 1972; Steedman 1985), which is repeated as (19) below:

- (19) CONSTRAINT ON CROSSING DEPENDENCIES:
No movement dependency may cross another movement dependency.

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 I⁰, which requires A-movement of the absolutive argument. In LOW ABS languages, absolutive case

¹³In contrast, CBL are somewhat agnostic about how the absolutive arguments arrives at I⁰ in HIGH ABS languages, suggesting that instead of case-checking demands, an EPP-feature motivates the movement. Here, we follow CMP instead of CBL, but nothing crucial hinges on that decision, i.e. our account goes through no matter what motivates the movement of the absolutive argument.

is assigned in situ by Voice⁰. Ergative case, meanwhile, is assigned to a transitive subject via inherent Agree with a lower Voice head.

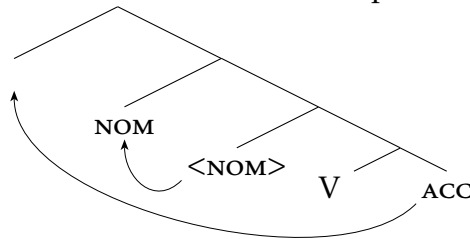
Before elaborating further on the specifics of our analysis, we would like to make the boundaries of our proposal clear: we offer a novel account of syntactic ergativity grounded in insights from the language processing and based on data from Mayan languages, but we do not offer an account of Mayan’s unique Agent Focus construction (see §2), which is one of many ways Mayan languages circumvent the EEC. Agent Focus is relevant to the present paper inasmuch as it signals the EEC. The literature contains a number of accounts of Agent Focus including Coon et al. (2014, 2019); Assmann et al. (2015); Stiebels (2006); Watanabe (2017); Ranero (2019).

The remainder of this section is organised as follows: the core details of our analysis are presented in Section 3.1 and, focusing primarily on prepositional goals and applicatives, the empirical predictions of our proposal are addressed in Section 3.2.

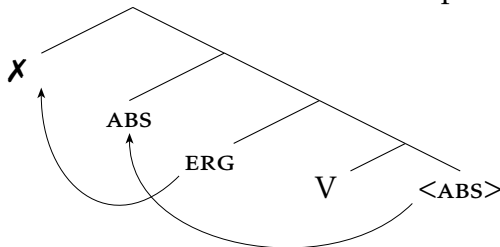
3.1 Proposal

The trees in (20) 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 A'-movement, as compared to a comparable sequence of movements in an ergative-absolutive language. Although restrictions on the extraction of an ergative argument are overwhelming more common cross-linguistically than restrictions on the extraction of an accusative argument (see Section 4), in many respects, the movement path in the nominative-accusative language is very similar to that of the ergative-absolutive language: the unmarked (nominative or absolutive) argument first A-moves into a more local position with its case assignor, after which A'-movement of the marked (accusative or ergative) argument is attempted.

- (20) a. Movement of ACC: Nested dependency



- b. *Movement of ERG: Crossed dependency



We note one crucial difference between the movement patterns shown in (20): in nominative languages, the accusative argument A-bar 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 A'-dependency in (20a) 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 A'-dependency in (20b) are crossed. In the crossed dependency the lower tail of the absolutive dependency does not c-command the lower tail of the ergative dependency.

Crossed dependencies are recognised as being typologically rarer in language than nested dependencies (e.g. Hays 1964; Kuno and Robinson 1972; Steedman 1985; Shieber 1985; Kruijff and Vasishth 2003; Levy and Manning 2004; Levy et al. 2012; Ferrer i Cancho et al. 2018; Yadav and Husain 2018). In English, for example, constructions which involve nested dependencies are typically judged as far more acceptable than constructions which involve crossed dependencies. Compare (21a–21b), repeated from (3) above.

- (21) Crossing and nested dependencies (Steedman 1985: 35)
- a. *Which sonata_j is this violin_i easy to play ____j on ____i.
- b. Which violin_j is this sonata_i to play ____i on ____j.
-

Based on examples like those in (21), Kuno and Robinson (1972: 474) proposed the WH CROSSING CONSTRAINT, under which dependencies can be nested as in (21b), but cannot cross, as in (21a). This insight resulted in a line of research focusing on experimental support for the existence of the CCD (19) as well as 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 WH CROSSING CONSTRAINT 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. crossed) manner.

In a reaction time study, Frazier et al. (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, Frazier et al. presented participants with sentences such as in (22). Both sentences involve the filler *who*, which must be associated with a gap site. In (22a), the correct 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. In the sentence in (22b), however, *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.

- (22) 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, (22a) should be more difficult to process than (22b): the gap site is further from the filler in (22a) than

it is in (22b) (cf. Frazier and Fodor 1978; Crain and Fodor 1985) and, the filler-gap dependency in (22a) contains two intervening discourse referents—*the teacher* and *PRO*—whereas the filler-gap dependency in (22b) contains only one—*the teacher*; cf. Gibson 1998. However, Frazier et al. found the reverse to be true: when presented with sentences like (22a) and (22b) word-by-word and asked to respond as fast as possible at the end of the sentence when they felt they had understood the sentence, participants responded to (22a) more quickly than to (22b), indicating that (22a) was processed more easily than (22b).

Frazier et al. 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 a *PRO* is encountered. Thus, in both sentences, the most recent potential filler which can be semantically associated with the null element following the matrix verb *wanted* is *the teacher*. In (22a), this turns out to be correct, and no reanalysis is required later on. In (22b), however, this turns out to be incorrect: the correct filler is in fact the more distal *wh*-phrase *who*; this requires reanalysis and subsequently means that (22b) generates a slower response time. Frazier et al. conclude that the parser necessarily activates the most recently encountered potential filler upon coming across a dependency site.

Connecting the discussion back to syntactic ergativity, we note that A'-movement of an ergative argument in HIGH ABS languages like K'iche' and Q'anjob'al creates a crossed dependency, because the A'-gap of the ergative argument is contained within the tails of the A-dependency of the absolutive argument; see again (20b). By contrast, A-bar movement of the accusative argument in a nominative-accusative language like English creates a nested dependency, because the A'-gap of the accusative argument is contained outside the tails of the A-dependency of the nominative argument; see again (20a).

Putting this observation into the context of Frazier et al.'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 distal A'-moved ergative argument. By contrast, in a non-syntactically ergative language like Ch'ol, the absolutive argument does not A-move past the ergative, such that there are no multiple movement dependencies 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 of processing a crossed dependency—as compared with a nested or disjoint dependency—has become a categorical constraint in Mayan languages. Critically, we argue that the processing mechanisms which give rise to the CCD—and which account for Frazier et al.'s (1983) finding—have become grammaticalized in Mayan languages. This view of grammaticalization is based upon Hawkins' (2004) PERFORMANCE-GRAMMAR CORRESPONDENCE HYPOTHESIS (23), according to which, processing-based preferences may become grammaticalized as categorical requirements in a subset of languages for which they are relevant.

- (23) PERFORMANCE-GRAMMAR CORRESPONDENCE HYPOTHESIS (Hawkins 2004: 3)
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.

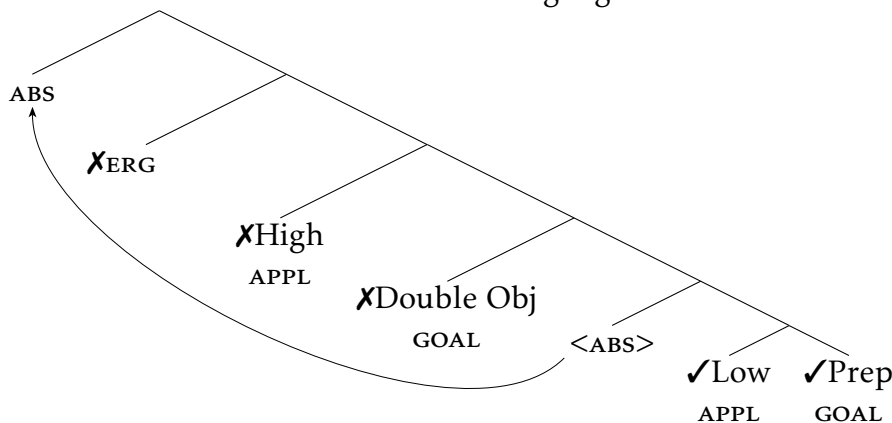
In the next sections, we test the predictions of our proposal, by investigating the extraction of DPs situated between the merge- and landing-sites of the absolutive object in HIGH ABS languages.

3.2 Beyond absolutive and ergative

Our proposal—that syntactic ergativity is the result of forming illicit crossed 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 this prediction can be tested: double objects and high applicatives. A goal argument in a double object construction is standardly analysed as being introduced by a high applicative phrase (Harley 1995; Anagnostopoulou 2003; Pytkänen 2008; Holmberg et al. 2018; a.o.); 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 (Pytkänen 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, which is that 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 examples of low applicatives in HIGH ABS Mayan languages.¹⁴ The predictions of our account, in terms of which elements should and should not be able to extract, are schematized in (24):

- (24) Extraction Predictions in HIGH ABS languages



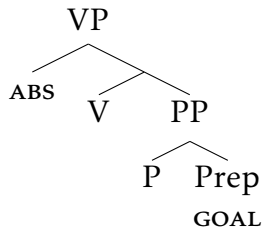
¹⁴Low applicatives appear to be restricted to the Tzeltalan branch languages within the Mayan family (Coon 2017 and sources therein), all of which are LOW ABS unclassifiable (see §2).

Working our way up the tree in (24), we begin testing the predictions of our proposal with the extraction of prepositional dative goals in HIGH ABS languages (§3.2.1), before turning to an interesting asymmetry in Kaqchikel adjunct extraction (§3.2.2) that helps us test both of our general predictions. Finally, we finish this section by discussing high applicatives in HIGH ABS languages (§3.2.3).

3.2.1 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, a.o.), as in (25).

(25) Prepositional ditransitive (based on Holmberg et al. 2018: 7)



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 Agent Focus or any other workaround. Each of the *wh*-questions in (26b–26d) target a different argument, but note that the Agent Focus construction is only used for the extraction of the agent (26b); when either the direct object (26c) or the prepositional object (26d) are extracted, the form of the verb is the same as it is in the declarative (26a).

- (26) a. Max- \emptyset y-aq' naq Xhunik ixim nal b'ay ix Carla.
 CP-3ABS 3ERG-give CLF Juan CLF CORN PREP CLF Carla
 'Juan gave the corn to Carla.'
- b. Maktxel max- \emptyset aq'-on ixim nal b'ay ix Carla?
 who CP-3ABS give-AF CLF Juan CLF CORN PREP CLF Carla
 'Who gave the corn to Carla?'
- c. Tzet max- \emptyset y-aq' naq Xhunik b'ay ix Carla?
 what CP-3ABS give-AF-ITV CLF Juan PREP CLF Carla
 'What did Juan give to Carla?'
- d. Maktxel b'ay max- \emptyset y-aq' naq Xhunik ixim nal?
 who PREP CP-3ABS 3ERG-give CLF Juan CLF corn
 'To whom did Juan give the corn?' Q'anjob'al, unpublished

This means that, when a ditransitive goal is A'-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. As such, the dependency is nested and is thus permitted.

In the 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, when the gap of the A'-moved ditransitive goal is encountered, the parser would activate the only remaining active filler—the A'-moved ditransitive goal. Thus, processing of this structure proceeds without problem.

In contrast to the data from Q'anjob'al, the extraction of prepositional goals in Kaqchikel appears to pose a problem for our analysis for the reason that it requires a dedicated construction used to focus (i.e. front) a certain types of adjuncts (Henderson 2007). The data in (27) 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 (27d). To restate the problem, although two different strategies are used for fronting ergative subjects (i.e. Agent Focus in 27b) and prepositional goals (*wi*-construction in 27d), they are similar in that for both cases the relevant DP cannot A'-move directly, as it can when an absolutive argument under goes focus A'-movement, as in (27c).

- (27) a. X- \emptyset -in-löq' ri äk' chi a-te'.
 CP-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 CP-1SG.ABS-give-AF DEM corte PREP 2SG.POSS-mother
 '[I]FOC gave the chicken to your mother.'
- c. Ja ri äk' x- \emptyset -in-löq' chi a-te'.
 FOC DEM corte CP-3SG.ABS-1SG.ERG-give PREP 2SG.POSS-mother
 'I gave [the chicken]FOC to your mother.'
- d. Ja chi a-te' x- \emptyset -in-löq' *(**wi**) ri äk'
 FOC PREP 2SG.POSS-mother CP-3SG.ABS-1SG.ERG-give wi DEM chicken
 'I gave the chicken [to your mother]FOC.' Kaqchikel, unpublished

Despite first appearance, Henderson (2007) provides evidence demonstrating that prepositional dative goals in Kaqchikel are not situated below the theme, as we would expect given the structure in (25). 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 (24), the extraction pattern in (27) is also straightforwardly explained by our analysis. We return to the apparent problem of prepositional goal extraction in Kaqchikel, once we have introduced the complete adjunct extraction paradigm in the next section.

3.2.2 Adjunction extraction in Kaqchikel

We now focus our attention 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 (24) pertaining to low applicatives.

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 (28a), the clitic *wi* must follow the verb. However, when a benefactive is fronted, as in (28b), *wi* cannot occur. In other words, it is possible to directly extract a benefactive adjunct, but not a place adjunct.

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

Henderson draws a parallel between high applicatives and *wi*-triggering adjuncts on one hand and low applicatives and adjuncts that do not trigger *wi* on the other. His argument is based on the semantic distinction between modifying events versus 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.

- (29) *Nim r-aqän rija' pa ch'at.
 big 3SG.ABS-leg 3SG PREP bed
 Intended: 'He is tall in bed.'

Kaqchikel, unpublished

In contrast, adjuncts which do not trigger *wi*, such as the benefactive, combine freely with individual-level predicates, as shown in (30). The compatibility between this class of adjuncts and individual-level predicates is consistent with an account where these adjuncts combines directly with the theme, as in low applicatives (Pylkkänen 2002).

- (30) Nim r-aqän ri ch'at w-ichin
 big 3SG.ABS-leg DEM bed POSS-BEN
 'My bed is tall.'

Kaqchikel, 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 is shown in (31). Henderson takes this to mean that the benefactive argument is structurally dependent on the (missing) theme argument, again, as would be true for a low applicative construction.

To summarize what we have seen 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 predicted by our proposal—they extract unproblematically. Kaqchikel prepositional object DPs, in contrast, behave in the manner of high applicatives: they are merged above the absolutive object, and therefore require a special element (*wi*) in order to surface in a non-canonical position. The next section considers the extraction of more prototypical high applicatives.

3.2.3 High applicatives

We expect that arguments introduced by a high applicative head should not be able to straightforwardly undergo A'-movement in transitive constructions in HIGH ABS Mayan languages, because those DPs are located between the tails of the absolutive argument's A-dependency. In order 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 our discussion of the Mayan *-b'e* construction in the HIGH ABS languages that have it, where it is also called the 'instrumental voice' construction (Ayres 1983; Mondlach 1978; Dayley 1985)¹⁵, but note that in the LOW ABS languages of the Ch'olan and Tzeltalan branches, *b'e* marks a low applicative construction that applies to transitive verbs in which an indirect object is promoted from oblique status (Vázquez Álvarez 2011; Shklovsky 2012; Polian 2013; Aissen 1987b; Coon 2016).

In a number of HIGH ABS languages including Ixil, Kaqchikel, K'iche', Tz'utujil, Poqomam, and Poqomchi, 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 there is K'iche' for which the promoted object can be shown to control the person marking on the verb. On the other end of the continuum is Kaqchikel, for which the 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, i.e. A'-contexts.

A pair of examples from K'iche' is given in (34). When the instrument is not fronted, as in (34a), it surfaces as an oblique, but when the instrument is fronted, the instrument appears without a preposition and *b'e* immediately follows the verb root, as in (34b).

¹⁵Most Mamean languages, with the exception of Ixil, do not have an analogous construction nor do the Q'anjob'al languages (Mora-Marín 2003).

- (36) a. A Juan max- \emptyset maq'on-i no tx'i.
 FOC Juan CMPL-3ABS hit-AF-ITV CL dog
 'It was Juan who hit the dog.'
- b. Ay-in max- \emptyset hin-maq'-a' no tx'i
 FOC-1SG CMPL-3ABS 1ERG-hit-TV CL dog
 'It was me who hit the dog.'

Q'anjob'al, CMP: 53

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 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 object are 1st/2nd person Mondloch 1978; 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).

The generalization to be drawn here is that, to varying degrees across syntactically ergative Mayan languages, 1st/2nd person pronouns allow for extraction of the ergative argument, where extraction would otherwise not be possible. The strictest languages are those which include Kaqchikel: the person features do not determine extraction possibilities. K'iche' is slightly less strict: if both the subject and object are 1st/2nd person, extraction of the ergative is permitted. Then, we have Q'anjob'al and Popti', in which 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 psycholinguistic literature that long-distance dependency structures involving 1st and 2nd person pronouns are processed more easily than those involving third person nominals: they are read faster in self-paced reading settings, and judged as more acceptable in grammaticality rating studies. Warren and Gibson (2002) 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 every and any conversational environment (which necessarily involves a 1st person speaker and a 2nd person listener). In contrast, 3rd 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/2nd person pronouns are less costly than 3rd person nominals to (i) store in working memory, and (ii) 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 between 1st and 2nd person on the one hand, and 3rd person on the other, has—again, to varying 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 such as Kaqchikel have fully grammaticalized the CCD. Our proposal nonetheless makes the concrete prediction that the contrast between 1st/2nd and 3rd nominals should obtain in a processing study: we predict that, when the subject and/or the object is 1st or 2nd person, an A'-dependency construction should be easier to process. We leave this to future work.

3.3.2 Reflexives

It is widely recognised that restrictions on the extraction of ergative subjects in Mayan languages do not typically hold when the object is a reflexive pronoun. In the Q'anjob'al example in (37), the ergative subject can straightforwardly extract when the object is reflexive (37a), but not otherwise (37b).¹⁶

- (37) a. Maktxel max y-il s-b'a?
 who CMPL 3ERG-see 3POSS-self
 'Who saw herself?'
 b. * Maktxel max y-il-a ix ix
 who CMPL 3ERG-see-TV CL woman
 Intended: 'Who saw the woman?'
 (Grammatical as 'Who did the woman see?')

Q'anjob'al, CMP: 15, 56

For our purposes, there is a crucial difference between reflexive objects and non-reflexive objects. Whereas Q'anjob'al word order is rigidly VSO with non-reflexive objects, reflexive objects must be adjacent to the verb, resulting in VOS word order (Pascual 2007; Coon et al. 2014; Clemens and Coon 2018). Building on a proposal by CMP, who posit that reflexive objects are caseless NP objects, Tollan (2019) propose that reflexives are, in fact, full DP objects, but are licensed via M-Merger with the verb (Baker 1988; Levin 2015; van Urk 2019), as opposed to via absolutive case assignment, and as such, they must remain verb-adjacent. 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.

A similar configuration in which the ergative subject can unexpectedly A'-move is the "extended reflexive" construction (Craig 1979; Mondlach 1978; Aissen 1999b; a.o.), again shown for Q'anjob'al in (38). Here, the ergative subject binds the possessor of the object.

- (38) Maktxel max s-bon-o s-na?
 who CMPL 3ERG-paint-TV 3POSS-house
 'Who_i painted his_{i/*j} (own) house?'

Q'anjob'al, CMP: 15, 57

As noted by CMP, extended reflexive objects are unlike prototypical reflexive objects in that they do not have to remain verb-adjacent. Thus, it would not seem that they are

¹⁶See also Berinstein (1991) for Q'eqchi; Craig (1977) for Popti'; Mondlach (1978) for K'ichee' and Henderson and Coon (2018) for Kaqchikel.

also licensed via M-Merger, and it is therefore entirely possible that they A-move past the ergative subject. The question remains, therefore, as to why such movement does not trap the ergative subject, which would otherwise be expected under an analysis based on the Constraint against Crossing Dependencies.

CBL presents 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 latter path does not actually involve a prototypical A-dependency: the object is not semantically interpreted in its raised position, but rather, in its base position. This means that the A-movement path does not qualitatively figure into the determination dependency paths, and therefore is not visible as a movement path for the ergative subject to cross.

3.3.3 Bare NPs

Aissen (2011) observes that K'iche' allows for extraction of the ergative subject when the object is a bare NP (note the absence of a determiner in 39a), as opposed to a full DP (note the presence of the determiner *rii* in 39b).

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

One attractive option for accounting for this observation would be to posit that bare NP objects in K'iche' do not undergo A-movement like full DP objects do. This is the position taken by CMP, and it would be nicely accommodated within our proposal: 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' pre-verbal absolutive, just like a full DP object does, so even the bare NP object has raised. As such, movement of the ergative subject across the A-movement path of the NP object should create a crossed dependency and be illicit on our account (see also CBL).

To account for (39a), we appeal to the contrast between dependencies of referential vs. non-referential nominals. Crucially, Aissen (2011) reports a difference in the interpretation associated with objects which do not permit ergative subject extraction as compared with bare NPs objects that do. She notes that, when the object allows for extraction (39a), 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 39b), 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 §4.3.1). When

the A-moved object is a full DP—such that the ergative subject cannot extract—then 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. As such, no other dependency can be formed during this process; that is to say, a crossed dependency, such as that which 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). As such, the storage and integration costs of an NP A-dependency are sufficiently light that the parser has enough free resources to allow it to form a second dependency—such as an ergative subject A-bar dependency—during that process: that is to say, a crossing dependency here is, exceptionally, permitted.

4 Previous accounts of Tada’s generalization

In this section, we focus on the proposals in Coon, Mateo Pedro, and Preminger 2014 (CMP) and Coon, Baier, and Levin 2019 (CBL), because while there are other accounts of syntactic ergativity in the Mayan languages, e.g. Erlewine 2016 (but see Henderson and Coon 2017) and Assmann et al. 2015, these other accounts do not aim at explaining Tada’s Generalization—that languages with a preverbal absolutive marker exhibit ergative extraction restrictions—and explaining this generalization is our desideratum.

4.1 Phase boundaries

CMP’s account of the ERGATIVE EXTRACTION CONSTRAINT (EEC), as well as the account presented in Section 3, is based on the variable absolutive case assignment in Mayan languages: in HIGH ABS languages, absolutive case is assigned by I^0 and in LOW ABS languages, absolutive case is assigned in situ by Voice⁰.

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 (40). 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.

(40) **Syntactic ergativity:** $[_{IP} I^0 \dots OBJ_{ABS} \parallel [_{VoiceP} SUBJ_{ERG} Voice [_{VP} V \overline{OBJ}]]]$

This proposal faces two empirical problems. The first problem 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 absolutive 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, giving rise to widespread syntactic accusativity, as schematized below.

(41) **Syntactic accusativity:** [_{IP} I⁰ ... SUB]_{NOM} || [_{VoiceP} ~~SUBJ~~ Voice [_{VP} V OBJ_{ACC}]]]

Syntactic accusativity is not particularly widespread, however. Of the 39 accusative languages data surveyed by Keenan and Comrie (1977),¹⁷ 12 (30.8%)¹⁸ can be construed as syntactically accusative in either one of two ways: (i) allowing for relativization of the subject, but not of the direct object (p.76-78), or (ii) requiring a pronoun at the extraction gap site for direct objects, but not for subjects (p.94). The remaining 27 languages (69.2%)¹⁹ allow extraction of the object. As first mentioned in Section 2 approximately 62.5% of morphologically ergative languages are syntactically ergative (Polinsky 2016; Comrie 2008; Comrie and Kuteva 2008).

To explain the asymmetry, CMP propose that Mayan languages differ from nominative-accusative languages in terms of where the external argument is merged relative to the *v*P phase boundary. Following Chomsky (2000, 2001), Legate (2003), and Deal (2009), among others, they argue that, in nominative languages, the merge position of a transitive subject is, in fact, above the *v*P phase boundary. In Mayan, on the other hand, the merge position is suggested to be below the phase boundary. However, this latter point is, as noted by the authors, stipulative. In contrast, the asymmetry between ergative-absolutive and nominative-accusative with respect to extraction restrictions falls out of our analysis; see discussion around (20).

A further issue concerns the extraction of non-ergative DPs. As noted by Assmann et al. (2015), the phase-based account for CMP predicts that no DP below the *v*P 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 *v*P phase. In Section 3.2.1, however, we saw evidence from Q’anjob’al that this is not the case: prepositional goal arguments are readily able to undergo A'-movement. Thus, the extraction of prepositional goals in Q’anjob’al provides further evidence that the *v*P phase boundary is not responsible for the trapping of the ergative argument in Mayan A'-structures.

4.2 Locality

In recent work, Coon, Baier, and Levin (2019; CBL) argue that locality, rather than the nature of *v*P phase boundaries, gives rise to the Mayan restriction on the extraction of 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.

The CBL account of the EEC proceeds as follows. Mayan A'-probes are relativized to the feature [D], and consequently, A'-heads probe simultaneously for A'-features and for

¹⁷Keenan and Comrie survey 49 languages in total. Of these, ten are known to either have an ergative alignment, or an Austronesian voice-marking system—Basque, Hindi, Iban, Javanese, Malagasy, Malay, Minang-Kabu, Tagalog, Toba Batak, Tongan—and are therefore excluded from the following count.

¹⁸These are: Aoban, Chinese, Classical Arabic, Czech, Genoese, German, Gilbertese, Hebrew, Kera, Mori, Persian, Slovenian.

¹⁹These are: Catalan, Dutch, English, Finnish, French, North Frisian, Fulani, Greek, Hausa, Italian, Japanese, Korean, Luganda, Polish, Romanian, Roviana, Russian, Sinhala, Shona, Spanish, Swedish, Tamil, Turkish, Urhobo, Welsh, Yoruba, Zurich German.

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 A'-probe. In absolutive object A'-configurations, the object, bearing both A'- and D-features, is both the best and closest match for the featural requirements of the A'-probe. Thus, object A'-movement is unproblematic.

In ergative subject A'-configurations, the subject is the best match for the A'-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 so-called “feature gluttony” (Coon and Keine 2018), wherein there is no way of optimally satisfying all the requirements of the A'-probe. In this case, the result is syntactic ergativity.

The strength of CBL’s account is the way in which it handles variation within the HIGH ABS languages (see also Section 3.3); however, 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 A'-move in configurations where the absolutive object intervenes between the A'-head and the subject goal, it is equally predicted that absolutive objects should be unable to A'-move in configurations where the ergative subject intervenes between the A'-head and the object goal. This is precisely the configuration which 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 [A'] features, is the better match. This too, should give rise to feature gluttony, resulting in a restriction on extraction of absolutive object. This prediction turns out to be incorrect for Ch’ol, as shown in (42), and to our knowledge, no LOW ABS Mayan language exhibits a ban on extraction of absolutive objects.

- (42) a. Tyi y-il-ä-yoñ jiñi wiñik.
 CP 3ERG-SEE-TV-1ABS DET man
 ‘The man saw (me).’
 b. Maxki tyi y-il-ä-yety
 who CP 3ERG-SEE-TV-2ABS
 ‘Who saw (you)?’

Ch’ol, CMP: 16

The account of syntactic ergativity developed in CBL, like the one in CMP, predicts that the extraction restriction in Mayan HIGH ABS languages should not be limited to ergative subjects. Rather, all DPs below the absolutive object should also be unable to undergo A'-movement; thus, the Q’anjob’al data in (26), in which ditransitive goal arguments can A'-move, is also problematic a locality-based account.

To summarize, this section has recounted two existing analyses of how the ergative argument becomes trapped in HIGH ABS Mayan languages, after movement of the absolutive object (CMP). Both CMP’s phase-based account and CBL’s locality-based account face empirical problems. CMP predict widespread syntactic accusativity, whereas CBL predict an absolutive object extraction restriction in LOW ABS Mayan languages. Furthermore, both accounts predict that all DPs below the absolutive object should be unextractable, contrary to the data in (26). Our account of how the ergative argument becomes trapped by object A'-movement avoids each of the aforementioned issues.

5 Extensions of the proposal

In this section, we turn our attention to extending our proposal beyond the Mayan language family. We focus firstly on three other ergative-absolutive languages from the Tongic branch of the Polynesian family, and then discuss how a grammaticalized constraint on crossed dependencies can explain an extraction asymmetry in the passives of double object constructions in nominative-accusative languages recently uncovered by Holmberg et al. (2018). We conclude the section by discussing an apparent problem for our analysis: multiple *wh*-movement in Bulgarian.

5.1 Syntactic ergativity in Tongic Polynesian

The Tongic branch of the Polynesian family (Austronesian > Malayo-Polynesian) consists of two languages: Tongan and Niuean, which are spoken primarily on the south Pacific islands of Tonga, Niue, and New Zealand. Like the Mayan languages discussed in the previous sections, Tongic languages have a base V1 word order and ergative alignment; however, unlike Mayan languages, Tongic languages are dependent marking.

Although both of the Tongic languages are morphologically ergative, only Tongan is syntactically ergative. In Tongan, the ergative argument patterns differently with respect to movement operations as compared to absolutive arguments. Only the absolutive object can relativize with a gap; the ergative subject relative requires a resumptive pronoun. This data is shown in (43).²⁰

- (43) a. e fefine_i [RC 'oku 'ofa'i 'e Sione ____i].
DEF woman PRS love ERG Sione
'the woman whom Sione loves'
- b. e fefine_i [RC 'oku *(ne)_i 'ofa'i 'a Sione].
DEF woman PRS RP love ABS Sione
'the woman who loves Sione' Tongan, Otsuka 2000:116

In contrast to the Tongan, both the ergative subject (44a) and absolutive object (44b) relativize with a gap in Niuean.

- (44) a. e tagata_i [ka kai ____i e talo].
ABS person FUT eat ABS taro
'the person who will eat the taro'
- b. e tagata_i [ne moto e koe ____i].
ABS person NFT punch ERG 2SG
'the person who you punched' Niuean, approx. Seiter 1980:94

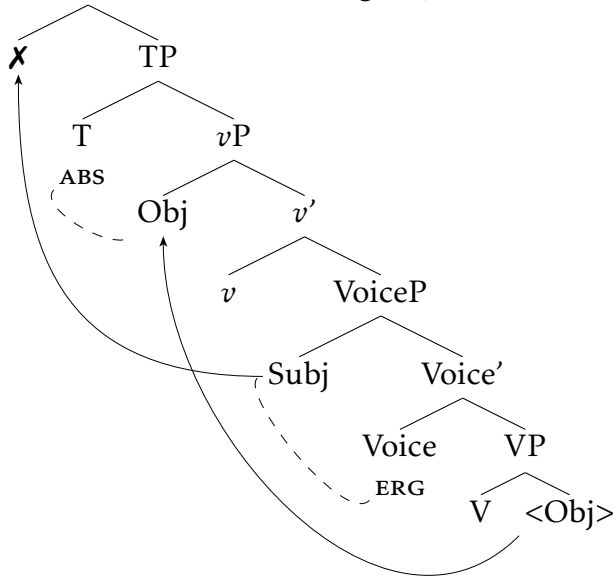
Clemens and Coon (2019) account for the presence of syntactic ergativity in Tongan (i.e. A'-movement restrictions upon ergative arguments) and the absence of syntactic

²⁰Additional evidence for the presence of syntactic ergativity in Tongan, but not Niuean, comes from Polynesian's so-called raising construction (Otsuka 2000; Longenbaugh and Polinsky 2018; Clemens and Coon 2019).

ergativity in Niuean in manner similar to how we accounted for syntactic ergativity in HIGH but not LOW ABS Mayan languages in Section 3. There are two main components to the analysis: i) variable case assignment and ii) a ban against crossed dependencies.

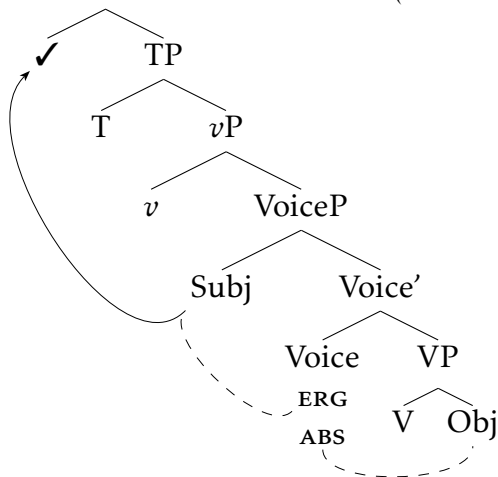
Clemens and Coon (2019) propose that the locus of absolutive case in Tongan is high (T^0) and argue that the movement of the absolutive argument into a case licensing position effectively traps the ergative argument in its base position. Subsequent movement of the ergative argument in Tongan results in an illicit crossed dependency, as shown in (45).

(45) No ERG extraction in Tongan (Clemens and Coon 2019)



In Niuean, absolutive case is assigned low by the Voice head (see also Massam 2006; Aldridge 2004; Legate 2008), and does not require movement of the absolutive argument. A'-movement of the ergative argument results in nested dependencies and is thus grammatical, as schematized in (46).

(46) ERG extraction in Niuean (Clemens and Coon 2019)



Recall that Mayan languages wear the movement of the absolutive argument on their sleeves: in HIGH ABS languages, the absolutive marker precedes the stem, whereas in LOW

ABS Mayan languages, the absolutive marker follows the verb stem. Clemens and Coon (2019) argue that Tongic languages have an analogous—albeit less transparent—correlate of absolutive A-movement. In transitive clauses with two full DP arguments, Tongan has VSO~VOS order whereas Niuean is strictly VSO. The choice between VSO and VOS in Tongan affects the prominence of the object in the interpretation of the utterance such that the object in VOS constructions is emphasized (Otsuka 2000, Polinsky and Potsdam 2019). As was shown in (45), the base position of the object follows the subject and the case position of the object precedes the subject. Clemens and Coon (2019) maintain that the object can be pronounced in either of its syntactic positions and that the choice between the two is governed by pragmatic factors.

Whether a crossing dependency-based analysis can be extended to ergative languages outside of Mayan and Polynesian remains an open topic. A-movement of the absolutive argument to T⁰/I⁰ has been the basis of proposals accounting for syntactic ergativity in other, unrelated languages, including West Circassian (Ershova 2019), Dyrbal (Bittner and Hale 1996), and Seediq (Aldridge 2004). In these languages, like in Tongan and HIGH ABS Mayan languages, the absolutive object is argued to A-move past the ergative subject; this leaves the ergative subject unable to undergo movement without creating an illicit crossed dependency. We do, however, see evidence that the crossing dependency analysis of syntactic ergativity is also operative in non-ergative languages; we turn to this now.

5.2 Extraction out of double object passives

The distinction between crossing and nested dependencies can also be argued to play a role in A'-movement in other types of constructions. Notably, Holmberg et al. (2018) observe a distinction in several unrelated languages with regards to passives of double object constructions. These languages include Norwegian (shown in 47), Swedish, North-west British English, Zulu, Xhosa, and Lubukusu. Unlike many other languages, these languages allow passivization of both a goal argument (47a) and a theme argument (47b).

- (47) 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 John.')

Norwegian, Holmberg et al. 2018: 1

The same group of languages also allows extraction of both goal arguments and theme arguments, as exemplified for Norwegian *wh*-questions in (48).

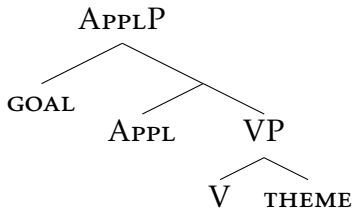
- (48) a. Hvem_i ga du boka ____i?
 who gave you book.DET
 ‘To whom did you give the book?’ (Lit. ‘Who gave you the book’)
- b. Hvilken bok_i ga du ____i Jon?
 which book gave you Jon
 ‘Which book did you give Jon?’
- Norwegian, Holmberg et al. 2018: 2

With regards to extraction from double object passives, however, an asymmetry arises. As a baseline, note that a goal can be extracted from a goal passive (49a) and a theme can be extracted from a theme passive (49b). Crucially, while a theme argument can be extracted from inside a goal passive (49c), a goal argument cannot be extracted from inside a theme passive (49d).

- (49) 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 John given?’
- d. *Hvem_i ____i ble boka gitt?
 who was book. given
 Intended: ‘Who was the book given to?’
- Norwegian, based on Holmberg et al. 2018: 3

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 (Harley 1995; Anagnostopoulou 2003; Pylkkänen 2008; Holmberg et al. 2018; a.o.–see earlier discussion in Section 3.2), as in (50). 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 25).

- (50) Double object ditransitive (based on Holmberg et al. 2018: 7)



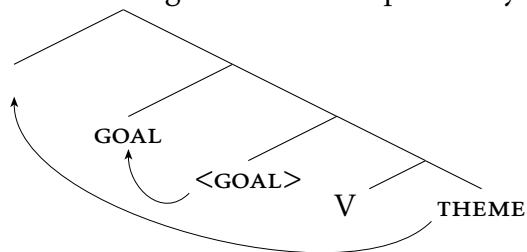
Holmberg et al. (2018) account for the asymmetry between (49c) and (49d) as follows: in a goal passive, APPL⁰ assigns Case to the lower theme via c-command. T⁰ then agrees with the goal, assigns nominative case to it, and attracts it to the TP specifier. Crucially

though, the theme moves to the outer edge of the lower phase, because it has an unvalued [*uwh*] feature.²¹ 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 Specifier-Head Agree relation. Now, because the theme has an unvalued [*uCASE*] 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 the TP specifier. However, when phase transfer occurs, only this outer specifier is visible, so the goal, bearing a [*uwh*] feature, is trapped.

Holmberg et al.'s account leaves two issues unresolved. Firstly, 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 (49c) 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 (49c) should be ruled out. Furthermore, Holmberg et al.'s account predicts that accusative objects should also be unable to extract: because the subject in such configurations has a [*uCASE*] feature (which is 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.

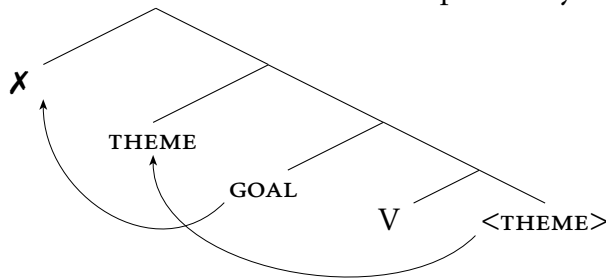
The asymmetry between (49c) and (49d) can be explained under a theory based on the distinction between crossing and nested dependencies, as in Section 3: in a double object goal passive, the goal A-moves from the specifier of $APPLP$ to the specifier of TP. In a double object theme passive, the theme A-moves from VP—past the goal argument—to Spec, TP. As a result, a theme *wh*-dependency in a goal passive, as in (49c) 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 (49d), 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 (51).

- (51) a. Theme inside goal: Nested dependency



²¹Following 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.

b. Goal inside theme: Crossed dependency



In this way, constructions which involve a goal dependency formed within a theme passive, such as (49d), are analogous to an attempted ergative *wh*-dependency formation, as in (20b), 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 counter example from multiple *wh*-movement.

5.3 Where crossing wins out: Multiple *wh*-movement

Despite the typological abundance of dependency nesting as compared with dependency crossing, it is not the case that crossed dependencies are non-existent. Aside from clause-final verb clusters in Dutch (Bach et al., 1986), we find that a subset of languages which allow for multiple *wh*-movement also require that such movement be crossed. One such language which is well-documented in syntactic literature is Bulgarian (e.g., Rudin 1988; Richards 1997; Bošković 2002; see also Jeong 2003 and Ortiz de Urbina 1989 on Basque). Bulgarian exhibits superiority effects in *wh*-fronting contexts; the consequence of this is that the A'-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 52.

- (52) Koj kogo običa?
 who whom loves
 'Who loves whom?'

Bulgarian, Bošković 2002: 354

We note that the structure in (52) involves three dependencies: i) the EPP-driven A-movement of the nominative subject *koj* who to the specifier of an inflectional projection ii) the A'-movement of the subject to the left periphery, as well as iii) the movement of the object to the left periphery, schematized in 53.

- (53) Koj_i kogo_j _i _i običa _j [=52]

 Bulgarian, Bošković 2002: 354; cf. Rivero 2005: 1089

Potentially problematic for our proposal is the fact that the two A'-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 (1997) proposal, A'-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 C⁰ 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 the principle of Shortest Move (i.e. it must cross the minimal number of nodes). This means that the object must “tuck in” below the subject (terminology by Richards 1997) into a lower specifier of the same projection which hosts the subject. The outcome of these principles is that the pre-movement superiority relation between the subject and the object which was established by their base positions (the subject asymmetrically c-commands the object) is maintained post-movement.

There are at least two avenues for further exploring the Bulgarian data within the context of our proposal. Note that neither of the A'-movement dependencies in (53) crosses the prior A-movement path of the subject. In other words, while Bulgarian exhibits crossing A'-movement paths, A'- and A-movement paths do not cross. This pattern is consistent the movement patterns in Mayan languages and the languages discussed in the previous section. Thus, it is possible that, where processing is concerned, there exists a difference between A'-dependencies and A-dependencies. Tollan (2019) proposes that A-dependencies are qualitatively different from A'- dependencies in terms of the relationship between the filler and the gap: in the processing of A'-dependencies, it is the presence of the A'-filler that prompts the parser to actively seek a gap site in which to form the filler-gap dependency. In (54), 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*).

- (54) A'-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 presence of the gap site that prompts the parser to identify the filler from the preceding word string. In the passive sentence in (55), for example, the subject *the ball* is not immediately identifiable as a filler. Later, however, the transitive verb *kicked* is encountered, prompting the parser to expect a direct object. When a gap is encountered instead of a direct object, the parser then actively probes the already-stored preceding sentence material to identify a filler (i.e. *the ball*) to associate with it.

- (55) 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- versus A-bar dependencies. We leave this question for future research.

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 i) it has not been grammaticalized in Bulgarian, as we have proposed for Mayan languages and ii) that 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 is argued to be 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 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 i) because the CCD is universal processing consideration, languages such as Dutch and Bulgarian should comprise a minority of the typological population (which they do), and even in these languages, constructions which violate the CCD should be fewer than those which satisfy it (which is also true).

6 Conclusion

Drawing on data from Mayan languages, this paper has developed an account of syntactic ergativity based on the grammaticalization of a processing constraint against crossing dependencies (Kuno and Robinson 1972) that also accounts for Tada’s Generalization that syntactically ergative Mayan languages are those with preverbal absolutive markers. We proposed that restrictions on the A'-movement of the ergative subject arise because such movement would cross the prior A-movement path of the absolutive object creating an illicit crossed 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 crossed 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 1) languages in which 1st and 2nd person ergative arguments can be exceptionally extracted, as in K'iche', Q'anjob'al, Popti', and Tsotsil and in 2) 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, which in the Mayan language family plays a categorical role. The idea that crossing dependencies yield difficulties in processing, and for this reason may be dispreferred, is independently supported in the sentence processing literature (e.g. Fodor 1978; Frazier and Fodor 1978; Rochemont and Culicover 1990; Pickering and Barry 1991; Frazier et al. 1983). The next step is to pursue the predictions of our proposal in experimental work on Mayan languages, particularly with respect to the extraction of arguments with specific person features. Firstly, for HIGH ABS languages, we expect that processing of Agent Focus constructions involving A'-movement should proceed most easily when both of the arguments are 1st or 2nd person, as compared with when only one is 1st or 2nd person. Processing should be most difficult when both arguments are 3rd person. Secondly, we predict that, in LOW ABS languages too, ergative subject, absolutive object, and absolutive subject A'-constructions should be easiest to process when no third person arguments are present. We leave this as a direction for future research.

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