AN OVERVIEW OF MAYAN

PHONOLOGY, SYNTAX, AND SEMANTICS

BY

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INTRODUCTION TO MAYAN LINGUISTICS[*]

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1   Introduction

This special issue of *Language and Linguistic Compass* is dedicated to a three-part survey of the grammatical structure of Mayan languages. The articles in this collection focus on core, well-studied aspects of Mayan linguistics: phonology (Bennett), syntax (Coon), and semantics (Henderson). The perspective taken is broadly typological, but also informed by theoretical issues in formal linguistics. Our goal is to share the richness of Mayan languages with the broader linguistic community, in the hopes of encouraging future research on these fascinating languages.

This introduction includes an overview of the Mayan language family and its internal structure (§2), as well as a discussion of the kinds of publications that we've drawn on in compiling the target articles (§3). We close with an outline of the glossing and transcription conventions that we've adopted for this special issue (§4).

2   Genetic classification and language names

2.1   The region and speakers

Mayan languages are spoken by over six million people across Mexico, Guatemala, Belize, and Honduras, as well as in various diaspora communities in the United States and Canada. The Maya area is divided into two geographical regions, the Highland and Lowland areas, with the boundary falling roughly along the chain of mountains that runs through central Guatemala (Figure 1; see Law 2014 for discussion).

Guatemala has the highest density of Mayan speakers of any country today. Official census estimates suggest that about 40% of Guatemalans speak a Mayan language natively; this almost certainly

underestimates the actual percentage of native Mayan speakers in the country, which is likely 50-60% or higher (Fischer and Brown 1996a; England 2003). In some areas the percentage of native Mayan speakers is closer to 90-100%, as in parts of the Q'eqchi'-speaking region in the department of Alta Verapaz (Richards
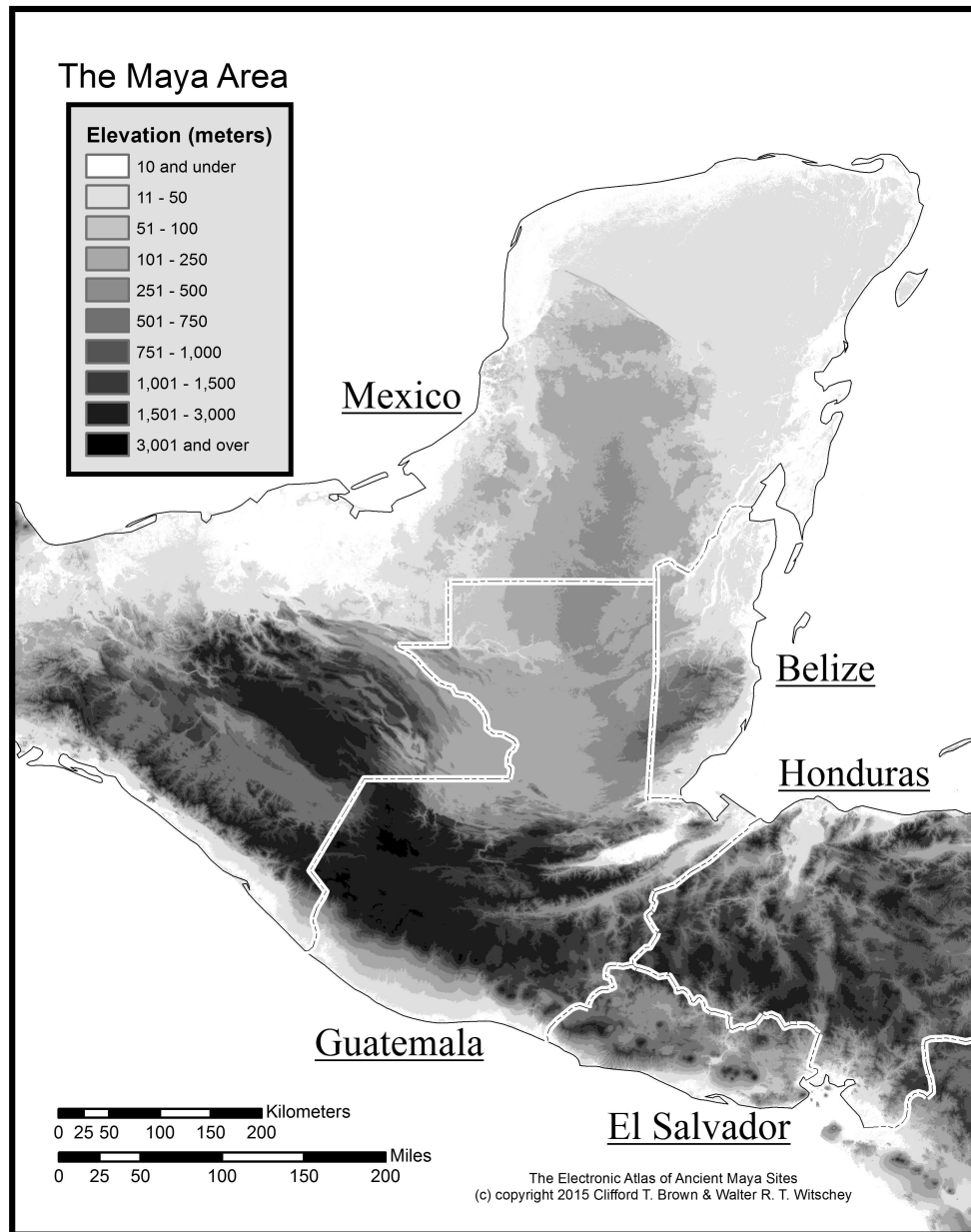

Figure 1: *Elevation map of the Maya area. Prepared by and courtesy of Walter R.T. Witschey and Clifford T. Brown. Copyright 2015, The Electronic Atlas of Ancient Maya Sites, http://MayaGIS.smv.org (Witschey and Brown 2015).*

2003). Many (perhaps most) speakers of Mayan languages in Guatemala are bilingual in Spanish, but monolingualism in Mayan languages is widespread, especially in rural areas. Multilingualism in two or more Mayan languages is also attested, particularly in municipalities which lie on a border between distinct linguistic areas (e.g. both K'iche' and Uspantek are spoken as home languages in the municipality of Uspantán; K'iche' serves as a *lingua franca* in this area for speakers of Uspantek, Ixil and Q'eqchi').

Outside of Guatemala, Mexico has the largest population of Mayan speakers in Mesoamerica. Based on census results reported in Law (2013) we can estimate that as of 2010 there were at least 2.5 million speakers of Mayan languages in Mexico, or just over 2% of the total population (the number of Mayan speakers in Belize is comparatively quite small, probably under 30,000 in total, and in Honduras there are only a handful of speakers of Ch'orti'; Lewis et al. 2015). These speakers are primarily concentrated in Southern Mexico and the Yucatán Peninsula, though Huastec is spoken further north in the San Luis Potosí and Veracruz regions of Central Mexico. As in Guatemala, bilingualism with Spanish is common, especially among younger generations, though many monolingual speakers exist as well.

2.2 Genetic classification

The Mayan family consists of about thirty languages, usually grouped into five or six major sub-groups. From top to bottom in the figure in (1), these branches are Yucatecan, Huastecan, Ch'olan–Tseltalan (a.k.a. Greater Tseltalan), Q'anjob'alan, Mamean, and K'ichean (Campbell and Kaufman 1985; England and Zavala 2013). The Ch'olan–Tseltalan and Q'anjob'alan branches together make up the Western Branch, while the Mamean and K'ichean branches make up the Eastern Branch. Most of these languages (about 21) are spoken in Guatemala. Some controversy over sub-family divisions exists, as discussed in Campbell and Kaufman 1985; Law 2014; Campbell to appear. In (1) we provide a reasonably well-accepted set of genetic subgroupings within the family. Genetic classification is particularly difficult in the case of Tojolab'al, which has been substantially shaped by areal contact between Mayan languages belonging to different sub-branches of the family (e.g. Law 2014).[1]

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[1]It bears mentioning that even firmly-classified Mayan languages may show extensive traces of areal influence from more distantly-related Mayan languages. Uspantek and Sipakapense, for instance, are both K'ichean-branch languages that have been profoundly affected by contact with nearby Mamean languages (Campbell 1977, Barrett 1999, Law 2013, 2014; Campbell to appear).

(1)

It should be noted that three languages included in (1)—Achi, Akatek, and Chalchitek—are sometimes characterized as dialects of K'iche', Q'anjob'al, and Awakatek respectively, rather than as independent languages. See Kaufman (1976); England (2003); Richards (2003); Law (2013); Campbell (to appear) for additional details.

2.3 Language health

The health of Mayan languages varies quite widely. There are currently at least 7 Mayan languages with over 400,000 speakers each (K'iche', Q'eqchi', Kaqchikel, Mam, Tseltal, Tsotsil, and Yucatec), but also at least 6 languages with fewer than 5000 speakers each (Sakapultek, Uspantek, Tektitek, Mocho', Itzaj, and

Distribution of Mayan Languages

1. Yucatec (Maya)
2. Itzaj (Itza')
3. Lacandon (Lakantun)
4. Mopan
5. Huastec (Teenek)
6. Chicomuceltec (Kabil)
7. Ch'ol
8. Chontal (Yokot'an)
9. Ch'orti'
10. Tseltal
11. Tsotsil
12. Tojolab'al
13. Chuj
14. Q'anjob'al
15. Akatek
16. Popti' (Jakaltek)
17. Mocho' (Motosintlek)
18. Mam
19. Tektitek (Teko)
20. Awakatek
21. Chalchitek
22. Ixil
23. Kaqchikel
24. Tz'utujil
25. K'iche'
26. Achi
27. Sakapultek
28. Sipakapense
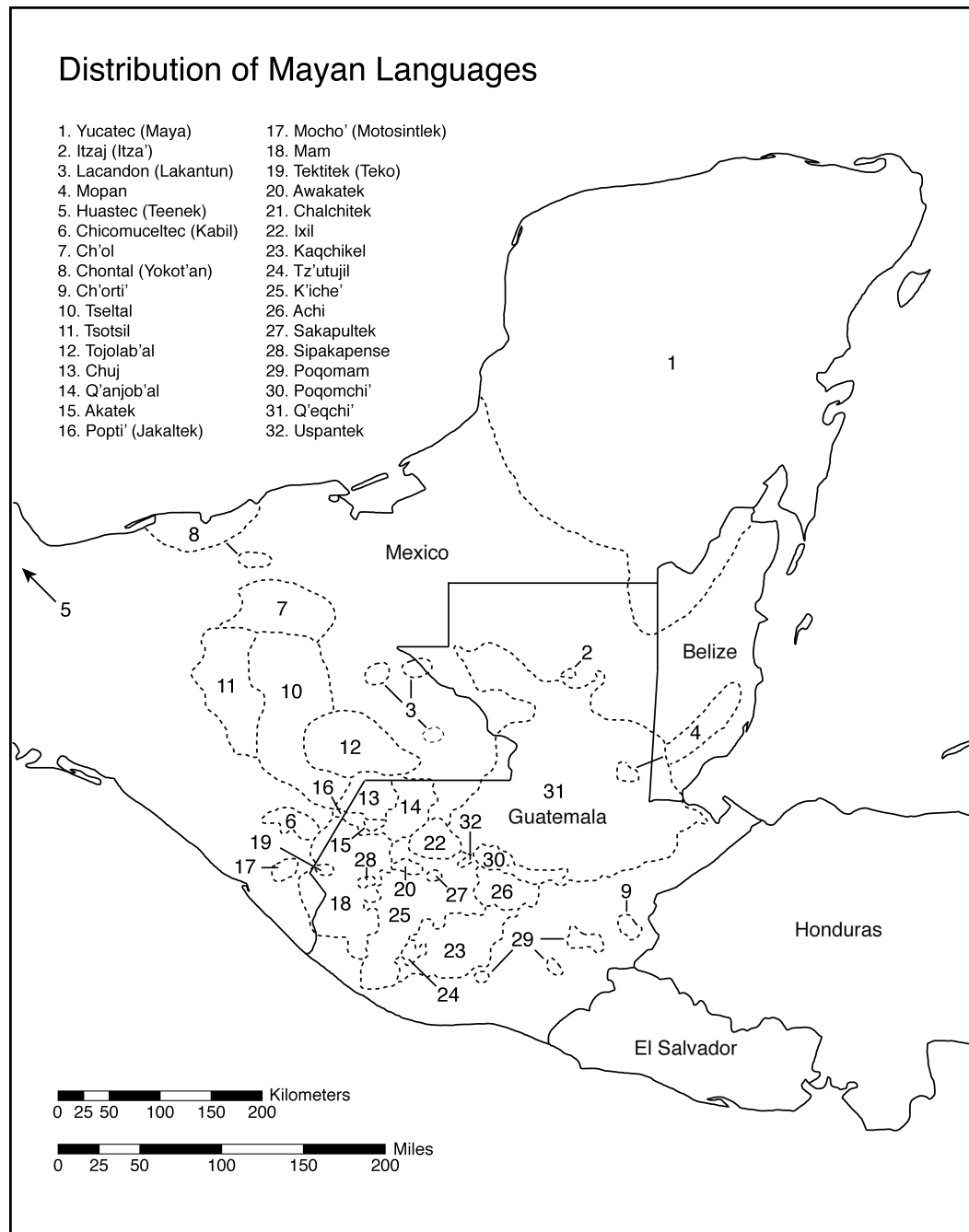29. Poqomam
30. Poqomchi'
31. Q'eqchi'
32. Uspantek

Figure 2: *Distribution of Mayan languages. Based on Map 4 in* Law 2014*; used with permission.*

Lacandon) (Richards 2003; Law 2013). Two languages, Itzaj and Mocho', have fewer than 100 remaining speakers and are quite clearly moribund (Hofling 2000; Palosaari 2011). Ch'olti' and Chicomuceltec are now extinct, fairly recently in the latter case (Campbell and Canger 1978, Law 2014).

While the health of some Mayan languages appears to be secure, at least for the near future, a pattern of gradual language shift toward Spanish can be observed even in language communities with large numbers of speakers (see e.g. Heinze 2004; Espantzay Serech 2006; French 2010 and references there for Kaqchikel, and England 2002, 2003; Richards 2003; Barrett 2008 for Guatemalan Mayan languages more generally). Literacy rates in Mayan languages are generally quite low (Richards 2003), though literacy has improved somewhat with the increased availability of Mayan language education and Mayan language publications (see England 2003; Brody 2004 and the contributions to Fischer and Brown 1996b for details). Still, as with overall language health, the presence and effectiveness of these materials and publications varies greatly. Historically, education for Maya people has been motivated by the goal of assimilation into the Spanish speaking mainstream (King 1994; Fischer and Brown 1996a). Only recently (1987 for Guatemala and 2010 for Mexico) have official alphabets been developed for the sole purpose of written production in Mayan languages (Brody 2004; Cruz Gómez 2010).

2.4 Language names

Throughout this volume we adopt the naming conventions recommended for Mayan languages by the *Academia de Lenguas Mayas de Guatemala* (ALMG, the state institution responsible for supporting Mayan languages in Guatemala) and by the *Instituto Nacional de Lenguas Indígenas* (INALI, the state institution responsible for supporting indigenous languages in Mexico) (see also Mateo-Toledo 2003).[2] Some widely-known alternative language names are given in parentheses in (1). This list of alternative names is not exhaustive: to give just two examples, a common autonym for Uspantek is *Tz'unun Kaab'* 'sweet hummingbird', and *Lak Ty'añ* 'our (inclusive) speech' is used by Ch'ol speakers to refer to their language. However *Uspantek* and *Ch'ol*, respectively, are the officially recognized names for these language, and the ones used in most publications.

A few words on the spelling of Mayan language names: alongside now-standard spellings such as

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[2]These recommendations can be found at the ALMG website (http://www.almg.org.gt/index.php/comunidades/) and in INALI (2009) (available online at http://www.inali.gob.mx/pdf/CLIN_completo.pdf). We diverge from the recommendations of INALI in using *Yucatec* rather than *Maya*, and in using *Mocho'* rather than *Qato'k*. We also omit the accent mark on *Lacandón*.

K'iche', one also encounters antiquated Hispanicized spellings like *Quiché*; these spellings are no longer in use, and should be avoided (see again Mateo-Toledo 2003). There are also some common spelling variants involving the interchange of *c∼k* (e.g. *Yucatec∼Yukatek*), *ts∼tz* (e.g. *Tsotsil∼Tzotzil*), vowel length (e.g. *K'iche'∼K'ichee'*), accent marks (e.g. *Mocho'∼Mochó*), and the presence or absence of a final *-o* in names that end in *k/c* (e.g. *Uspantek∼Uspanteko*; these vowels correspond to inflectional gender suffixes in Spanish). A few points of variation are limited to individual languages or sub-families (e.g. *Huastec∼Wastek*, *Ch'ol(an)∼Chol(an)*; the latter is a point of variation among different Ch'ol dialects). Again, we recommend using the names in (1), allowing for the fact that authors may differ as to whether they employ an *o*-final form for languages like *Uspanteko, Tektiteko, Yucateco*, etc.

3 Reference grammars and other resources

The three overview articles in this volume draw on a wealth of existing work on Mayan languages, which make up the most well-documented of Mesoamerican language families. Formal work on these languages began in the 1970s, and more recently, Mayan linguistics has benefited immensely from the many contributions of native-speaker linguists. England and Zavala (2013) compile a comprehensive and recent annotated bibliography, to which we refer the reader for further information. Our attention here is focused on grammatical characteristics of the contemporary languages; Law (2013, 2014) and Campbell (to appear) provide a thorough overview of Mayan historical linguistics.

3.1 Anthologies

The late 1970s and early 1980s saw an explosion of work on Mayan linguistics, including McClaran (1976), England (1978), as well as issues of the short-lived *Journal of Mayan Linguistics* (three volumes from 1979–1981). England and Elliott (1990) is an important collection of descriptive and analytical articles from the tail-end of this period. More recent compilations include the proceedings of a special session on Mayan linguistics at the annual meeting of SSILA (Avelino 2011), as well as proceedings of the first two meetings of *Form and Analysis in Mayan Linguistics* (FAMLi; Shklovsky et al. 2011; Clemens et al. 2012). A forthcoming volume, edited by Judith Aissen, Nora England, and Roberto Zavala, will contain articles on many topics in Mayan grammar as well as sketches of representative languages in the family (Aissen et al. forthcoming).

3.2 OKMA and CIESAS

Among the world's endangered and minority languages, Mayan languages are remarkable in the amount and range of scholarship produced by native-speaker linguists. As documented in greater detail in England (2007), Maya-speaking linguists began to emerge in the early 1970s in as part of the *Proyecto Lingüístico Francisco Marroquín* (PLFM) in Guatemala, and then as part of OKMA (*Oxlajuuj Keej Maya' Ajtz'iib'*) in the late 1980s, under the leadership of Terrence Kaufman and Nora England. Since its inception in 1991, the Mexican *Centro de Investigaciones y Estudios Superiores en Antropologia Social* (CIESAS) has graduated nearly 100 MA students from its Indoamerican Linguistics program. The program is designed specifically for native speakers of languages of Mesoamerica and roughly one quarter of the students have been speakers of Mayan languages.

The overview articles that follow have relied heavily on these works, but the benefits of scholarship by native speakers reaches far beyond linguistic documentation and analysis. As England notes:

> "It is striking that in addition to producing excellent basic documentation and advanced linguistic analyses of their languages they have also sought ways to apply linguistics to education and language policy. For Mayas, linguistics and such applications are not separate endeavors, but rather part of a common goal of maintaining and increasing their political and cultural space in society" (England 2007, 1).

Maya-speaking linguists have gone on to make contributions to language policy and pedagogy, as well as to PhD programs in linguistics locally and abroad.

3.3 Reference Grammars

The table in (2) is an incomplete compilation of resources on the grammars of contemporary Mayan languages. These include full reference grammars, pedagogical grammars, and—for languages which do not have a full grammar—some works with relatively comprehensive grammatical sketches. We include these here without detailed commentary, though see England and Zavala 2013 for an annotated bibliography, as well as references cited throughout the three chapters to follow.

(2) Reference grammars and grammatical sketches

Yucatecan	Yucatec	Blair (1964); Blair and Vermont Salas (1965); Straight (1976); Bricker et al. (1998)
	Itzaj	Hofling (2000); Schumann Galvéz (1971, 2000); Zocal Chayax et al. (2001)
	Lacandon	Bruce (1968); Bergqvist (2008)
	Mopan	Comunidad Lingüística Mopan (2001); Hofling (2011)
Huastecan	Huastec	Edmonson (1988); Constable (1989)
Ch'olan–Tseltalan	Ch'ol	Schumann (1973); Attinasi (1973); Warkentin and Scott (1980); Vázquez Álvarez (2011)
	Chontal	Knowles (1984); Pérez González (1985)
	Ch'orti'	Pérez Martínez (1994)
	Tseltal	Polian (2006, 2013)
	Tsotsil	Sarles (1966); Haviland (1981); Aissen (1987)
Q'anjob'alan	Tojolab'al	Furbee-Losee (1976); Curiel Ramírez del Prado (2007)
	Chuj	Hopkins (1967); Domingo Pascual (2007); Buenrostro (2013)
	Q'anjob'al	Raymundo González et al. (2000); Comunidad Lingüística Q'anjob'al (2005)
	Akatek	Zavala (1992)
	Popti'	Day (1973); Craig (1977); Comunidad Lingüística Jakalteka (2001)
	Mocho'	Palosaari (2011)
Mamean	Mam	England (1983); Pérez Vail and Jiménez (1997); Pérez et al. (2000); Rojas Ramirez et al. (2002)
	Tektitek	Pérez Vail (2007)
	Awakatek	Comunidad Lingüística Awakateka (2001); Delgado Rojas and Mateo Toledo (2006)
	Ixil	Ayres (1991); Poma et al. (1996)
K'ichean	Kaqchikel	García Matzar and Rodríguez Guaján (1997); García Matzar et al. (1999); Majzul et al. (2000); Brown et al. (2006)
	Tz'utujil	Dayley (1985); García Ixmatá (1997)
	K'iche'	Mondloch (1981); Larsen (1988); López Ixcoy (1997); Par Sapón and Can Pixabaj (2000)
	Achi	Antonio Lopez and Sis Iboy (1998)
	Sakapultek	DuBois (1981); Comunidad Lingüística Sakapulteka (2001); Mó Isém (2007)
	Sipakapense	Barrett (1999); Comunidad Lingüística Sipakapense (2005)
	Poqomam	Smith-Stark (1983); Santos Nicolás and Benito Pérez (1998)
	Poqomchi'	Malchic Nicolás et al. (2000)
	Q'eqchi'	Tzul and Cacao (2002); Caz Cho (2007)
	Uspantek	Can Pixabaj (2007)

4   A note on transcription

4.1   Mayan orthographies

In the modern era Mayan languages have been written in a range of different orthographic systems, both standardized and *ad hoc* (see England 1996; Kaufman 2003 for some historical discussion). (These systems are all based on the Latin alphabet; for an introduction to Mayan hieroglyphics see Coe and Van Stone 2005.) In this volume we follow the orthographic norms developed for Mayan languages by ALMG and INALI. In collaboration with local linguistic communities ALMG has proposed standard orthographies for all 22 officially-recognized Mayan languages in Guatemala. INALI has developed standard orthographies for 8 Mayan languages spoken in Mexico: Yucatec, Ch'ol, Tseltal, Tsotsil, Tojolab'al, Mocho', Mam, and Tektitek (all except Yucatec are spoken in the Mexican state of Chiapas; see http://www.inali.gob.mx/es/difusion/publicaciones.html).[3] To the best of our knowledge there are no official orthographies for Itzaj, Lacandon, Mopan, Chontal, Huastec, or the extinct Chicomuceltec and Ch'olti'. For these languages we have generally followed the orthographic conventions used by the authors of the primary source materials we draw on.

There are two prominent differences between the standard orthographies employed in Guatemala and those used in Mexico. First, the affricates $/\widehat{ts}\ \widehat{ts}^{\text{ʔ}}/$ are written as ⟨tz tz'⟩ in Guatemala, but as ⟨ts ts'⟩ in Mexico. Second, the glottalized /ɓ/ is always written as ⟨b'⟩ for Guatemalan Mayan languages, but most Mexican orthographies omit the apostrophe ⟨b⟩, reflecting phonetic differences in the realization of this segment across languages (see Bennett this volume).

In writing this volume it has often been necessary to re-transcribe data from earlier sources so that it conforms to these modern orthographic standards. One frequent substitution was the replacement of ⟨7⟩ with standard ⟨'⟩ for the glottal stop (IPA /ʔ/), which is also no longer represented in word-initial position (see Kaufman 2003 for discussion). Other substitutions included replacing ⟨n̈⟩ with standard ⟨nh⟩ (IPA /ŋ/) and ⟨ʌ⟩ with standard ⟨ä⟩ (IPA /ə/ or /ɨ/, depending on the language).

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[3]The orthographic norms developed by INALI for Tektitek refer to that language as *Kakchikel*. This nomenclature reflects an unfortunate historical misunderstanding rather than any special affinity with the Mayan language *Kaqchikel* spoken in Guatemala (Kaufman 1969).

4.2 Abbreviations used in glosses

The abbreviations used in glosses throughout the articles in this volume are provided in (3) below. In most cases, we follow the Leipzig Glossing Rules, with some Mayan-family specific additions and exceptions. Notably, we follow Mayan tradition in using the labels "Set A" (ergative/possessive) and "Set B" (absolutive) for the two series of person markers found across the family (Ch'orti' also has a third, known as "Set C"). Though more opaque to non-specialists, these labels avoid committing to any particular analysis, for example about whether a verb form has been nominalized and contains a possessor or a true verbal subject; this becomes especially useful in cases of split ergativity (Coon, this volume).

We make frequent use of the abbreviations -ITV, -TV, and DTV for "intransitive verb", "transitive verb", and "derived transitive verb" status suffixes, respectively. We depart from Leipzig Glossing Rules in using -NML rather than -NMLZ for nominal suffixes, as the nominal suffixes in question are not always category changing (i.e. not nominal-*izers*). Some other glossing conventions—for example, whether null morphemes are represented—are discussed as they arise in this volume.

(3) GLOSSING CONVENTIONS

1, 2, 3	1ST, 2ND, 3RD person	EXH	exhortative	OPT	optative
A	set A (ERGATIVE, GENITIVE)	EXT	existential	PASS	passive
ACAUS	anticausative	EVID	evidential	PLRC	pluractional
AF	Agent Focus	FOC	focus	PRF	perfect
AFF	affectionate	IMP	imperative	PFV	perfective
ANTIP	antipassive	IMM	immediate	POS	positional suffix
APPL	applicative	IPFV	imperfective	POT	potential
ASP	aspect	INCH	inchoative	PL	plural
ATT	attenuator	INC	incompletive	PREP	preposition
B	set B (ABSOLUTIVE)	INCL	inclusive	PROG	progressive
CAUS	causative	INDF	indefinite	PRON	pronoun
CL	clitic	IDF	ideophone	PROSP	prospective
CLF	classifier	INF	infinitive	PRES	present
COMP	complementizer	INS	instrumental	Q	question particle
COMPL	completive	INTS	intensifier	REL	relative clause suffix

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DEIC	deictic	IRR	irrealis	REM	remote
DEM	demonstrative	ITV	intransitive verb suffix	REP	reportative
DEP	dependent clause	LOC	locative	RN	relational noun
DET	determiner	NEG	negation	SG	singular
DIR	directional	NML	nominal	SUF	suffix
DTV	derived transitive	NUM	numeral	TERM	terminative
ENCL	enclitic	NT	neutral aspect	TOP	topic
EP	epenthesis	OBL	oblique	TV	transitive verb suffix
EXCL	exclusive				

5 A disclaimer

Finally, it is important to recognize what we have not been able to do in these three articles. First, as the titles suggest, we do not cover all subfields of linguistics. In particular, the large sociolinguistic and historical linguistic literature on Mayan languages is not addressed in any detail. This is perhaps not ideal given that much is known about the historical development of Mayan languages, as well as the sociolinguistic contexts in which they have been spoken, both pre-colonially as part of the Mesoamerican cultural area and post-colonially where the influence of European languages like Spanish and English has become dominant. For references and overviews see Law 2013, 2014; Campbell to appear.

Perhaps more controversially, even within those subfields we have addressed, we have not been able to fully represent all theoretical perspectives on the data presented. Instead, we have taken a broadly generative stance. This is primarily due to the backgrounds of the authors and is not meant to suggest that this is the only way to successfully analyze the grammars of Mayan languages. That said, none of the articles are particularly theoretical. Instead, we have tried to front the empirical phenomena themselves, and so non-generative works have been cited for raw data and empirical generalizations.

Finally, while the articles are meant to address the family as a whole, not all Mayan languages have been equally represented. This is partially due to authors' backgrounds—none of the authors have done original research in more than two of the sub-groups of Mayan languages. More than that, though, the literature on Mayan languages is itself uneven. For instance, there has been much more research done on the semantics

of Yucatec than any other Mayan language, and so our semantics article almost certainly has a bias toward that language. With that caveat in mind, we have at least tried to balance our articles with respect to their coverage of the major sub-groups of Mayan languages.

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Mayan phonology[*]

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1   Introduction

This article provides an overview of the phonology of Mayan languages. The principal aim
is to describe the commonalities and differences between phonological systems in the Mayan
family. I have also tried to highlight some phonological patterns which are interesting from a
typological or theoretical perspective. There are many intriguing aspects of Mayan phonology
which remain understudied; I've noted a handful of such phenomena here, with the hope
that other researchers will take up these fascinating and difficult questions.

Apart from phonology proper, this article also touches on the phonetics and morpho-
syntax of Mayan languages (see also Coon this volume). Most work on Mayan phonology
has focused on basic phonetic description and phonemic analysis. A much smaller portion
of the literature deals directly with phonotactics, alternations, prosody, morpho-phonology,
or quantitative phonetics. Since phonology connects with all of these topics, I have tried to
be as thematically inclusive as possible given the current state of research on Mayan sound
patterns.

The phonemic systems of Mayan languages are comparatively well-studied, thanks to
the efforts of numerous Mayan and non-Mayan scholars. This article has drawn heavily
on grammatical descriptions published by the *Proyecto Lingüístico Francisco Marroquín*
(PLFM), *Oxlajuuj Keej Maya' Ajtz'ib'* (OKMA), and the *Academia de Lenguas Mayas de
Guatemala* (ALMG); many of these works were written by native-speaker linguists. Other
important sources include the various dissertations written on Mayan languages from the
1960s onward, as well as overviews like England (1988, 1992, 2001), Kaufman (1990), García
Ixmatá et al. (1993), and Law (2011, 2014). Many of these resources are in Spanish, though
certainly not all.

There is a certain bias in this article toward the Eastern Mayan languages, and to a lesser
extent, languages of the Q'anjob'alan branch. This is a consequence of two factors. First,
these languages have some of the best-described phonologies of the family (though other
languages, such as Yucatec, have also been the subject of substantial phonological study).

Second, my own background encourages a skew toward Eastern Mayan, given that I have primarily worked on languages of the K'ichean branch.

A few notes on the transcriptions are in order. Whenever possible I have tried to give data in both the IPA and in the local Mayan orthography of each particular language. The IPA transcriptions are fairly narrow (at least to the level of gross allophonic variation), though sources differ as to the amount of phonetic detail they provide. In many cases I have reproduced transcriptions as written in the original source material, albeit with some modifications to meet current IPA standards. Even then, I have sometimes added allophonic details that were missing from the original transcriptions if such details were explicitly mentioned in a grammatical sketch of that particular variety. In other cases I have inferred phonetic transcriptions by interpreting orthographic forms according to prose descriptions of their phonetic value. In the process of reconstructing allophonic transcriptions I have almost certainly committed major errors; readers are strongly encouraged to consult the original sources for data and description. Spanish glosses have also been translated into English, and readers should be wary of errors here too. Lastly, I have sometimes been forced to guess at an appropriate orthographic transcription for particular examples, especially when discussing languages that currently lack an orthographic standard (as is true for many of the Mayan languages spoken in Mexico).

I make no claims to exhaustive coverage of either data or citations in this article. The Mayan languages are too diverse, and the literature too vast, to do justice to all aspects of Mayan phonology in a single article. I do hope, however, that the contents are rich enough to be of use to both Mayan specialists and the general phonological community.

2   Vowel inventories

Proto-Mayan most likely had a ten-vowel inventory contrasting short /a e i o u/ with their long counterparts (Fox 1978, Kaufman & Norman 1984, Campbell & Kaufman 1985; cf. the richer inventories in Kaufman 1969 and Brown & Wichmann 2004).[1] This inventory has proven quite stable, and despite some 4000 years of development has persisted into the majority of modern-day Mayan languages.[2]

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[1]Slash brackets /X/ mark phonemic (broad) transcription, and square brackets [X] mark allophonic (narrow) transcription. Stress is indicated with an uptick ['V] before the stressed vowel; though non-standard, this convention has the advantage of avoiding implicit claims about syllabification (section 4). Tone is indicated by acute [V́] (high) and grave [V̀] (low) accents. The asterisk *X marks either reconstructed forms or ungrammatical forms, depending on the context.

[2]The use of IPA /a e i o u/ to represent the five core vowels of Mayan is something of an idealization. In particular, the vowels transcribed as /a i e o u/ may be closer in phonetic terms to [ɑ/ʌ ɪ ɛ ɔ ʊ], depending on the language and the segmental or prosodic context (see e.g. Bruce 1968, England 1983, Edmonson 1988 and other descriptive references in this section). This is no surprise: in many five-vowel systems, phonemic vowel categories range over fairly wide regions of contiguous phonetic space (e.g. Liljencrants & Lindblom 1972, Lindblom 1986, Rice 1995, Manuel 1999, Becker-Kristal 2010 and references there). In this paper I transcribe vowel qualities as they are reported in primary data sources for that language.

(1)   Vowel contrasts in Ixil, Nebaj variety (Mamean, Guatemala; Poma et al. 1996, Chel & Ramirez 1999)

a.	*xan*	[ʂɑn]	'adobe'	b.	*xaan*	[ʂɑːn]	'(s)he walks'
c.	*sel*	[sel]	'type of basket'	d.	*seel*	[seːl]	'brushed'
e.	*rip*	[ripʰ]	'bat'	f.	*b'iil*	[ɓiːl]	'little'
g.	*q'ol*	[qˀol]	'turpentine'	h.	*q'ool*	[qˀoːl]	'musician'
i.	*ul-*	[ʔul-]	'to come'	j.	*uul*	[ʔuːl]	'stomach'

Vowel length distinctions may be reinforced by differences in quality, with short vowels being somewhat more centralized than corresponding long vowels (e.g. DuBois 1981, England 1983, Dayley 1985, Edmonson 1988, Barrett 1999, Baird 2010). There are also Mayan languages in which vowel length contrasts are realized by duration alone, at least impressionistically (England 2001). The actual durational difference between long and short vowels varies on a language-by-language basis (England 2001), but relative durations of about 2:1 have been reported for [Vː]∼[V] contrasts in K'ichean and Yucatecan languages (Berinstein 1979, Dayley 1985, Baird 2010; Frazier 2009a, Sobrino Gómez 2010, Herrera Zendejas 2014:Ch.10). Kaufman (1969) gives a ratio of just 1.25:1 for the vowel length contrast in Tektitek; see Herrera Zendejas (2014:Ch.7) for Huastec.

   Not all Mayan languages evince a contrast between short and long vowels. For one, vowel length distinctions are mostly absent from Western Mayan (encompassing Greater Tseltalan and Greater Q'anjob'alan).

(2)   Vowel contrasts in Q'anjob'al, Santa Eulalia variety (Q'anjob'alan, Guatemala; Raymundo González et al. 2000)

a.	*ka'*	[kaʔ]	'mortar'	b.	*xe'*	[ʂeʔ]	'root'
c.	*si'*	[siʔ]	'firewood'	d.	*hon*	[on]	'your paper'
e.	*kuk*	[kuk]	'squirrel'				

Akatek and Mocho' are unique among Western Mayan languages in having phonemic long vowels (England 2001, Law 2014).[3] Vowel length contrasts in Mocho' are apparently a proto-Mayan retention (Palosaari 2011, Law 2014), while phonemic vowel length in Akatek is instead a recent innovation which emerged primarily from a [Vx] > [V(ː)] sound change, as in Akatek *nojnaq* [noːnax] vs. Q'anjob'al [noxnaχ] 'full' (Kaufman 1976b, Zavala 1992, Raymundo González et al. 2000). The reduction of postvocalic [Vx] or [Vh] to [V(ː)] has been a common source of long vowels throughout the development of the Mayan languages (Kaufman 1974, Campbell 1977, England 1992, Kaufman 2003, Brown & Wichmann 2004).[4]

   In Kaqchikel (K'ichean, Guatemala), the proto-K'ichean (and proto-Mayan) length opposition has been transposed into a system based primarily on vowel tenseness, or centralization (Campbell 1977, Chacach Cutzal 1990, Cojtí Macario & Lopez 1990, García Matzar et al. 1999, Majzul et al. 2000, Léonard & Gendrot 2007, Léonard & Tuyuc Sucuc 2009). In the

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[3]Akatek is sometimes described as a dialect of Q'anjob'al (e.g. Raymundo González et al. 2000). See Kaufman (1976b), Zavala (1992), Kaufman (2003), England (2003) for discussion.

[4]It appears that the San Andreas dialect of Popti' may have also developed phonemic vowel length (Ross Montejo & Delgado Rojas 2000), though sources differ on this point (see e.g. Tuyuc Sucuc et al. 2001).

Kaqchikel of Santa María Cauqué, for instance, all vowels except /e/ have a lax counterpart, written *ä ï ö ü* (*ë* and *e* are both realized as tense [e]).

(3) Vowel contrasts in Kaqchikel, Santa María Cauqué variety (K'ichean, Guatemala; Majzul et al. 2000)

a.	*kär*	[kəṛ]	'fish'	b.	*par*	[paṛ̥]	'skunk'
c.	*xël*	[ʃ-el̥]	'(s)he left'	d.	*tew*	[tef̥]	'cold'
e.	*k'ïx*	[kʔɪʃ]	'shame'	f.	*q'ij*	[ɠíχ]	'day'
g.	*jöb'*	[χɔɓ]	'rain'	h.	*kow*	[kof̥]	'hard'
i.	*jül*	[χʊl̥]	'pit, hole'	j.	*chuw*	[t͡ʃuf̥]	'stinky'

Outside of Kaqchikel vowel systems based on a tense-lax opposition are found only in a few dialects of K'iche', such as the variety spoken in Chichicastenango (Larsen 1988, López Ixcoy 1994, 1997, England 1992, 2001, Baird 2010).

Phonemic lax vowels are typically lower and more centralized than tense vowels, though lax *ä* may be raised relative to tense *a*. The precise quality of lax *ä* varies widely across dialects: common realizations of this vowel include [a ə ɨ ɜ], but [ɛ ɪ̯ ʌ y ʉ ɯ] have also been reported as possible variants. The rationale for treating lax *ä* as the counterpart of tense *a* is essentially phonological: whatever its phonetic value, lax *ä* alternates with tense *a* in the same environments where other tense-lax alternations are observed (sections 2.4, 5.2).

(4) Tense-lax alternations in Comalapa Kaqchikel (Chacach Cutzal 1990)

a.	*ninb'än*	[n-in-ɓ3̱n]	'I make it'	b.	*b'anöl*	[ɓan-ɔl̥]	'maker of…'
b.	*nintïk*	[n-in-tɪ̱kʰ]	'I sow it'	d.	*tiköy*	[tḭk-ɔj̥]	'sower of…'
e.	*ninchüp*	[n-in-t͡ʃʊ̱pʰ]	'I turn it off'	f.	*chupüy*	[t͡ʃṵp-ʊj̥]	'power switch for…'

The phonetic diversity of lax *ä* raises interesting questions about the extent to which tense-lax alternations can be treated as a uniform phonological process in Kaqchikel, both within and across dialects; see Léonard & Tuyuc Sucuc (2009) for some discussion.

The merger of tense-lax vowel pairs is quite common in Kaqchikel, such that any given dialect may have between five and ten contrastive vowel qualities. Distinctions between tense *a* and lax *ä* are frequent, but dialects with a contrast between *o/ö*, *u/ü*, and especially *e/ë* are harder to find (Majzul et al. 2000, England 2001, Baird 2010). Tense-lax contrasts may also be cued by durational differences (as in English; Peterson & Lehiste 1960), but such durational differences are smaller in magnitude than true vowel length distinctions, and may show inter-speaker variation (England 2001, Léonard & Tuyuc Sucuc 2009).

The greatest number of contrastive vowels is found within the Yucatecan branch. Along with the five vowel qualities of proto-Mayan, Mopan, Itzaj, and Lacandon have a short central vowel *ä* [ɨ], yielding eleven distinctive vowels in total (or even more if 'rearticulated' vowels are counted, section 2.3) (Fisher 1973, Schumann Galvéz 1971, 2000, Dienhart 1986, Hofling 2000, Cohuoj Caal et al. 2001, Zocal Chayax et al. 2001, Bricker & Orie 2014, Herrera Zendejas 2014:Ch.10).[5]

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[5]Central *ä* is closer to [ə] in Lacandon (Bruce 1968, Bricker & Orie 2014, Herrera Zendejas 2014:Ch.10).

(5) Some vowel contrasts in Itzaj (Yucatecan, Guatemala; Hofling 2000)

    a. *k'äx* [kʔɨʃ] 'tie'   b. *k'ax* [kʔaʃ] 'knot'

    c. *k'aax* [kʔaːʃ] 'forest'   d. *ka'an* [kaʔan] 'sky'

    e. *ek'* [ʔekʔ] 'star'   f. *kil* [kil] 'when'

    g. *kok* [kokʰ] 'stingy'   h. *suk* [sukʰ] 'tame'

Phonemic *ä* [ɨ] alternates with [a] under certain complex conditions, e.g. Mopan *k'al* [kʔal] 'close (antipassive)' ∼ *k'älik* [kʔɨl-ikʲʰ] 'close (it)' (Fisher 1976, Cohuoj Caal et al. 2001, Lois & Vapnarsky 2003, Hofling 2011, Bricker & Orie 2014, Herrera Zendejas 2014:Ch.10).[6] Yucatec itself has a basic ten-vowel system, but non-phonemic [ə] is used as an epenthetic vowel to resolve otherwise illicit consonant clusters (e.g. *kche'* /k-t͡ʃeʔ/ → [kət͡ʃeʔ] 'our tree', Orie & Bricker 2000, Bricker & Orie 2014).

One last major vowel inventory, built from the six short vowels /a e i o u ɨ/, is found in the Western Ch'olan languages (Ch'ol and Chontal; Keller 1959, Knowles 1984, Pérez González 1985, Schumann Galvéz 1973, Attinasi 1973, Warkentin & Scott 1980, Coon 2010, Vázquez Álvarez 2011). This system is the result of a chain shift */aː/ > */a/ > */ɨ/ which occurred early on in the development of Common Ch'olan (Kaufman & Norman 1984, Law 2014).[7] The */a/ > */ɨ/ merger was blocked in some environments, giving rise to synchronic phonotactic restrictions on the distribution of [ɨ], as well as synchronic [ɨ] ∼ [a] alternations reminiscent of Kaqchikel and the Yucatecan languages (Kaufman & Norman 1984, Law 2014). Other Greater Tseltalan languages use a simpler five-vowel system /a e i o u/.[8]

2.1   Internally complex vowel nuclei

2.2   Diphthongs

Vowel quality is typically monophthongal in Mayan, though as with many phonetic characteristics of these languages, more instrumental work is needed to verify this impressionistic description. Heterorganic /$V_\alpha V_\beta$/ sequences are typically realized with a hiatus-breaking glottal stop [$V_\alpha ʔ V_\beta$] or glide [$V_\alpha j V_\beta$], not as diphthongs or adjacent vowels (see section 2.4 for more discussion of hiatus in Mayan).

(6) Hiatus-resolving [j]-insertion in Ch'ol (Ch'olan, Mexico; Attinasi 1973, Coon 2010, Vázquez Álvarez 2011)

    a. *tyi wäyiyoñ* /tʲi wɨji-oŋ/ → [tʲi wɨjijoŋ] 'I slept.'

    b. *tyi imek'eyety* /tʲi i-mekʔ-e-etʲ/ → [tʲi imekʔejetʲ] 'She hugged you.'

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[6]Fisher (1976) argues that the development of [ɨ] from [a] was conditioned by lexical tone; cf. Fisher (1973), Fox (1978), Sobrino Gómez (2010) and references there.

[7]In the Eastern Ch'olan languages, the Common Ch'olan */ɨ/ ∼ */a/ contrast was destroyed by a chronologically later */ɨ/ > /a/ merger.

[8]Herrera Zendejas (2014:Ch9.) describes a variety of Tsotsil which has an innovative /a e i o ɨ/ vowel system. The /o/ appears to be substantially raised in this dialect, presumably in response to the earlier /u/ > /ɨ/ shift.

However, some K'ichean-branch languages have developed diphthongs from historical long vowels, through the breaking of mid /eː/ and /oː/ (England 2001). Diphthongs of this type are reported for various dialects of Tz'utujil, Kaqchikel, Poqomam, and Poqomchi'. In Tz'utujil and Kaqchikel these diphthongs contrast with what appear to be historically newer instances of long (or tense) /eː oː/, but not in Poqomam or Poqomchi' (Smith-Stark 1983, Dayley 1985, Majzul et al. 2000, Malchic Nicolás et al. 2000).

(7)   Contrastive diphthongs in Santiago Atitlán Tz'utujil (K'ichean, Guatemala; Dayley 1985)

    a. *ch'uob'* [t͡ʃʔu͡op̚ʔ] 'pineapple'   b. *tiew* [ti͡eɸ] 'cold'

    c. *ch'oob'* [t͡ʃʔoːp̚ʔ] 'cajete tree'   d. *ch'eech'* [t͡ʃʔeːt͡ʃʔ] 'metal, car'

    e. *muuj* [muːx] 'shadow, shade'   e. *b'iix* [ɓiːʃ] 'song'

Polian (2013:108,116-7) has also observed an innovative [a͡e] diphthong in Oxchuc Tseltal, derived by diachronic metathesis of [i] as in *atimal* [ʔa͡etmal] < [ʔatimal] 'to bathe'.

2.3 'Rearticulated' vowels

The descriptive literature on Yucatec has traditionally recognized a set of 'rearticulated' vowels [VₐʔVₐ] as unit phonemes that contrast with both short and long vowels of the same quality (Pike 1946, Blair 1964, Blair & Vermont Salas 1965, McQuown 1968, Fisher 1973, Straight 1976, among many others). These vowels are also characterized as 'glottalized', 'laryngeal', 'broken', 'echo,' or 'double', and can be found in all Yucatecan languages.

(8)   Vowel shape contrasts in Yucatec (Yucatecan, Mexico and Belize; Sobrino Gómez 2010)

    a. *pak'* [pakʔ] 'wall'   b. *páap* [páːpʰ] 'spicy'

    c. *paal* [pàːl] 'child'   d. *pa'at* [páʔatʰ] 'to wait'

The proper analysis of these rearticulated vowels has been a perennial problem in the study of Yucatec phonetics and phonology. The central point of contention is whether such vowels should be treated as trisegmental sequences [Vₐ]+[ʔ]+[Vₐ], or as monosegmental, but internally-complex nuclei [VₐʔVₐ]. There are several arguments in favor of the monosegmental analysis. The first is distributional: the vowels in a morpheme-internal [VʔV] sequence are sharply restricted, with an internal coherence that points toward a single, complex segment. To wit, the vowels flanking [ʔ] must be identical, they must be short, and they must have a high-falling tonal pattern [V́ₐʔVₐ] (section 6.2). These restrictions are quite specific to rearticulated [VₐʔVₐ], as tone, quality, and length combine much more freely in other segmental environments, even for vowels flanking the other laryngeal [h] (e.g. *mahaan* [mahàːn] 'loan' and *naapul* [nàːpul] 'direct', Orie & Bricker 2000). Furthermore, short vowels are generally toneless (or perhaps low toned) in Yucatec, even before glottal stop (e.g. *cho'* [t͡ʃoʔ] 'clean'; section 6.2). The exceptionless high-falling tone on morpheme-internal [V́ₐʔVₐ] is thus unexpected on a multisegmental analysis.

The second argument for a monosegmental treatment of [VₐʔVₐ] comes from root phonotactics (section 5.1). As in other Mayan languages, roots in Yucatec are overwhelmingly

[CV(ː)C] in form (particularly verbal and positional roots). A large number of roots are of the shape [CV$_\alpha$ʔV$_\alpha$C] (e.g. *-ni'ik'* [-niʔik$^\text{ʔ}$] 'move'), suggesting that rearticulated [V$_\alpha$ʔV$_\alpha$] patterns as a single vowel for root phonotactic restrictions (Blair 1964, Lois & Vapnarsky 2003). Voice alternations in verbal derivation may also be marked by changes in root-internal vowels, e.g. *ka k'axik* [k-a k$^\text{ʔ}$a̠ʃ-ik] 'you tie it' ∼ *ka k'aax* [k-a k$^\text{ʔ}$à̠ːʃ] 'you tie' (Straight 1976, Coon this volume). Rearticulated [V$_\alpha$ʔV$_\alpha$] participates in such alternations (e.g. *ku juuch'* [k-u hù̠ː͡tʃ$^\text{ʔ}$] 'she grinds' ∼ *ku ju'uch'ul* [k-u hú̠ʔu͡tʃ$^\text{ʔ}$-ul] 'it is ground'), which provides another indication that [V$_\alpha$ʔV$_\alpha$] patterns as a unit phoneme in Yucatec morpho-phonology (Fisher 1973, Bricker 1978, Lois & Vapnarsky 2003). Analogous arguments can be constructed for rearticulated vowels in other Yucatecan languages (see also Coon 2010 on Ch'ol and England 1983 on Mam).

Defenders of the multisegmental analysis of Yucatec [V$_\alpha$ʔV$_\alpha$] are harder to find, but arguments in favor of this view are given in Orie & Bricker (2000). On balance, however, the evidence clearly favors a monosegmental treatment of rearticulated [V́$_\alpha$ʔV$_\alpha$] vowels.

Attinasi (1973) and Coon (2010) argue for another type of complex nucleus in Ch'ol: 'aspirated' [V͡h] (analyzed as [VV̥] by Attinasi; see also Brown & Wichmann 2004). The evidence is quite parallel to the evidence for complex laryngealized vowels in Yucatecan, e.g. the existence of underived [CVhC] roots like *sajk'* [sahk$^\text{ʔ}$] 'grasshopper' (see also Coon this volume). For general discussion of complex laryngealized vowel nuclei in Mesoamerican languages, see Macaulay & Salmons (1995), Silverman (1997), Gerfen (1999), Avelino (2004), Arellanes Arellanes (2008), DiCanio (2008), Chávez Peón (2010) and references there.

2.3.1 Phonetics of 'rearticulated' vowels

The notation [V$_\alpha$ʔV$_\alpha$] implies that Yucatecan rearticulated vowels are produced with a complete glottal closure in the medial portion of the vowel (i.e. with true 'rearticulation'). This is at best an oversimplification. It has long been known that the 'rearticulated' vowels are more often produced with weak laryngealization (creaky voice) than with a true glottal stop in Yucatecan languages (see comments to this effect in Pike 1946, Blair 1964, Blair & Vermont Salas 1965, Fisher 1973, Straight 1976, Fox 1978). Frazier (2009a,b, 2013) provides an extensive phonetic documentation of Yucatec vowels and tones which confirms these fieldworker descriptions using instrumental methods. She shows that rearticulated vowels are most commonly realized with initial high tone, and with creaky voice in the medial or final portion of the vowel (though Frazier finds some sparse examples of full glottal closure [V́ʔV] as well). For this reason, she advocates calling these vowels 'glottalized' rather than 'rearticulated', and transcribes them as [V́V̰].[9] Frazier (2013) further points out that the sequencing of tone and creaky voice as [V́V̰] in glottalized vowels runs counter to the typological tendency to realize lexical tone *after* non-modal phonation on the same vowel (Silverman 1997). Lastly, Frazier (2009a) finds that glottalized vowels are as long as, or even longer than [V̀ː] and [V́ː] in Yucatec (Sobrino Gómez 2010 reports similar durations, as does Herrera Zendejas 2014:Ch.10 for Lacandon). See section 3.3.2 for comparison with [Vʔ] sequences in other Mayan languages.

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[9]Frazier (2013) also discusses the possibility that rearticulated vowels *were* produced with full glottal closure at earlier stages of historical development.

2.4 Vowel phonotactics

2.4.1 Vowel length and tenseness

The distribution of vowel length is conditioned by stress in several Mayan languages. In some varieties of K'iche', for example, long vowels are restricted to stressed (word-final) syllables (9). In other languages, such as the Ixtahuacán variety of Mam (10), long vowels may occur in any position as long as they are stressed.

(9)   Long vowels in K'iche' (K'ichean, Guatemala; López Ixcoy 1994, 1997)

   a. *kunaneel*   'doctor'   b. *kunanelaab'*   'doctors'
       [kun-an-ˈeːl̥]   [kun-an-el-ˈaːɓ]

   c. *xkich'ikimiij*   'they pushed it' d. *xch'ikiminik*   '(s)he pushed'
       [ʃ-ki-t͡ʃ'ikim-ˈiːx]   [ʃ-t͡ʃ'ikim-in-ˈikʰ]

   e. *keem*   'weaving'   f. *xukemaaj*   '(s)he weaved it'
       [kʲˈeːm]   [ʃ-u-kʲem-ˈaːx]

(10)   Long vowels in Ixtahuacán Mam (Mamean, Guatemala; England 1983, 1990, Pérez Vail & Jiménez 1997)

   a. *q'uulan*   [ɠ'uːlaŋ]   'warm'   b. *q'ulaniix*   [ɠ̥ʊlan-ˈiːʃ]   'become warm'

   c. *qiinan*   [qˈiːnaŋ]   'rich'   d. *tq'inamiil* [tʰ-ɠ̥inam-ˈiːl] 'richness'

   e. *xjaal*   [ʃxˈaːl]   'person'   f. *nxjaalala*   [n-ʃxˈaːl-al-a] 'my people'

As these examples show, underlying long vowels shorten when unstressed in these languages. Long vowels also attract stress in Ixtahuacán Mam (section 6.1), and so shortening is only observed in words that contain more than one long vowel in their underlying form.

   Other languages are more permissive with vowel length. Unstressed long vowels are freely allowed in Sakapultek (final stress) and in Huastec (quantity-sensitive stress).

(11)   Long vowels in Sakapultek (K'ichean, Guatemala; DuBois 1981, Mó Isém 2007)

   a. *b'aateek*   [ɓaːt'eːkʰ]   'it was   b. *weet-'aam*   [weːtʰʔˈaːm] 'I know it'
                                   rolled up'   (*weetaam*)

   c. *ruuk'aa'*   [ʂuːkʔ'ˈaːʔ] 'its horn'   d. *tiiwila'*   [tiːwilˈaʔ]   'Y'all look
                                                                                at it!'

(12)   Long vowels in Huastec (Huastecan, Mexico; Edmonson 1988)

a. *biilmeel*   [biːlmˈeːl̥]   'becomes weak' b. *miimlaab*   [miːmlˈaːɸ]   'lady'

c. *tsapneetha'* [t͡sapʰnˈeːθəʔ] 'greeted him'   d. *waleekliyal* [walˈeːkʰlɪjal̥] 'cast the
                                                                                      evil eye'

Kaqchikel shows a restriction on lax vowels which parallels the distribution of long vowels in other K'ichean languages: lax $\ddot{V}$ is only permitted in stressed, word-final syllables (see also López Ixcoy 1994 on K'iche'). Alternations like *xtab'än* [ʃtaɓˈən] 'you will do it' ~ *tab'ana'* [taɓanˈaʔ] 'You do it!' are quite widespread (see also (4)). This restriction is somewhat unexpected, given that the lax vowels of Kaqchikel correspond to historical *short* vowels, which are basically unrestricted in K'ichean languages (e.g. Campbell 1977).

Finally, there are several languages in which long vowels are prohibited, or at least statistically underattested, before glottal stop [ʔ] (England 2001:36; see also Blair 1964:3, Campbell 1977:35, England 1983:35, Barrett 1999:23, Pérez et al. 2000, DuBois 1981:117, Frazier 2013). Here too Kaqchikel is the mirror-image of other Mayan languages: Maxwell & Hill (2010:68) point out that most transitive verb roots contain a lax (historically short) vowel /CV̈C/ (e.g. *-täq* /-təq/ 'send, order'), unless the final consonant is a glottal stop /CVʔ/, in which case the vowel must be tense (historically long) (e.g. *-ya'* /-jaʔ/ 'give').

2.4.2 Hiatus

Mayan languages differ as to whether or not they permit hiatus [V.V]. To illustrate, hiatus is banned in Poqomam, and underlying vowel sequences are split by [ʔ]-epenthesis (13). This can be compared with Ixil (14), where hiatus is not only permitted but also contrasts with [V.ʔV].

(13) Hiatus avoidance in Poqomam (K'ichean, Guatemala; Santos Nicolás & Benito Pérez 1998)

    a.   *ti'oka* /ti-ok-a/ → [tiʔok^ja] 'you enter'

    b.   *xin'oo'ato'* /x-in-ʔoː-a-toʔ/ → [xinʔoːʔatoʔ] 'you came to help me'

(14) Contrastive hiatus in Ixil (Ayres 1991, Poma et al. 1996, Chel & Ramirez 1999)

    a.   *tx'aoni*   [t͡sʼa.o.ni]   '(s)he washed'   b.   *tx'a'oni*   [t͡sʼa.ʔo.ni]   '(s)he ate'

    c.   *ia*   [ʔi.a]   'grandchild'   d.   *i'a*   [ʔi.ʔa]   'to value'

Apart from Ixil, I am aware of only a handful of Mayan languages that clearly allow hiatus: Q'anjob'al (Raymundo González et al. 2000, Baquiax Barreno et al. 2005), Akatek (Zavala 1992), Tseltal (at least some dialects; Kaufman 1971, Gerdel 1974, Polian 2013), and Tsotsil (at least some dialects; Weathers 1947, Haviland 1981, Aissen 1987).[10]

Several hiatus-avoidance strategies are attested in Mayan languages. Within the K'ichean branch, [ʔ]-insertion (13) is the preferred repair; it is also found in Mamean (Pérez et al. 2000) and in Itzaj (Schumann Galvéz 1971, 2000, Dienhart 1986, Hofling 2000). Glide insertion is another strategy, attested within the Yucatecan (Orie & Bricker 2000), Ch'olan (6), Tseltalan (Shklovsky 2012), and Mamean branches (England 1983, Pérez Vail & Jiménez 1997, Pérez et al. 2000). The insertion of laryngeal [h] is reported for Greater Tseltalan languages, e.g. Petalcingo Tseltal *tenelahe* /ten-el-a=e/ → [tenelahe] 'was buried' (Attinasi 1973, Shklovsky 2005; see Schumann Galvéz 1971, 2000 for Itzaj). Vowel deletion may also occur in /V.V/ clusters, e.g. Mam *ma chook* /ma t͡ʃi-ook/ → [ma t͡ʃook] 'they entered' (England 1983:45). Deletion is attested in Greater Tseltalan as well, e.g. Tsotsil *ak'bo* /akʼ-ɓe-o/ → [ʔakʼ-ɓ'-o] 'give it to him' (Aissen 1987:278). Finally, Edmonson (1988) reports /V.V/ → [Vː] 'fusion' in Huastec (for Chontal, see Knowles 1984 and Keller & Luciano 1997). Multiple patterns of hiatus avoidance may also co-occur within a single language, sometimes differentiating

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[10]While some descriptive work reports hiatus in Popti' (Day 1973) and Yucatec (Blair 1964) other researchers explicitly deny that hiatus is possible in these languages, being avoided through consonant epenthesis (Jiménez Camposeco et al. 2001, Delgado Rojas et al. 2007, Orie & Bricker 2000). Given that hiatus is generally limited to Western Mayan, it would not surprise me to find other cases of hiatus in Greater Tseltalan, Greater Q'anjob'alan, or even Yucatecan languages. See also Hofling (2000:27).

word-internal /V-V/ from word-external /V#V/ (e.g. Coon 2010, Vázquez Álvarez 2011; see also Casali 1996).

Against this background, a few caveats are in order. The morphology of Mayan languages favors [CVC] roots and C-final suffixes (section 5.1); as a result, hiatus configurations are quite rare at stem-suffix boundaries. In the prefixal domain, phonologically conditioned allomorphy is generally structured to avoid /V-V/ strings (section 5.2), which has the effect of minimizing stem-initial hiatus as well. This makes it very difficult to test the productivity of hiatus repair strategies in most Mayan languages. Furthermore, when hiatus does occur, the choice of repair strategy may depend on the morphemes involved (see e.g. Attinasi 1973, England 1983, Barrett 2011). Indeed, some alternations are limited to single morphemes, such as the apparent [w]-insertion in Kaqchikel *yinik'o* [j-in-ikʔo] 'I pass over' vs. *ik'owinik* [ʔikʔow-in-ikʰ] 'to pass over', or the [∅]~[x] alternation in *k'o* [kʔo] 'there is' vs. *xk'oje'* [ʃ-kʔox-eʔ] 'there was' (Macario et al. 1998; both alternations are root-specific). These facts suggest that some cases of hiatus resolution might be better understood as morphological rather than purely phonological in character.

2.4.3 Initial [ʔ]-insertion

In contrast with the diversity of responses to hiatus, we find that Mayan languages consistently avoid word-initial vowels through [ʔ]-insertion.[11]

(15) Initial [ʔ]-epenthesis in Tektitek (Mamean, Guatemala and Mexico; Pérez Vail 2007)

a.	*wab'aj*	[w-aːɓaχ]	'my stone'	b.	*ab'j*	[ʔaɓχ]	'stone'
c.	*matx tz'itz'jik*	[maʧ͡s t͡sʔ-it͡sʔχikʰ]	'(s)he was already born'	d.	*itz'jik*	[ʔit͡sʔχikʰ]	'to be born'

This appears to be an exceptionless pattern across Mayan, though with some additional intricacies. In Q'anjob'al, for instance, word-initial [ʔ] is phonemic and distinguishes minimal pairs like *ixim* [ʔiʂim] 'corn' from *hixim* [iʂim] 'your corn' (England 2001, Baquiax Barreno et al. 2005). Note however that almost all vowel-initial forms are possessed nouns; such forms are exceptions to [ʔ]-insertion in other languages as well (see below). Moreover, word-initial [ʔ] appears to be epenthetic even when contrasting with [∅]: compare *ajan* [ʔaxan] 'ear of corn' and *hajan* [axan] 'your ear of corn' with the prefixed form *wajan* [w-axan] 'my ear of corn', where no [ʔ] appears.

An understudied facet of [ʔ]-insertion is its interaction with prosodic structure (Garellek 2013 and citations there). One gets the impression that most descriptions of initial [ʔ]-epenthesis are based on isolation forms (though some researchers do discuss phrasal context, e.g. Keller 1959, Knowles 1984, Sarles 1966:17-8, Schumann Galvéz 1971:35, Fisher 1973:62, Straight 1976:71, DuBois 1981:100, Dienhart 1986:29, Edmonson 1988:34, Larsen 1988:54).

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[11]Some authors have treated alternations like (15) as the deletion of underlying /ʔ/ rather than [ʔ]-epenthesis (e.g. Craig 1977, Aissen 1987, Bricker et al. 1998, Hofling 2000:11-2). Since (i) initial [ʔ] is highly predictable, and (ii) there appear to be phonological differences between underlying and inserted [ʔ] (16), an analysis in terms of epenthesis seems more appropriate.

England (1983:34-6;41-2) also reports that native speakers of Mam have the intuition that initial [ʔ] is non-distinctive. Similar judgments presumably hold for speakers of the other Mayan languages, given that word-initial glottal stops are not represented in any standard Mayan orthography.

As such, it remains unclear whether [ʔ]-insertion is really a word-level process across Mayan, rather than a phrase- or utterance-initial phenomenon (see also Warkentin & Brend 1974, Hofling 2000:10). It would be worthwhile to investigate the effect of phrasal position on the phonetics and phonology of initial [ʔ] in greater detail.

At lower levels of prosody, Dayley (1985) observes that [ʔ]-epenthesis in Tz'utujil is optional for vowel-initial words of more than one syllable, e.g. *utziil* [(ʔ)ʊts͡ˈɪːl] 'goodness'. This may point to conditioning by stress, which is normally final in Tz'utujil (see Larsen 1988:54 for K'iche'). Dayley also notes that some vowel-initial function morphemes never carry an initial [ʔ], such as the possessive prefixes (e.g. *aatz'ii'* [aː-t͡sˀiːʔ] 'your dog') and directional particles (e.g. *xel eel* [ʃ-ɛl̥ eːl] 'he went out'). Flack (2009) interprets this data as evidence that Tz'utujil requires every prosodic word to begin with a consonant, and accounts for vowel-initial function morphemes by treating them as clitics external to the prosodic word (see also section 7.2).

Though initial [ʔ] is not generally distinctive in Mayan languages, in the sense that there are no contrasts between initial [#ʔV] and simple [#V], there do appear to be phonological differences between underlying initial glottal stops /#ʔV/ and epenthetic [#ʔV]. In Mocho', some initial glottal stops are invariant under prefixation (16a-d), while most disappear (16e-h), triggering prefixal allomorphy (section 5.2).

(16)   Non-alternating [#ʔV] in Mocho' (Greater Q'anjob'alan, Mexico; Palosaari 2011)

a.	*onh*	[ʔoŋ]	'go'	b.	*kii'onh*	[k-iː-ʔoŋ]	'I'm going to go'
c.	*uub'*	[ʔuːɓ]	'quail'	d.	*ii'ub'*	[ʔiː-ʔuɓ]	'my quail'
e.	*ooki*	[ʔoːk-i]	'he entered'	f.	*kwooki*	[k-w-oːk-i]	'I'm going to enter'
g.	*oonh*	[ʔoːŋ]	'avocado'	h.	*woonh*	[w-oːŋ]	'my avocado'

Barrett (2007, 2011) catalogs parallel cases of non-alternating [#ʔ] in the K'ichean languages (see also Campbell 1974). Similar patterns have been documented for Mamean (England 1983) and Yucatecan languages (Blair 1964, Straight 1976, Orie & Bricker 2000, Hofling 2000; in the Yucatecanist literature, non-alternating initial glottal stops are called 'firm').

Non-alternating [#ʔ] plausibly corresponds to a 'phonemic' (though non-contrastive) /#ʔ/ which is specified in the underlying representation of the lexical items in question. The lexicalization of initial [ʔ] may depend on the frequency of [ʔ]∼[∅] alternations: if a particular root normally occurs in its isolation form, with an epenthetic glottal stop [#ʔ], learners may re-analyze the initial glottal stop as being underlying instead. Among nouns, non-alternating [#ʔ] should then be most common for roots which resist being possessed, such as Q'anjob'al *asun* [ʔasun] 'cloud' (Baquiax Barreno et al. 2005:92; see also Campbell 1974, Smith-Stark 1983:131-2, Larsen 1988:103, Barrett 1999:57-8, Orie & Bricker 2000, Kenstowicz 2013). It is unclear to me whether this expectation is actually borne out.

Not all instances of [#ʔ]-retention can be treated as simple phonemicization, however (see also Majzul et al. 2000:46). While some prefixes may block [ʔ]-insertion, other prefixes may systematically co-occur with epenthetic [ʔ]. For example, the [ʔ] in Kaqchikel *ik'* [ʔikˀ] 'month' is clearly epenthetic, because it alternates with [∅] when a possessive prefix is added, *rik'* [r-ikˀ] 'her period'. The initial [ʔ] is nonetheless maintained in forms containing the agentive prefix *aj*, as in *aj'ik'* [ax-ʔikˀ] 'domestic worker' (Barrett 2007). The retention

of epenthetic [#ʔ] is extremely common for agentive prefixes and noun class prefixes in other Mayan languages as well (some of these are cognate with Kaqchikel *aj-*). This heterogenous behavior cannot be explained by positing an underlying glottal stop; some higher grammatical principle is clearly involved, such as prosodic conditioning or morphological cyclicity (see also Bennett & Henderson 2014).

Similar patterns are observed in the verbal domain: in Popti', for instance, the A1SG agreement prefix *w-* /w-/ bleeds [ʔ]-insertion (*oq'anh* [ʔoqʔ-aŋ] 'You cry!' vs. *lanhan woq'i* [laŋan w-oqʔ-i] 'I'm crying'), but not the completive aspect marker *x-* /ʂ-/ (*x'oq' naj* [ʂ-ʔoqʔnaχ] 'he cried') or the B1SG agreement prefix *in-* /in-/ (*chin'oq'i* [t͡ʃ-in-ʔoqʔ-i] 'I cry') (Day 1973, Jiménez Camposeco et al. 2001). Mayan languages differ as to which verbal prefixes bleed [ʔ]-insertion, and which do not (see Santos Nicolás & Benito Pérez 1998 for Poqomam, Pérez Vail & Jiménez 1997 for Mam, and DuBois 1981:156 for Sakapultek). This is clearly an area for further investigation.

2.4.4 Vowel deletion

The deletion of unstressed short vowels is pervasive throughout the Mayan languages. Example (17) illustrates the deletion of pre-tonic short vowels in Sipakapense.

(17)   Pre-tonic syncope in Sipakapense (K'ichean, Guatemala; Barrett 1999, 2011, Tema Bautista 2005)

    a.   *wxim* /w-i̠ʃim/ → [wʃˈɪm] 'my corn'

    b.   *chab'na'* /t͡ʃ-a-ɓa̠n-aʔ/ → [t͡ʃ-a-ɓn-ˈaʔ] 'Do it!'

    c.   *xtqpxoj* /ʃt-q-po̠ʃ-oχ/ → [ʃtʰqʰpʰʃˈoχ] 'We are going to shatter it'

Vowel deletion has led to heavy lexical restructuring in Sipakapense, so that forms like K'iche' /w-at͡ʃoot͡ʃ/ 'my house' and /q(a)-/ 'A1PL' have cognates like /w-t͡ʃot͡ʃ/ and /q-/ in Sipakapense (Campbell 1977, Tema Bautista 2005, Barrett 2011).

Syncope processes like (17) have been described for Mamean languages (Mam: England 1983, Pérez et al. 2000; Tektitek: Pérez Vail 2007; Ixil: Ayres 1991), K'ichean languages (Uspantek: Campbell 1977, Can Pixabaj 2006, Bennett & Henderson 2013; Tz'utujil: Dayley 1985; Sakapultek: DuBois 1981, Mó Isém 2007; K'iche': Larsen 1988), Tseltal (Polian 2013), Yucatec (Krämer 2001, Sobrino Gómez 2007), Tojolab'al (Furbee-Losee 1976a,b), Mocho' (Palosaari 2011), and Huastec (Edmonson 1988). Historical instances of syncope are described for proto-Ch'olan in Kaufman & Norman (1984). There are surely other cases of syncope in Mayan that have yet to be documented in detail.

Despite this prevalence of vowel deletion patterns, the conditions on syncope remain poorly understood. There are nonetheless some tendencies worth noting. First, deletion is typically limited to short unstressed vowels. Vowels in pre-tonic and post-tonic syllables are particularly susceptible; Bennett & Henderson (2013) take this as evidence that syncope is conditioned by metrical foot structure in Uspantek. Deletion may also be restricted by morphology. In Huastec, syncope exclusively targets vowels belonging to affixes (Edmonson 1988). Barrett (1999, 2011) suggests that vowel deletion in Sipakapense does not occur in verbal prefixes, e.g. *xinb'an* [ʃ-i̠m-ɓá̠n] 'I did it', *[ʃmɓán], cf. *xnmaj* [ʃ-nmaχ] 'he believed it' and *xb'now* [ʃ-ɓn-ow̥] 'who made it (agent focus)'. Certain roots may resist syncope, e.g.

Sipakapense *sipil* [sip-ˈi̥l] 'gift-giver', *[sp-ˈi̥l].

Syncope can also be restricted by purely phonological conditions. Word-initial vowels (surface [#ʔV]) may escape deletion. Consonant phonotactics play a role as well. Syncope can derive impressive consonant clusters, such as Sipakapense *katwroq* [k-at-wr-oq] 'Sleep!' (cf. *worb'al* [wo̥r-ɓal̥] 'bedroom', (17c); Barrett 1999, 2011) or Mam *tzaj tlq'o'n* [t͡saχ tʰlqʼoʔn] '(s)he bought it' (cf. *looq'ol* [loːqʼo̥l] 'to buy'; Pérez Vail & Jiménez 1997, Pérez et al. 2000) (section 2.4.4). However, syncope may still be blocked when it would derive clusters that are illicit in the language in question, e.g. Tseltal *ajk'taj* /ahkʼot-ah/ → [ʔahkʼtah] '(s)he danced', but *akiltik* [ʔaki̥ltik], *[ʔakltik] 'grassland', Polian 2013; see also Palosaari 2011). Barrett (1999, 2011) and Bennett & Henderson (2013) report an 'antigemination' effect that inhibits the deletion of vowels between identical consonants in K'ichean languages, e.g. Uspantek *ajij* [ʔˈá.xix], *[ʔˈáxx] 'sugarcane' (cf. McCarthy 1986, Odden 1988).

To close this discussion, it should be pointed out that syncope may yield opaque interactions with allophony, prosody, and morphology in Mayan languages. Space limitations prevent me from discussing such patterns in detail. For specific examples, consult section 5.2, DuBois (1981:106), England (1983:29), Edmonson (1988:87), Larsen (1988:46), Barrett (2011, 1999:35-6,56-8), and Bennett & Henderson (2013).

3   Consonant inventories

Table 1 provides an overview of the phonemic consonants found in Mayan languages. For simplicity I have omitted phonemes that are only attested in Spanish loans. The table is meant to be schematic: some non-contrastive phonetic detail is ignored (such as whether the implosives are voiced or voiceless, section 3.3), and other authors may have different interpretations of the appropriate underlying phones for a given language.

	Bilabial	Dental/ alveolar	Post- alveolar	Retroflex	Palatal	Velar	Uvular	Glottal
Plain plosive	p {b}	t t͡s {t͡s̪}	t͡ʃ	(t͡ʂ)	{tʲ}	k (kʲ) {kʷ}	(q)	
'Glottalized' plosive	(pˀ) ɓ	tˀ {d} t͡sˀ {t͡s̪ˀ}	t͡ʃˀ	(t͡ʂˀ)	{tʲˀ}	kˀ (kʲˀ) {kʷˀ}	(qˀ ∼ ɢˀ)	ʔ
Fricative		{θ} s {s̪}	ʃ	(ʂ)		(x ∼ χ)		(h)
Nasal	m	n			{ɲ}	(ŋ)		
Approximant	w ∼ v/β	l (r ∼ ɾ)			j			

Table 1: Mayan consonant inventories: (C) marks phonemic consonants missing from at least one branch; {C} marks rare phonemic consonants found in just one or two languages; $C_a \sim C_b$ marks non-contrastive variation in the basic phonetic form of a phoneme across languages or dialects.

A few commonalities are immediately apparent. Mayan languages typically contrast a set of plain voiceless stops with a distinct set of 'glottalized' stops at the same place of

articulation. The 'glottalized' stops may be ejective, implosive, preglottalized, etc. depending on the language and phonetic context (section 3.3), but are treated as a natural class because of their phonological patterning (section 3.4; see also Shosted 2009).[12] In addition to plain and glottalized stops, the coronal affricates $/\widehat{ts}\ \widehat{t\int}\ \widehat{ts}^{ʔ}\ \widehat{t\int}^{ʔ}/$ are also part of the canonical Mayan consonant inventory.[13] Though glottal stop /ʔ/ may not be contrastive in all positions (section 2.4), it is nonetheless phonemic in every Mayan language.

Among fricatives, the only constant is an opposition between /s/ and /∫/.[14] While proto-Mayan had a contrast between */h/ and */x/, just a few Mayan languages preserve this distinction (Law 2014). Most languages have either phonemic /h/ or phonemic /x/ (which may be uvular /χ/), but not both. In languages that have merged historical */h/ and */x/ the historical place difference may still be reflected in the synchronic morpho-phonology; see Orie & Bricker (2000) on Yucatec, Smith-Stark (1983:131-2,156) on Poqomam, and Anderson (1981) for general discussion.

The core sonorant inventory is composed of /m n l j w/. The phoneme transcribed as /w/ is more accurately /v/ or /β/ in some languages: this is true for certain varieties of Tsotsil (Haviland 1981, Aissen 1987, Herrera Zendejas 2014:Ch.9) and for Ixil (Ayres 1991, Poma et al. 1996). Romero (2009) provides a sociolinguistic analysis of /l/ allophony in Santa Maria Chiquimula K'iche', focusing on a typologically unusual pattern of lateral fricativization /VlV/ → [VðV].

3.1 Common phonemic contrasts

3.1.1 Uvular stops

All Mayan languages have stops at labial, coronal, and velar places of articulation. Eastern Mayan languages (Mamean, K'ichean) also retain the proto-Mayan uvular stops /q qʔ/, as do the languages of Q'anjob'alan Proper (Q'anjob'al, Akatek, and Popti'). This is shown for Q'eqchi' in (18).

(18)   Contrastive uvular stops in Q'eqchi (K'ichean, Guatemala and Belize; Tzul & Cacao 2002)

a.	*kaq*	[kaqˣ]	'red'	b.	*k'al*	[kʔal̥]	'cornfield'
c.	*qas*	[qas]	'our brother'	d.	*q'an*	[qʔan]	'yellow'
e.	*kok*	[kokʰ]	'turtle'	f.	*uk'*	[ʔukʔ]	'louse'
g.	*toq*	[toqˣ]	'Cut it!'	h.	*toq'*	[toqʔ]	'gum'

While Popti' has a phonemic glottalized /qʔ/, it lacks the corresponding plain uvular stop /q/ (Day 1973, Jiménez Camposeco et al. 2001). The same may be true for Akatek (Zavala 1992, cf. Raymundo González et al. 2000). The uvular stops may be disappearing from Q'anjob'al

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[12]Ejective /t'/ has a low lexical frequency in Mayan languages, e.g. England (2001:26), Palosaari (2011:18).

[13]Plain */$\widehat{ts}$/ has largely merged with /s/ in Poqomam, and to a lesser extent in Poqomchi' and some varieties of Q'eqchi' (Campbell 1977, Smith-Stark 1983:68, Malchic Nicolás et al. 2000:48-9, England 2001:28, Caz Cho 2007:32-3). Herrera Zendejas (2014:Ch.10) reports a similar merger for southern Lacandon.

[14]The fricative /s/ is marginal in Huastec, having shifted to /θ/ sometime after the split from Chicomuseltec (section 3.2.5; Edmonson 1988:36, Norcliffe 2003). Both the absence of /s/ and the presence of /θ/ are typologically uncommon features (Maddieson 1984).

and Akatek: plain /q/ is realized as the fricative [χ] in a wide range of environments, and /qˀ/ is frequently realized as either [kˀ] or [ʔ], especially among younger speakers (Zavala 1992, Raymundo González et al. 2000, Baquiax Barreno et al. 2005).

3.1.2 Sub-coronal place contrasts

Along with the alveolar and post-alveolar sibilants /s t͡s t͡sˀ ʃ t͡ʃ t͡ʃˀ/, some Mayan languages have an additional retroflex series /ʂ t͡ʂ t͡ʂˀ/. These sibilants are attested in Q'anjob'alan and Mamean languages.

(19)   Sub-coronal place contrasts in Popti' sibilants (Q'anjob'alan, Guatemala; Jiménez Camposeco et al. 2001)

    a.   *tzima*   [t͡sima]   'drinking gourd'   b.   *sik'*   [sikˀ]   'cigarette'

    c.   *cheh*   [t͡ʃeh]   'horse'   d.   *axhni*   [ʔaʃni]   'to bathe'

    e.   *txitam*   [t͡ʂitam]   'pig'   f.   *xib'al*   [ʂipˀal]   'comb'

An even richer set of sibilant place contrasts has been reported for varieties of Ixil (Ayres 1991, Poma et al. 1996), Tektitek (Kaufman 1969, Pérez Vail 2007), and Mam (Pérez et al. 2000, England 2001). The dialects in question make a further distinction between apico-alveolar /s t͡s t͡sˀ/ and lamino-alveolar (or lamino-alveopalatal) /s̺ t͡s̺ t͡s̺ˀ/, yielding the four-way coronal place distinction illustrated in (20).

(20)   Sub-coronal place contrasts in Todos Santos Mam (Pérez et al. 2000, England 2001)

    a.   *shik*   [s̺ikʰ]   'rabbit'   b.   *sii'*   [siːʔ]   'firewood'

    c.   *k'o'xh*   [kˀoʔʃ]   'measure of liquor'   d.   *xyeb'*   [s̺jeɓ̥]   'comb'

The lamino-alveolar consonants are sometimes reflexes of /kʲ(ˀ)/ (section 3.2.1), but may also descend from sibilants at other places of articulation. As far as I know such contrasts are only found in the Mamean branch.

    Some of the Veracruz varieties of Huastec contrast retroflex /t͡ʂ(ˀ)/ with post-alveolar /t͡ʃ(ˀ)/. This two-way coronal place distinction corresponds to a post-alveolar /t͡ʃ(ˀ)/ ∼ apical /t͡s(ˀ)/ contrast in other varieties of Huastec (Kaufman 1985, Norcliffe 2003:15,56-9, Herrera Zendejas 2014:Ch.7, Lucero Meléndez, p.c.).

3.1.3 Ejective /pˀ/

The voiceless labial ejective [pˀ] is commonly observed as an allophone of the implosive /ɓ/, especially in final position (sections 3.3, 3.4.2). There are, however, a number of languages in which ejective /pˀ/ contrasts phonemically with the implosive /ɓ/ and the plain labial stop /p/ (see also Ladefoged & Maddieson 1996:Ch.3).

(21)   Phonemic /pˀ/ in Chontal (Ch'olan, Mexico; Keller 1959, Knowles 1984)

    a.   *bab*   [baɓ̥]   'paddle'   b.   *pop*   [popʰ]   'sleeping mat'

    c.   *p'os*   [pˀos]   'sweepings'   d.   *nap'*   [napˀ]   'lake'

Phonemic /pˀ/ appears to be an areal feature, attested in all the Yucatecan languages, most of the Greater Tseltalan languages, and in the K'ichean branch, Poqomam and Poqomchi'

(Campbell 1977, Kaufman & Norman 1984, Justeson et al. 1985, Law 2014).

3.1.4 Rhotics

Most Mayan languages lack a phonemic rhotic /r/. The modern reflexes of proto-Mayan */r/ include /j/ (Western Mayan, Yucatecan, Huastec) and /t/ (Mamean), along with some sparse cases of /t͡ʃ/ (Kaufman 1976a, Justeson et al. 1985, Law 2014). Phonemic /r/ is only robustly attested in the K'ichean branch: while other languages may have scattered instances of /r/, in both loans and in the native vocabulary, it is essentially a marginal phoneme found mainly in 'expressive' morphemes like affect words and onomatopoeia (England 2001; see also Pullum & Zwicky 1987, Hall 2013 and Henderson this volume). In Yucatec, /r/ is mostly restricted to intervocalic position in polysyllabic expressive roots (Bricker et al. 1998:xii, Le Guen 2012; see Schumann Galvéz 1971, 2000, Dienhart 1986, Zocal Chayax et al. 2001 for Itzaj).

The Mayan rhotic is usually realized as a flap or tap; when devoiced (section 3.4), it may become a retroflex or post-alveolar fricative (cf. Howson et al. 2014 on Czech).

3.2 Uncommon phonemic contrasts

3.2.1 Palatalized velars

The palatalization of velar stops is a well-attested allophonic process in K'ichean Mayan languages, e.g. Tz'utijil *k'im* [kʲʔm͡m̥] 'straw' (Dayley 1985, see also Campbell 1977, Ohala 1981, Palosaari 2011). In three Mamean languages (Mam, Tektitek, and Awakatek), palatalization has in fact become contrastive for the velar stop series.

(22)   Phonemic palatalized velar stops in Awakatek (Mamean, Guatemala; Velásquez Mendoza 2001)

   a. *kay*   [kaj̥]   'fish'   b. *kyaq*   [kʲaqʰ]   'red'

   c. *samlik'*   [samlikʔ]   'sand'   d. *xiiky'* [ʂiːkʲʔ] 'wing'

As noted above, the pronunciation of palatalized /kʲ⁽ʔ⁾/ has shifted toward lamino-alveolar [t͡s⁽ʔ⁾] or [tʲ⁽ʔ⁾] in Tektitek and a few dialects of Mam. England (2001) suggests that some K'ichean languages may be developing phonemic palatalized velars as well.

3.2.2 Palatalized coronals

Ch'ol has developed an unusual set of alveolar stops (including the alveolar nasal): the phonemic inventory of the language includes 'palatalized' /tʲ tʲʔ ɲ/, but not their plain unpalatalized counterparts (Schumann Galvéz 1973, Attinasi 1973, Warkentin & Brend 1974, Vázquez Álvarez 2011). This is clearly an innovation, as Ch'ol /tʲ tʲʔ ɲ/ corresponds to /t tʔ n/ in other Greater Tseltalan languages.[15]

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[15]While palatalized or fronted coronal stops /tʲ tʲʔ/ are often reconstructed for proto-Mayan, these sounds are not the direct source of the palatalized coronals in Ch'ol (Kaufman 1976a, Kaufman & Norman 1984, Vázquez Álvarez 2011).

(23)   Palatalized alveolars in Ch'ol (Warkentin & Brend 1974, Vázquez Álvarez 2011)

    a. *tyuñ*   [tʲuɲ]   'stone'   b. *ty'uñ*   [tʲʔuɲ]   'follow (the path)'

    c. *tyiñäm*   [tʲiɲɨm]   'cotton'   d. *tyatymuty*   [tʲatʲ-mutʲ]   'rooster'

Non-palatalized /t/ exists only as a marginal phoneme, and [n] occurs only as an allophone of /ɲ/. Vázquez Álvarez (2011) suggests that the palatalized series may have developed under contact with Mixe-Zoquean languages. The articulatory details of the palatalized series are unknown: they may be true palatals (with raising and fronting of the tongue dorsum), or may be simple lamino-alveolars (see discussion in Ladefoged & Maddieson 1996:Ch.2). It would be surprising from a typological perspective to find true articulatory palatalization for Ch'ol /tʲ tʲʔ ɲ/, given that languages typically favor consonants with simple articulatory requirements (Lindblom & Maddieson 1988).

3.2.3   Velar nasal

Three languages in the Greater Q'anjob'alan branch (Popti', Chuj, and Mocho') have retained a phonemic velar nasal /ŋ/ from proto-Mayan (Kaufman 1976a, Campbell & Kaufman 1985, Law 2014).

(24)   Phonemic velar nasal in Chuj (Chujean, Guatemala and Mexico; Hopkins 1967, García Pablo & Domingo Pascual 2007)

    a. *nhab'*   [ŋaɓ˺]   'rain'   b. *ingat*   [ʔiŋatʰ]   'seed'

    c. *yib'anh*   [jiɓaŋ]   'above'   d. *namam*   [namam]   'warm'

Elsewhere in Western Mayan, proto-Mayan */ŋ/ merged with alveolar /n/. The same shift can be observed in the Yucatecan languages. More curiously, proto-Mayan */ŋ/ developed into the velar fricative */x/ in the Eastern Mayan languages (K'ichean and Mamean) and into /h/ or /w/ in Huastecan (Campbell 1977, Campbell 1999:195, Norcliffe 2003). See Ohala & Busà (1995) and citations there for relevant discussion of 'rhinoglottophilia' in sound change.

3.2.4   Implosive /ɗ/

The Yucatecan language Mopan has a three-way laryngeal contrast among coronal stops, illustrated in (25). The implosive /ɗ/ is the innovative phoneme in this case (Fisher 1973, Hofling 2007, 2011).

(25)   Phonemic /t tʔ ɗ/ in Mopan (Yucatecan, Guatemala and Belize; Cohuoj Caal et al. 2001)

    a. *k'ati*   [kʔati]   '(s)he wanted'   b. *jit'i*   [hitʔi]   'Weave it!'

    c. *k'aɗ'i*   [kʔaɗi]   'it was joined'   d. *jeɗ'i*   [heɗi]   '(s)he rested'

Voiced implosive /ɗ/ has been noted in other Yucatecan languages, but only in Spanish loans (Straight 1976, Hofling 2000). Surface [ɗ] is sometimes observed as an allophone of /tʔ/ in non-Yucatecan languages (e.g. Dayley 1985 for Tz'utujil; Hopkins 1967:19 for Chuj; Polian 2013:88 for Tseltal; England 2001:26 for Tektitek).

3.2.5 Huastec

Huastec broke away from the other Mayan languages very early in the development of the family, as part of a northward migration of speakers which eventually settled in east-central Mexico, nearly 1000 miles from the Mayan homeland in Southern Mexico and Guatemala (McQuown 1964, Kaufman 1976a, Campbell & Kaufman 1985, Law 2013, 2014). As a result of this early linguistic and geographical divergence, Huastec (and its now-extinct sibling Chicomuseltec) has a number of features which clearly set it apart from other Mayan languages. Phonologically speaking, Huastec is the only Mayan language with a phonemic interdental fricative /θ/, and the only language with a phonemic contrast between plain velar /k kˀ/ and labialized velar /kʷ kʷˀ/ (Larsen & Pike 1949, McQuown 1984, Edmonson 1988).

(26)   Innovative phonemic /θ kʷ kʷˀ/ in Huastec (Edmonson 1988)

  a. *thakw* [θakʷʰ] 'stone'   b. *lekw'tsiy* [lɛkʷˀt͡sɪ̯] 'lit it'

  c. *ith*   [ʔiθ]   'sweet potato' d. *katsiy*   [kat͡sij]   'sliced it'

  e. *kwatsiy* [kʷat͡sij̊] 'went to bed' f. *kw'atsiy* [kʷˀat͡sij̊] 'put corn to soak'

For enlightening discussion of the development of /θ kʷ kʷˀ/ in Huastec, and the difficulties in reconstructing the linguistic history of these sounds, see Campbell (1999) and Norcliffe (2003).

The labial stops of Huastec also differ from Mayan languages with respect to their laryngeal specification. Edmonson (1988) reports a true voicing contrast for /b p/, with some allophonic spirantization and devoicing of /b/. Kaufman (1985) concurs, though he also notes that a conservative variety of Huastec (Chontla) possesses a glottalized /b'/ (presumably IPA /ɓ/) which may have been present in proto-Huastecan as well. See Herrera Zendejas (2014:Ch.7) for more detailed discussion.

3.3 Consonant phonetics

3.3.1 'Glottalized' stops

The 'glottalized' stops of Mayan have been studied in more depth than any other phonetic or phonological characteristic of these languages. The phonology of glottalized stops will be described in sections 3.4 and 5; here I focus on their phonetic properties.

The term 'glottalized' subsumes the phonemic ejectives and phonemic implosives in the Mayan languages. Glottalized stops are monosegmental in both phonetic and phonological terms, distinct from [Cʔ] and [ʔC] sequences.

(27)   Monosegmental glottalized stops in Sipakapense (Barrett 1999, Tema Bautista 2005)

  a. *xa'k* [ʃaʔkʰ] 'piece, sheet' b. *ak'* [ʔakˀ] 'chick'

  c. *k'am* [kˀam] 'to be taken' d. *k-'aam* [k-ʔaːm] 'their spider'

Languages differ as to whether the glottalized stop at a particular place of articulation is realized as an ejective or an implosive. For example, the glottalized coronal /tˀ/ is consistently produced as an ejective in Kaqchikel, but in closely-related Tz'utujil it is either a voiced implosive [ɗ] or ejective [tˀ], depending on prosodic context (e.g. [ɗoːtˀ] 'snail'; Dayley 1985,

Pinkerton 1986, Chacach Cutzal 1990, Majzul et al. 2000). Most of this variation occurs with labial /ɓ/ and uvular /qʔ/: velar /kʔ/ and coronal /tʔ/ seem to be reliably ejective in most Mayan languages.

There is a sizable literature on the phonetics of glottalized stops across Mayan. An incomplete list includes Campbell (1973), Kingston (1984), Pinkerton (1986), Russell (1997), Burnett-Deas (2009), Shosted (2009), Frazier (2009b), and Wagner & Baker-Smemoe (2013), as well as the many descriptive grammars which include phonetic detail in their discussion of ejectives and implosives.

Glottalized stops differ from the plain stops along a number of phonetic parameters. Perhaps the most consistent cue to glottalization is the laryngealization of adjacent vowels, which has been noted for a range of different languages in the family (e.g. Keller 1959, Blair 1964:10, Sarles 1966:25-7, Day 1973:12, England 1983:32, Dayley 1985:32, Edmonson 1988:40, England 1990:223, DuBois 1981:120, Herrera Zendejas 2014, etc.). Other differences may include voice onset time (ejective > {plain (unaspirated), implosive}), burst amplitude (ejective > {plain, implosive}), burst type (a period of silence may follow ejective bursts), and pitch on following vowels ({ejective, plain} > implosive). Russell (1997) finds that the abruptness and sharpness of the vowel onset following stop release may also index the plain ∼ glottalized contrast in Northern Mam (plain > glottalized).

I hasten to emphasize that the phonetic differences sketched above are at best tendencies. The overall picture that emerges from the literature is that the phonetic realization of glottalized stops in Mayan varies quite widely across languages, dialects, and perhaps even individual speakers. This makes it difficult to extract any robust, cross-language generalizations about the phonetic cues to the glottalization contrast.

To illustrate, consider the various manifestations of /ɓ/, the voiced glottalized labial stop. Voiceless ejective [pʔ], voiced implosive [ɓ], and voiceless implosive [ɓ̥] are all reported as possible variants of this phoneme, and language descriptions will commonly note at least two of these realizations (28). Pre-glottalized realizations like [ʔb] are also attested, especially in the Greater Tseltalan languages (Warkentin & Brend 1974, Haviland 1981, Polian 2013). Some of this variation is allophonic and may be restricted to particular contexts, but unconditioned variation clearly exists both within and across languages.

(28)   Glottalized /ɓ/ in three Mayan languages (Jiménez Camposeco et al. 2001, Majzul et al. 2000, Zocal Chayax et al. 2001)

a. Kaqchikel I: *jöb'* [χoɓ̥] 'rain' b. Kaqchikel II: *sïb'* [sɪpʔ] 'smoke'
(Santa Maria Cauqué) (Tecpán)

c. Popti': *b'alunheb'* [pʔaluŋeɓ̥] 'nine things' d. Itzaj: *b'äk'* [ɓɨkʔ] 'meat'

This is to say nothing of the more extreme allophonic (and diachronic) patterns which may target /ɓ/, such as debuccalization to [ʔ], spirantization to [f/ɸ], and sonorization to [m⁽ʔ⁾] or [w⁽ʔ⁾] (Haviland 1981, Cojtí Macario & Lopez 1990, Par Sapón & Can Pixabaj 2000, Malchic Nicolás et al. 2000, Jiménez Camposeco et al. 2001, Caz Cho 2007, Herrera Zendejas 2014).[16]

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[16]The debuccalization of /ɓ/ to [ʔ] is a recurrent pattern across Mayan languages, especially in word-final position (see e.g. Barrett 2007 for K'ichean). This may be a case of parallel innovation: debuccalization often occurs in some, but not all dialects of a language (ruling out shared inheritance), without any obvious geographical basis for its distribution (ruling out areal diffusion). Debuccalization of /ɓ/ is presumably

The voiced labial /ɓ/ is clearly the most variable of the glottalized stops, but as mentioned above, qualitatively similar variation is described for uvular /qʼ/ as well. Even for the 'stable' ejectives /tʼ kʼ/, caution is warranted: cross-linguistically, ejectives may be produced with differences in laryngeal dynamics which give rise to rather distinct acoustic consequences (e.g. Lindau 1984, Kingston 1984, Ladefoged & Maddieson 1996, Warner 1996, Wright et al. 2002, Ham 2004, Kingston 2005, Shosted 2009, and references there). At present, the range of articulatory and acoustic variation for Mayan ejectives is not known.

With that said, some of the apparent variation in the phonetics of 'glottalized' stops may be spurious, reflecting methodological differences rather than true phonetic heterogeneity. While some studies have collected direct articulatory data (such as oral airflow) to investigate glottal state contrasts for stops (e.g. Pinkerton 1986, Shosted 2009), others have relied exclusively on acoustic measures (Russell 1997, Frazier 2009b, Burnett-Deas 2009). Most descriptive studies seem to be based on simple auditory impressions; this may be one reason why different sources sometimes provide different phonetic descriptions for glottalized stops in the same language. Given that some laryngeal distinctions are both perceptually weak and non-contrastive (e.g. the difference between voiced [ɓ] and voiceless [ɓ̥]), it would be worthwhile to re-confirm these impressionistic descriptions using quantitative instrumental methods.

3.3.2 Glottal stop [ʔ]

The phonetics of the glottal stop [ʔ] have been studied for Yucatec (Frazier 2009a, 2013), K'iche' (Baird 2011), and Q'anjob'al (Baird & Pascual 2011). Together with the larger descriptive literature, these works converge on a few basic generalizations about the phonetic patterning of [ʔ] (see also section 2.3 and Barrett 2007).

Glottal stop may sometimes be produced with full closure, yielding a brief period of silence in the acoustic signal. However, the primary phonetic cue for [ʔ] is its effect on preceding and following vowels. As with the glottalized oral stop series, the glottal stop [ʔ] is routinely described as inducing laryngealization on adjacent vowels (e.g. DuBois 1981:99, among many others). Creaky voice may occur with or without full glottal closure. Full closure seems to be most frequent in word-final position, though creaky /Vʔ#/ → [V̰#] is certainly attested as well. Baird (2011) and Baird & Pascual (2011) find that full closure for intervocalic /VʔV/ is more common in K'ichee than in Q'anjob'al; they speculate that this difference may be related to the fact that Q'anjob'al allows hiatus, but K'ichee does not (section 2.4.2).

Glottal stop is sometimes produced with an 'echo' vowel, e.g. K'iche' *po't* [poʔᵒt] 'huipil'. This is particularly common in pre-consonantal position, especially if the following consonant is voiceless. Such echo vowels are apparently rare in Q'anjob'al. Voiceless echo vowels are occasionally reported for word-final [ʔ] as well, e.g. Sakapultek *b'ee'* [ɓeːʔe̥] 'sheep' (DuBois 1981; see also Sarles 1966:16, Attinasi 1973, Dienhart 1986, Larsen 1988:54, and others). These 'vowels' may correspond to allophonic aspiration rather than a true vocalic element (e.g. Barrett 1999:37, section 3.4).

Frazier (2009b) tentatively suggests that glottal stop may depress pitch on adjacent vowels in Yucatec, at least relative to fricatives and non-implosive stops (see England 1983:32 for

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related to the weakness of the release burst in final [ɓ#] and voiceless [ɓ̥].

Mam). Glottal stop is deeply implicated in tonogenesis in Mayan (section 6.2), and so pitch perturbations conditioned by [ʔ] are to be expected. Vowel lowering has also been noted in the environment of [ʔ] (Attinasi 1973:33, Furbee-Losee 1976b, England 1983:32).

3.3.3 Fricatives

I am aware of just two studies on the phonetics of Mayan fricatives. Preliminary work by Shosted (2014) suggests that Q'anjob'al may have a true sub-apical retroflex fricative *x* [ʂ], articulated with pronounced upward curling of the tongue tip ('sub-apical' means that a constriction is formed between the underside of the tongue tip and the area behind the alveolar ridge; Laver 1994, Ladefoged & Maddieson 1996). Q'anjob'al may therefore be an exception to Hamann's (2003) typological generalization that "retroflex fricatives do not involve the same [extreme] backwards bending of the tongue tip as retroflex stops".

Léonard et al. (2009) investigate the acoustics of Tseltal [x] and [h], comparing their spectral and durational characteristics. Their paper includes detailed discussion of inter-dialectal variation in the distribution of these two fricatives, which have merged in some varieties of Tseltal.

3.4 Consonant phonotactics

3.4.1 Final aspiration and final devoicing

The plain stops /p t k (q)/ are typically aspirated in word-final position. The uvular /q/ may also be affricated, e.g. Mam *kyaq* [kʲaqˣ] 'hot' (England 1983).[17]

(29)   Final aspiration in Poqomchi' (K'ichean, Guatemala; Malchic Nicolás et al. 2000)
    a. *tz'aplik* [t͡sʔapʰlikʰ] 'closed'   b. *ch'upaq* [t͡ʃʔupaqʰ] 'amole'
    c. *ati't* [ʔatiʔtʰ] 'female'   d. *qajik* [qaχikʰ] 'lowered'

The status of aspiration as an allophonic process can be illustrated with alternations like Kaqchikel *xusök* [ʃ-u-sokʰ] 'he cut it' ∼ *sokanel* [sok-an-e̥l] 'barber'.

Final aspiration is an exceedingly regular characteristic of Mayan languages. Of the roughly thirty Mayan languages spoken today, only Q'anjob'al and Lacandon lack predictable final aspiration—and even then, final aspiration is possible, though not required (Bruce 1968, Raymundo González et al. 2000).

(30)   Variable realization of plain final stops in San Pedro Soloma Q'anjob'al (Raymundo González et al. 2000, Baquiax Barreno et al. 2005)
    a. *penek* [penek⁽ʰ⁾] 'knee'   b. *hasat* [asat̚] 'your eye
    c. *inup* [ʔinup] 'ceiba'   d. *saq* [saqˣ]∼[saχ] 'white'

Languages differ as to whether aspiration also occurs in medial position before other consonants, [TʰC]. By way of illustration, pre-consonantal plain stops are aspirated [TʰC] in Poqomchi' (29); variably aspirated [T⁽ʰ⁾C] in Mam (England 1983:25); and consistently unaspi-

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[17]Not all language descriptions report allophonic aspiration for the plain affricates /t͡s t͡ʃ (t͡ʂ t͡s̪)/. This may represent a systematic difference across languages, or simply the relative difficulty of perceiving aspiration following the noisy sibilant release of a coronal affricate.

rated [TC] in Popti' (Jiménez Camposeco et al. 2001). It is unclear at present whether the environment for pre-consonantal aspiration should be stated in terms of syllable structure ('syllable-final') or linear context ('pre-consonantal'); this may vary language-to-language (see also Steriade 1999, Bennett 2010, sections 2.4.4 and 4).

Phrasal position may also condition the strength of aspiration. Warkentin & Brend's (1974) description of Ch'ol claims that "[plain voiceless] stops and affricates are. . . more heavily aspirated phonological sentence finally" (see also Weathers 1947, Straight 1976, Bennett 2010). AnderBois (2011) draws a parallel between word-final aspiration in Yucatec and two separate processes which derive coda [h], namely word-final stop debuccalization /T/ → [h] and phrase-final [h]-epenthesis. For AnderBois, all three processes are instances of 'laryngeal strengthening': [h] signals the right edge of particular prosodic domains. This is plausibly the the phonologized reflex of gradient phonetic devoicing and laryngealization in phrase- or utterance-final positions (see also Barnes 2006, Blevins 2006, Garellek 2013, Padgett & Myers to appear).

A strikingly parallel pattern of word-final sonorant devoicing occurs in several Mayan languages, particularly in the K'ichean branch. This phenomenon is shown for Tz'utujil in (31).

(31)   Final sonorant devoicing in Tz'utujil (Dayley 1985)

a.	*way*	[waj̥]	'tortilla'	b.	*kow*	[kɔɸ]	'hard'
c.	*jul*	[xʊl̥]	'hole'	d.	*q'or*	[qʔɔr̥]	'lazy'
e.	*meem*	[meːm͡m̥]	'mute'	f.	*naan*	[naːn͡n̥]	'lady'

Like final aspiration, the synchronic status of sonorant devoicing is reinforced by numerous allophonic alternations, e.g. Kaqchikel *tew* [tef̥] 'cold' ∼ *xtewär* [x-tew̲-ər] 'it became cold' (Brown et al. 2010).

Final sonorant devoicing is more heterogeneous than final aspiration. First, it seems to be confined to languages in the K'ichean, Greater Tseltalan, and Huastecan branches. In other branches sonorant devoicing may be restricted to phrase- or utterance-final position (e.g. Straight 1976); some of the Greater Tseltalan languages may in fact belong to this category (e.g. Weathers 1947, Sarles 1966, Warkentin & Brend 1974). Final sonorant devoicing is attested in Mamean but may require a preceding voiceless consonant, e.g. Tektitek *maa'y* [maːʔj̥] ∼ [maːʔj] 'tobacco' (Pérez Vail 2007). Sonorants are similarly devoiced in final [VhC#] clusters in Ch'ol, e.g. [t͡sʔihn̥] 'yucca', though sources differ as to how they characterize final devoicing in this language (Schumann Galvéz 1973, Attinasi 1973, Coon 2010, Vázquez Álvarez 2011, etc.; cf. section 2.3).

Second, languages differ as to which sonorants undergo final devoicing. Devoicing of final nasals is attested in Tz'utujil (31), but in most K'ichean languages final devoicing only affects the approximants /w j l r/ (see also Stewart 1980, Caz Cho 2007 for Q'eqchi'). As with final aspiration, sonorant devoicing frequently occurs in medial position before another consonant, as in Uspantek *mortoom* [mor̥toːm] 'member of a brotherhood (cofrade)' (Can Pixabaj 2006). On the basis of comparisons like *worb'al* [wor̥ɓal] 'bedroom' vs. *rmxu'x* [r-mʃuʔʃ] 'his belly button', Barrett (1999) argues that the environment for sonorant devoicing in Sipakapense must be stated in terms of syllable structure rather than simple linear context (but cf. Tema

Bautista 2005 and Majzul et al. 2000).

The result of devoicing /w/ differs somewhat across languages and dialects. Majzul et al. (2000) report [w̥ f pʰ x] for devoiced /w/ in Kaqchikel; in other languages one finds [ɸ] and [β] as well (DuBois 1981, Dayley 1985, Cojtí Macario & Lopez 1990, Caz Cho 2007). See also Kaufman (1969), Pérez et al. (2000) on devoiced /j/ → [ʃ] in Mam.[18]

3.4.2 Glottalized stops

The heterogenous realization of glottalized stops across Mayan precludes any blanket statements about their allophonics. Perhaps the strongest thing that can be said is that final position seems to favor voiceless and ejective realizations. I am unaware of any language in which velar /kʔ/ is realized as implosive. Also notable is the spirantization of glottalized /kʔ/ to [ɣ] in Chuj when followed by /Vʔ/, as in *mak'a'* [maɣaʔ] 'Hit him/her!' (England 1988, García Pablo & Domingo Pascual 2007; see Herrera Zendejas 2014:Ch.9 for a similar pattern in Tsotsil). Herrera Zendejas (2014) suggests that the release bursts for ejective stops may be substantially attenuated before other consonants, possibly to the point of neutralizing with the bursts for plain stops.

For some theoretically-oriented discussion of the allophonics of Mayan glottalized stops, see Lombardi (1991, 1995), MacEachern (1999), Fallon (2002), Gallagher (2010).

4   Syllable structure

Syllable structure is a surprisingly thorny problem in Mayan languages. If we limit ourselves to bare roots, a few generalizations seem within reach. Roots are generally /CVC/, possibly indicating a dispreference for tautosyllabic clusters (section 5.1). Complex onsets are nonetheless attested in roots like Kaqchikel *-k'waj* [-kʔwax] 'carry, take' and *xkoya'* [ʃkojaʔ] 'tomato' (Brown et al. 2010). Complex codas are similarly evident in roots like Uspantek *k'a'n* [kʔaʔn] 'bold'; such clusters are typically /ʔC/, /hC/, or /NC/ in form (England 1983, 2001, Vázquez Álvarez 2011; see Campbell 1977, Smith-Stark 1983, Barrett 2011:108-110 for specific discussion of K'ichean). Triconsonantal clusters are essentially unknown in roots (at least in most Mayan languages), which may indicate an upper-limit on the complexity of syllable margins.

While these generalizations are fairly reliable within the class of roots, morphologically complex words permit substantially more phonotactic complexity. Affixation can derive extensive clusters, especially at the prefix-stem boundary. Forms like Tz'utujil *xtkamsaj na* [ʃtʰ-k-amsax na] 'he'll kill it' thus undermine any naïve ideas about a two consonant limit on initial clusters (Dayley 1985:84). Vowel deletion (section 2.4.4) can conspire with affixation to yield even more stunning consonant sequences, as in Mam *tkstaala* [tʰ-kʰstaːl-a] 'your rib' and *itz'jnqe'tl* [ʔit͡sʔxŋ-qeʔ-tl̥] 'they have already been born' (Pérez Vail & Jiménez 1997:30,39-47; England 2001). Complex consonant clusters are most common in highland languages, especially those belonging to Eastern Mayan, but derived clusters can also be found in lowland languages like Ch'ol and Tsotsil, albeit in a smaller range of morphological

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[18] Glide hardening is also observed in some Mayan languages, as in Q'eqchi' *winq* [ᵏwiŋqʰ] 'man' and *yu'am* [ᵗjuʔam] 'life' (Campbell 1974, England 2001, Tzul & Cacao 2002, Caz Cho 2007), or San Juan Sacatepéquez Kaqchikel *wokowik* [βokovikʰ] 'hollow' (García Matzar et al. 1999). Space considerations prevent me from discussing these patterns in more detail.

contexts (e.g. Ch'ol *ktyem* [k-tʲem̥] 'my chair', Vázquez Álvarez 2011:47; Tsotsil *jmanoj* [h-man-oh] 'I/we have bought it', Aissen 1987:42; see Bricker & Orie 2014 on cluster resolution in Yucatecan languages).

The question, then, is how to interpret syllable structure in words with derived clusters. There are few (if any) phonotactic patterns in Mayan languages that clearly have the syllable as their domain (section 3.4). This makes it difficult to probe for syllabification through segmental diagnostics. Barrett (1999, 2011) claims that some syllable-based phonotactics in Sipakapense systematically fail to apply in prefix strings; this may indicate that prefixal consonants are extrasyllabic. These are again questions that should be addressed for each language individually; see Furbee-Losee (1976b), Knowles (1984), Barrett (1999) and England (2001) for more discussion.

Lastly, the prevalence of initial [ʔ]-insertion (section 2.4.3) and hiatus avoidance (section 2.4.2) plausibly indicate a preference for syllables with onsets, [CVX$_0$]. Nasukawa et al. (2011) stake out a rather different position, arguing that the basic shape of syllables in Kaqchikel is [VC] rather than [CV].

5 Morpho-phonology

5.1 Root phonotactics

The canonical form for bare roots in Mayan languages is /CVC/ (Kaufman 1990). Roots like Tojolab'al *nah* /nah/ 'house', *-mak'* /-mak$^?$/ 'to hit' and *-kul* /-kul/ 'seated' abound across all lexical categories (Furbee-Losee 1976a,b). The tendency toward /CVC/ holds equally for free morphemes like *tz'up* /t͡s$^?$up/ 'feather' and bound morphemes like *-tz'ub'* /-t͡s$^?$ub̥/ 'to kiss' (examples from Q'anjob'al, Baquiax Barreno et al. 2005).

Though /CVC/ roots clearly predominate, there are exceptions to this template. Section 4 gave examples of roots containing clusters, like Kaqchikel *xpëq* [ʃpɛq^x] 'toad' or *pwäq* [pwəq^x] 'money' (Majzul et al. 2000). Some of these clusters occur in loanwords (e.g. Awakatek *spej* [spex] 'mirror' < Spanish *espejo*, Velásquez Mendoza 2001), while other root-internal clusters are derived from historical vowel deletion (e.g. Q'eqchi' *sank* [saŋk^h] and Sipakapense *snik* [snik^h], cf. K'iche' *sanik* [sanik^h] 'ant'; Kaufman 2003, Caz Cho 2007). Roots ending in /ʔC/ or /hC/ are by and large native Mayan lexemes (Campbell 1977, Kaufman 1990, 2003, Brown & Wichmann 2004).

Much less common (though still attested) are roots lacking a final consonant, such as Uspantek *b'a* /ɓa/ 'head', *jee* /χeː/ 'tail', etc. (Can Pixabaj 2006; see also DuBois 1985b). In contrast, there are numerous /VC/ roots like Chuj *ich* /it͡ʃ/ 'chile' (García Pablo & Domingo Pascual 2007), though independent phonological factors ensure that such roots will always surface as [ʔVC] when unprefixed (sections 2.4.3 and 5.2).[19]

While verbal and positional roots overwhelmingly conform to the /CVC/ template, nouns and adjectives are more permissive (see also Coon, Henderson this volume). This lexical split holds for both segmental composition and for root length. Polysyllabic root nouns like Tsotsil *vinik* [vinik^h] 'man' (Haviland 1981) are much more common than polysyllabic

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[19]It bears mentioning that initial glottal stop insertion is not directly motivated by the /CVC/ root template, as [ʔ]-insertion occurs in both polysyllabic roots (Kaqchikel *umül* [ʔumʊl] 'rabbit') and in inflected words (Kaqchikel *awixk'äq* [ʔaw-iʃk$^?$ɨq^x] 'your fingernail'; Majzul et al. 2000) (section 2.4.3).

roots belonging to other lexical categories. Long roots are often words of historically foreign origin, like K'iche' *tinimit* [tinimitʰ] 'town' and *masaat* [masaːtʰ] 'deer' (< Nahuatl *tena:mi-tl* 'fortified town' and *mazatl* 'deer') or Ch'ol *ake'* [ʔakeʔ] 'lizard' (< Mixe-Zoquean) (Kaufman 1976a, Campbell 1977, Larsen 1988, Campbell 1999, Vázquez Álvarez 2011). Disyllabic roots were also well-attested in proto-Mayan (Fox 1978, Kaufman 2003).

The proper synchronic interpretation of the /CVC/ root template remains somewhat obscure. The statistical skew toward /CVC/ roots is quite large, but exceptions are nonetheless plentiful. Questions naturally arise as to whether this root template is grammatically operative, and if so, at what level. Patterns of loanword adaptation may suggest an active preference for consonant-final roots (if not /CVC/ as such): in Yucatec, for example, vowel-final Spanish words are borrowed with an epenthetic /h/, as in *mamá* > *mamah* [mamah] (Orie & Bricker 2000; see also AnderBois 2011 on Yucatec, Attinasi 1973 and Coon 2010 on Ch'ol, and Baquiax Barreno et al. 2005:36-7 for some intriguing [ʔ] alternations in Q'anjob'al).

For more in-depth discussion of Mayan root templates see Straight (1976), Furbee-Losee (1976b), Lois & Vapnarsky (2003), Coon this volume, and Henderson this volume. Furbee-Losee (1976b) specifically addresses the relation between root templates and surface syllable structure requirements.

5.1.1 Root-internal restrictions on stops

Mayan languages typically place restrictions on the consonants that co-occur in a /CVC/ root. Two common restrictions on co-occurring stops are listed in (32); restrictions on co-occurring sibilants are discussed in section 5.1.2.

(32)   Common stop co-occurrence restrictions in Mayan (T = stop, T' = glottalized stop)
      a.   /T'VT'/ $\Rightarrow$ /T'$_\alpha$VT'$_\alpha$/
          If a /CVC/ root contains two glottalized stops, the stops must be homorganic.

      b.   /T$_\alpha$VT$_\alpha$/ $\Rightarrow$ /T'VT'/ or /TVT/
          If a /CVC/ root contains two homorganic stops, the stops must have the same laryngeal specification.

Such restrictions have been most thoroughly documented for the Yucatecan, Greater Tseltalan, K'ichean, and Huastecan languages (see Weathers 1947, Keller 1959, Straight 1976, Barrett 1999, Gallagher & Coon 2009, and the literature review in Edmonson 1988). There is little reason to doubt their presence in the Q'anjob'alan and Mamean branches, though I am unaware of work specifically addressing this point.

These root co-occurrence restrictions have been of substantial theoretical interest within generative phonology. Relevant work includes McCarthy (1989), Yip (1989), MacEachern (1999), Gallagher & Coon (2009), Gallagher (2010), and Hansson (2010).

Mayan languages differ as to the strength and content of stop co-occurrence restrictions. Straight (1976) reports that Yucatec obeys constraint (32b), and so does not allow roots like /kikʔ/ which contain two stops with differing laryngeal specifications at the same place of articulation. But in K'ichean languages this is a perfectly licit root: /kikʔ/ 'blood' is attested in every language in the branch. Mamean languages also have roots like /qʔaq/ 'black', as do Greater Q'anjob'alan languages. Roots violating (32b) are found in Huastec

as well, though Edmonson (1988) reports that they are statistically rare, suggesting that some root co-occurrence restrictions are gradient rather than categorical in nature. This may also be true for other Mayan languages: apart from Smith-Stark (1983) and Lois & Vapnarsky (2003), few studies have attempted to systematically quantify root phonotactics (see too Straight 1976, Gallagher & Coon 2009). Edmonson (1988) points out that the strength of these static phonotactics may vary across different lexical classes, and may also hold more strongly for /CVC/ roots than for roots with long vowels /CV(ː)C/, 'broken' vowels /CVʔVC/, or coda clusters like /CVhC/ or /CVʔC/.

More idiosyncractic root phonotactics are attested in individual languages as well. For example, Furbee-Losee (1976a,b) claims that Tojolab'al does not allow /jVC/ roots where C is an oral continuant /s ʃ l r w j/, plain oral stop, or plain affricate. Roots like *yah* /jah/ 'pain', *ya'* /jaʔ/ 'to be watery', and *-yak'* /-jakʔ/ 'to be shaking' are however permissible. These generalizations are patently disregarded by other Mayan languages, as illustrated by Q'anjob'al *yas* /jas/ 'injury', K'iche' *yaak* /jaːk/ 'mountain lion', and so on (Baquiax Barreno et al. 2005, López Ixcoy 1997). To date, the extent to which these language-specific patterns reflect real, grammatically live restrictions on roots (rather than accidental lexical gaps) has not been conclusively established (see also Smith-Stark 1983).

There are two systematic exceptions to the phonotactic restrictions on co-occurring stops in /CVC/ roots: in many languages, the glottalized labial /ɓ/ and glottal stop /ʔ/ freely combine with roots at any place of articulation. These exceptions can be illustrated with roots like Tz'utujil *q'oob'* /qʔoːɓ/ 'earring' or Ixil *ch'u'* /t͡ʃʔuʔ/ 'chest' (Dayley 1985, Chel & Ramirez 1999). These exemptions are almost certainly related to the fact that /ɓ ʔ/ are not ejectives, which differentiates them from the other glottalized stops.[20] For discussion of these exceptions in a more theoretical context, see MacEachern (1999), Gallagher (2010).

As with the /CVC/ root template itself, the synchronic status of root co-occurrence restrictions in Mayan is unknown. Few authors have commented on this point: Gallagher & Coon (2009) offer some informal observations in favor of the cognitive reality of such restrictions for Ch'ol speakers, and Fox (1978) argues that some otherwise regular sound changes were blocked in particular lexical items when they would have led to violations of static phonotactic restrictions on roots.

5.1.2 Sibilant harmony

Along with restrictions on root-internal stops, Mayan languages may also prohibit certain pairs of coronal sibilants within the same /CVC/ root. The core generalizations are as follows: if a root contains two plain (non-glottalized) sibilants, they must be entirely identical, as in the Yucatec examples (33).

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[20]There are varieties of Poqomam in which the glottalized labial is uniformly produced as an ejective [pʔ], but remains exempt from root co-occurrence restrictions on stops (Smith-Stark 1983, Malchic Nicolás et al. 2000). In languages with a /pʔ ɓ/ contrast, it is always the implosive /ɓ/ which patterns separately from the other glottalized stops.

(33)   Anteriority restrictions on root-internal sibilants in Yucatec (Bricker et al. 1998)

   a. *xáax*   [ʃáːʃ]   'to sift (antipassive)'   b. *[ʃáːs], *[t͡ʃáːʃ], etc.

   c. *tsaats*   [t͡sàːt͡s]   'fat'   d. *[t͡sàːt͡ʃ], *[sàːt͡s], etc.

   e. *chúuch*   [t͡ʃúːt͡ʃ]   'stem'   f. *[t͡ʃúːt͡s], *[t͡ʃúːʃ], etc.

When a root contains just one glottalized affricate the identity restriction is relaxed such that sibilant fricatives and affricates may co-occur, provided they agree in anteriority. This is illustrated by Ch'ol roots like *säts'* [sɨt͡sˀ] 'stretch' and *ch'ox* [t͡ʃˀoʃ] 'worm' (Gallagher & Coon 2009). Roots with one glottalized affricate and one plain affricate, such as *[t͡sˀet͡ʃ] and *[t͡sˀut͡s], are unattested. If both affricates are ejective, they must again be identical, pursuant to the stop co-occurrence restrictions (32) (e.g. Ch'ol *ch'ach'* [t͡ʃˀat͡ʃˀ] 'bush').

Restrictions on root-internal sibilant pairs have been observed in the K'ichean (Smith-Stark 1983, Dayley 1985, Barrett 1999), Chujean (Hopkins 1967, Furbee-Losee 1976a,b), Greater Tseltalan (Kaufman 1971, Gallagher & Coon 2009), Huastecan (Edmonson 1988), and Yucatecan branches (Straight 1976). As with stop co-occurrence restrictions, the exact details of sibilant patterning differ somewhat across languages (see again Edmonson 1988).

In some languages, such as those of the K'ichean branch, sibilant co-occurrence restrictions appear to be completely static statements about roots (much like the stop co-occurrence restrictions (32)). But in other languages, sibilant distributions may reflect an active process of long-distance sibilant harmony that also occurs across morpheme boundaries. By way of illustration, Aissen (1987:276-7) gives Tsotsil forms like *ta x̠kil* [ta ʃ-k-il] 'I'll see it' vs. *smes̠et* [s-meset^h] 'refreshing himself' (see also Herrera Zendejas 2014:Ch.9 and references there). Sibilant harmony processes of one type or another can also be found in Ch'ol (Gallagher & Coon 2009), Tseltal (Kaufman 1971), Ixil (Ayres 1991:24), and Sakapultek (DuBois 1981:137).

Lombardi (1990) draws on sibilant distributions in Yucatec to argue that phonological representations do not specify the temporal order of the stop and fricative portions of affricates; phonologically, they are unordered bundles of the features [-cont] and [+cont] (cf. Anderson 1976, Sagey 1986). In a discussion of Ch'ol, Gallagher & Coon (2009) argue for a formal distinction between long-distance phonotactics which require total segmental identity (such as (32)) and those that only require agreement for particular features (such as anteriority); the latter are taken to be more local in nature, being grounded in articulatory factors (see also Hansson 2010).

Sibilant co-occurrence restrictions may be weak, or even inactive in those Mayan languages that have rich sub-coronal place distinctions (section 3.1.2). In Mamean, historical shifts in consonant place have given rise to forms that violate the sibilant phonotactics mentioned above (e.g. Kaufman 1976a, Lengyel 1991). This can be seen in roots like Ixtahuacán Mam *xooch* [ʂoːt͡ʃ] 'well (n)' and Todos Santos Mam *tch'eex* [t͡sˀeːʂ] 'loan (n)' (Pérez et al. 2000).

Retroflex sibilants are also attested in Q'anjob'alan Proper (Q'anjob'al, Akatek, and Popti'), but I do not know what patterns hold for the distribution of sibilants in this branch. While a preliminary inspection of word lists (Cú Cab et al. 2003) suggests that sibilant co-occurrence restrictions do hold over [CVC] roots in these languages, this question merits

more careful study.

5.2 Phonologically conditioned allomorphy

Mayan languages show phonologically conditioned allomorphy (PCA) for both inflectional affixes (mostly prefixes) and derivational affixes (mostly suffixes; see Coon this volume and Kaufman 1990). The types of allomorphy observed in each affixal field are nonetheless different in character. Ergative prefixes typically vary in form depending on the initial segment of the stem to which they attach: C-initial stems take V-final allomorphs of the ergative markers, while V-initial stems take C-final allomorphs.

(34) Ergative allomorphy in Uspantek (K'ichean, Guatemala; Can Pixabaj 2006)

    a. *qóoj* [q-ó:χ] 'my avocado' b. *qatiko'n* [qa-tikoʔn] 'our planted corn'

    c. *xatuk'* [ʃ-a-tuk'] 'you pushed it' d. *xawil* [ʃ-aw-il] 'you saw it'

These alternations appear to be motivated by syllable well-formedness conditions in at least some languages (see Kenstowicz 2013 for Kaqchikel). To be more precise, the appearance of V-final ergative markers with C-initial stems avoids consonant clusters like *qtiko'n* */q-tikoʔn/ (34b), while the use of C-final ergative markers with V-initial stems minimizes hiatus configurations like *qaóoj* /qa-ó:χ/ (34a) (see Mascaró 1996, 2007 for a theory-oriented discussion of similar patterns in Arabic). This is clearly suppletive allomorphy, as these alternations occur even in languages that permit clusters like /qt/ in other contexts (cf. Uspantek *tk'ixib'* [tʰk'iʃiɓ̥] '(s)he became embarassed'). In other Mayan languages, such as Mam, the prosodic motivation for ergative allomorphy is less clear (if such motivation even exists): here, ergative allomorphy in pairs like *npaaya* [m-pa:ja] 'my bag' vs. *wuu'ja* [w-u:ʔχa] 'my book' (Pérez Vail & Jiménez 1997) serves no obvious phonological purpose at all.

As mentioned in section 2.4.4 the interaction of allomorph selection with phonological processes like vowel deletion may also render the choice of allomorph opaque. An illustration is provided by Sipakapense: here vowel deletion may obscure the selection of the prevocalic ergative allomorph by deriving a C-initial surface form for the stem, e.g. *wtz'om* /w-at͡sʔom/ → [w-t͡sʔ'om] 'my salt'; compare this with an underlyingly C-initial stem like *npoop* [n-p'o:pʰ] 'my reed mat', as well as non-deleting V-initial stems like *waak'* [w-ˈa:kʔ] 'my chicken' (Barrett 1999:55-62, Barrett 2011).

The suffixal field shows three main patterns of PCA: vowel dissimilation/assimilation; consonant dissimilation; and syllable-counting allomorphy. Vowel alternations are treated in section 5.2.1. Consonant dissimilation occurs with some /-VC/ suffixes, as in Kaqchikel *tz'uyul* [t͡s'uj-ul̥] 'seated' vs. *tzalan* [t͡sal-an] 'lying on one's side' (Tummons 2010, Brown et al. 2010:184). This is clearly a case of allomorphy rather than a general phonological process of liquid dissimilation, given forms like *tulül* [tulʊl̥] 'zapote'. (On liquid dissimilations in other languages, such as English *coron-al* vs. *vel-ar*, see e.g. Ohala 1993, Nevins 2010, Bennett 2013 and references there.) Similar dissimilatory patterns have been noted for Tseltal (Kaufman 1971, Polian 2013), Huastec (Edmonson 1988) and Lacandon (Bruce 1968).

Syllable-counting allomorphy is also attested in several languages. For example, the Tsotsil passive marker varies according to the length of its host, yielding alternations like *imuke* [ʔi-muk-e] 'he was buried' vs. *i'elk'anat* [ʔi-ʔelk'an-at] 'it was stolen' (Aissen 1987:65-6). The Tseltal perfective marker *-ej/-oj* [-eh/-oh] provides another case of PCA conditioned

by syllable count, with *-oj* appearing after monosyllabic stems and *-ej* appearing elsewhere (Kaufman 1971, Walsh Dickey 1999, Polian 2013). Paster (2005, 2006) points out that such alternations are problematic for the view that syllable-counting allomorphy reflects prosodic well-formedness conditions, given that these *-ej*∼*-oj* alternations have no obvious benefit for the overall prosodic structure of the verb. On the other hand, polysyllabic stems are typically morphologically derived: since the difference between root and derived verb stems has a range of morphological consequences in Mayan (Coon this volume), some apparent patterns of syllable-counting allomorphy may in fact be morpho-syntactic rather than phonological in character.

Allomorphy may be observed for roots as well as for affixes. Vowel lengthening under possession is a common morpho-phonemic process in Mayan, exemplified by pairs like K'iche' *kar* [kar̥] 'fish' and *nukaar* [nu-kaːr̥] 'my fish' (Larsen 1976, DuBois 1985a, López Ixcoy 1994, Par Sapón & Can Pixabaj 2000). In Kaqchikel, possession may induce changes in vowel tenseness rather than length (section 2). Possession can trigger ablaut as well, as in Uspantek *kaa'* [kaːʔ] 'grinding stone' vs. *ínki'* [ín-kiʔ] 'my grinding stone' (Bennett & Henderson 2013), or even outright suppletion, as in Kaqchikel *jay* [χaj̥] 'house' vs. *wochoch* [w-ot͡ʃot͡ʃ] 'my house'. These are all root-specific phenomena, in the sense that some roots maintain their isolation forms under possession (for example K'iche' *waj* [w-aχ] 'my ear of corn', López Ixcoy 1997). Vowel length and quality alternations are also observed in verbal voice paradigms; see sections 2 and 2.3 for examples. Various roots have final consonant alternations under suffixation, as the result of historical processes of consonant lenition (e.g. Tz'utujil *aaq'a'* [ʔaːq'aʔ] 'night' vs. *aaq'ab'iil* [ʔaːq'aɓ-iːl̥] 'time before dawn', Dayley 1985; also Day 1973:19, Barrett 2007).

5.2.1   Reduplication and copying

Suffixes often copy segmental material from the roots to which they attach in Mayan. These suffixes may include some invariant segmental content along with a consonant or vowel taken from the root, or may consistent entirely of copied segments.

(35)   Some copying suffixes in Kaqchikel (Brown et al. 2010) ('𝕏' = copied segment)
  a.   *-jotob'a'*   /-χot-𝕍ɓaʔ/   →   [-χot-oɓaʔ]   'to raise up'
  b.   *setesik*   /set-𝕍ℂ-ɪk/   →   [set-es-ɪkʰ]   'round'
  c.   *pik'ïl*   /pik'-𝕍l/   →   [pik'-ɪl̥]   'on tip-toes'
  d.   *saqsöj*   /səq-ℂɔχ/   →   [saqʰ-sɔχ]   'whiteish'

Three aspects of these copying patterns are worthy of note. First, copying may be non-local, in the sense that root-initial consonants are preferentially copied even though the root-final consonant is closer to the suffix itself (see (35b,d)). Within generative phonology, non-local copying of this sort has been taken as diagnostic of true morphological reduplication rather than phonological spreading (e.g. Kawahara 2007 and references there). Second, patterns like (35b) appear to instantiate 'mirror reduplication', in that the linear order of segments in the base is inverted in the reduplicant. If this is the correct analysis, then Kaqchikel would counter-exemplify Marantz's (1982) generalization that mirror reduplication does not exist in natural language. Third, copying may be imperfect or partial: (35c) shows that the

suffixal vowel may be lax even when the root vowel is tense (lax vowels are only permitted in final syllables, sections 2 and 2.4). See Warkentin & Brend (1974) for similar observations regarding [a]∼[ɨ] variation in copying suffixes in Ch'ol. For sketch analyses of some consonant and vowel copying patterns in Mayan see Steriade (1988), Nelson (2003), Hall (2003, 2006), Yu (2005).

Vowel copying patterns, sometimes described as 'harmony', are quite common among Mayan languages. Specific examples can be found in many of the descriptive works cited here; vowel harmony has also has been discussed in a theoretical context by Orie & Bricker (2000) and Krämer (2001). Krämer (2001) suggests that vowel copying may be blocked over consonant clusters in Yucatec, yielding pairs like *lubul* [luɓ-<u>ul</u>] 'fall (imperfective)' vs. *t'ochbal* [t'otʃ͡-ɓ-<u>al</u>] 'be thought (imperfective)'. (Clusters are restricted to morphologically derived forms in Yucatec, Lois & Vapnarsky 2003, Bricker & Orie 2014; see Butler 2005 for a critique of Kramer's analysis that draws on this fact.)

Apart from copying suffixes, one also finds suffixes that show *dissimilation* in vowel quality (consonant dissimilations were discussed in section 5.2). Polian (2013) provides Tseltal examples like *jamulay* [xam-<u>ula</u>j] 'open many times' and *juxilay* [xuʃ-<u>ila</u>j] 'scrape many times' which illustrate allomorphy conditioned by roundness dissimilation. Similar patterns are discussed for Yucatec in Blair (1964), Krämer (2001); Huastec in Edmonson (1988); Ixil in Ayres (1991); Mam in England (1983); and Poqomam in Smith-Stark (1983:158-9). Some of these dissimilation patterns are statistical tendencies rather than categorical requirements (England 1983, Smith-Stark 1983).

6 Word-level prosody

6.1 Stress

Both fixed and mobile stress systems are attested in Mayan languages. Languages with fixed stress fall into two main sub-types: final stress and penultimate stress (Campbell et al. 1986, Kaufman 1990, England 1990, 2001). Final stress (36a) is the norm in K'ichean languages, though it is also found in Mamean (Tectitán Tektitek, Pérez Vail 2007:37-8; some varieties of Southern Mam, England 1990:225-6). Fixed penultimate stress (36b) is restricted to a few dialects of Southern Mam.

(36)   Fixed stress systems in Mayan:
     a.   Tz'utujil (Dayley 1985): final stress
         i.   *xch'eyooni*   [ʃtʃ'ɛjoːnˈɪ]   'he hit'   ii.   *tewlaj*   [teɸlˈax]   'very cold'

     b.   Southern Mam (Ostuncalco; England 1990): penultimate stress
         i.   *t-xmilaal*   [t-ʂmˈilaːl]   'his/her   ii.   *kaab'aje*   [kaːɓˈaχe]   'day before
                            body'   yesterday'

Even in languages with fixed stress there are pockets of exceptions: Kaqchikel, for instance, follows the typical K'ichean pattern of final stress, but non-final stress occurs in both loanwords (*anima* [ʔˈanima] 'spirit') and in some native words (*janila* [χanˈila] 'very').

Phrasal conditioning of various sorts has been reported for Mayan languages with fixed stress. In Q'anjob'al, phrase medial words take initial stress, but phrase final words carry

stress on the last syllable instead.

(37) Phrasal stress in Q'anjob'al (Santa Eulalia dialect, Baquiax Barreno et al. 2005, Mateo Toledo 2008; transcription is orthographic, '‖' marks an intonational break, V́ a stressed vowel)

    a. <u>sáqyin</u> hab' no <u>kaxhlán</u> ‖ no <u>kámnaq</u> tu
       'It is said that the chicken was white, that dead one.'

    b. éwi máxex wayajóq
       'You (all) fell asleep yesterday.'

Similar patterns have been noted for Greater Tseltalan languages (Kaufman 1971, Attinasi 1973, Warkentin & Brend 1974, Haviland 1981, Coon 2010, Vázquez Álvarez 2011, Polian 2013), as well as Tojolab'al (Furbee-Losee 1976a), Popti' (Day 1973), Akatek (England 2001), and Itzaj (Schumann Galvéz 1971, Dienhart 1986, Hofling 2000). Hofling (2011) describes root-initial stress for Mopan.[21]

Various authors even imply that stress is assigned at the phrase level rather than the word level, particularly for languages with final stress (e.g Weathers 1947, Gerdel 1974, Ayres 1991, Palosaari 2011, Polian 2013; see Jun & Fougeron 2002 for related discussion of French). While stress is impressionistically stronger in phrase- or utterance-final position (as fieldworkers have noted), many languages have segmental phonotactics which demonstrate that stress is phonologically present at the word level even when acoustically weak (sections 2, 3.4, and 6.1). Some of these putative patterns of phrase-level stress assignment may involve phrase-level intonational contours rather than true word-level stress (Gordon 2014); the same possibility holds for the phrasally-conditioned patterns of stress-shift described above. This is another empirical domain where more extensive investigation is needed.

Stress placement may be influenced by syllable weight; this occurs in the Mamean and Huastecan branches, and possibly in Lacandon (Yucatecan; Herrera Zendejas 2014:Ch.10).[22] In Huastec, stress falls on the rightmost long vowel, otherwise on the initial syllable (Larsen & Pike 1949, Edmonson 1988, Herrera Zendejas 2011; cf. Herrera Zendejas 2014:Ch.7 for apparent counter-examples). Northern Mam has an especially interesting pattern of quantity-sensitive stress. These varieties show a four-way weight distinction [Vː] > [Vʔ] > [VC] > [V], which influences not only the position of stress but also the distribution of syllable types within the word (England 1983, 1990, Pérez Vail & Jiménez 1997, Pérez et al. 2000). Stress falls on the rightmost underlying long vowel /Vː/ (38a); if there are no long vowels, stress falls on the rightmost short vowel followed by glottal stop /Vʔ/ (38b,c).[23] In the absence of long vowels and post-vocalic /ʔ/, stress falls on the last vowel of the root if it ends in a consonant (38d), otherwise on the penultimate root vowel (38e). Suffixes and enclitics are only stressed when containing /Vː/ or /Vʔ/.

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[21]Fox (1978) argues that proto-Mayan had initial stress, which may have interacted with both syncope and tonogenesis.

[22]Weight-conditioned penultimate stress is also found in K'iche' and Uspantek (Barrett 2002, Henderson 2012, section 6.2). These languages differ from Mamean and Huastecan in limiting stress to a final two-syllable window.

[23]While there are clear examples of stress attraction to /VʔC/ and /Vʔ#/, England (1983, 1990), Pérez Vail & Jiménez (1997), and Pérez et al. (2000) are not explicit as to whether intervocalic /ʔ/ in /V.ʔV/ also draws stress to the syllable that precedes /ʔ/.

(38)　Quantity-sensitive stress in Ixtahuacán Mam (England 1983, Pérez et al. 2000)

a.	*tq'ulaniil*	/t-qʔuːlan-iːl/	→	[tʰ-qʔʊlan-ˈiːl]	'warmth'
b.	*pu'la'*	/puʔlaʔ/	→	[pʊʔlˈaʔ]	'dipper'
c.	*i'tzal*	/iʔt͡sal/	→	[ʔˈɪʔt͡səl]	'Ixtahuacán'
d.	*awal*	/awal/	→	[ʔawˈal]	'planted corn'
e.	*spiky'a*	/spikʲʔa/	→	[spˈɪkʲʔa]	'clear'

Unstressed long vowels are disallowed and shortened, giving a surface distribution in which only one long vowel may occur per word (see Hyman 2006 for typological framing of this pattern). Certain suffixes idiosyncratically attract stress and/or shorten root vowels; England (1983), Pérez et al. (2000) provide more details. Unstressed /Vʔ/ is permitted (38b), but not in words that also contain a long vowel; see England (1983). The prosodic behavior of /Vʔ/ leads England (1983) and van der Hulst et al. (2010) to conclude that post-vocalic glottal stop is a suprasegmental vowel feature rather than a true segment in Mam; see also sections 2.3 and 6.2. Ayres (1991) describes a similar pattern of stress assignment in Ixil; see also McArthur & McArthur (1956) on Awakatek; and Kaufman (1969), England (1990, 2001:41) on Mamean more generally.

Not much work has been done investigating the role of abstract metrical structure in shaping phonological patterns in Mayan languages. Two exceptions are Barrett (2002), who provides a foot-based analysis of stress assignment in K'iche', and Bennett & Henderson (2013), who argue that the prosodic and segmental system of Uspantek is extensively conditioned by foot structure at the right edge of words.

6.1.1　Minor stress patterns

Only one Mayan language shows robust evidence for phonemic stress: in Chontal, minimal pairs like *u hok'i* [ʔu hˈokʔi] 'he dug it out' and *u hok'i* [ʔu hokʔˈi] 'he called him' seem to be well-attested (Keller 1959, Knowles 1984, Pérez González 1985). Such contrasts are nonetheless marginal, as stress is generally predictable on the basis of stem and morpheme boundaries.

There is substantial debate as to where stress falls in Yucatec, or indeed as to whether the language has word-level stress at all. Fox (1978), Sobrino Gómez (2010) and Kidder (2013) provide overviews of past proposals; Kidder concludes on the basis of acoustic measurements and native speaker judgments that Yucatec has "no concrete pattern of obligatory stress on the word level". Gussenhoven & Teeuw (2008) take the anchoring of phrase-level intonational contours in Yucatec as evidence for stress on long vowels and word-initial short vowels, though they concede that stress is "non-obvious…from a phonetic perspective" (see also Blair 1964:2-3, Krämer 2001). The elusiveness of stress in Yucatec may be connected to the fact that both pitch and vowel length are used contrastively within the phonological system, reducing their usefulness as cues for higher-level prosodic distinctions (section 6.1.2).

Evidence for secondary stress in Mayan languages is scarce. Though secondary stress is sometimes reported, such descriptions seem to be based on impressionistic judgments rather than any phonological diagnostics or quantitative phonetic measurements (examples include Mayers 1960, Hopkins 1967, Furbee-Losee 1976a, Barrett 1999, 2002, and others). Since secondary stress is notoriously difficult to transcribe, especially for non-native speakers,

these reports should be treated with caution (for more on this point see Day 1973:13, de Lacy 2007, 2014). In some cases 'secondary stress' may actually refer to phrase-level stress or intonation (see discussion and references above), or to stress in compounded prosodic words (e.g. Edmonson 1988:40,300, Herrera Zendejas 2014:Ch.7). There are however a handful of cases in which secondary stress may have phonological consequences at the word level: these include Sakapultek (DuBois 1981:99,124,144-55) and Itzaj (Hofling 2000:25). See Herrera Zendejas (2014:Ch.10) for possible phonetic evidence of secondary stress in Lacandon.

6.1.2   Phonetics of stress

Berinstein (1979) is a landmark study of the phonetics of stress in Mayan. Drawing on both production and perception data, Berinstein argues that stress in two K'ichean-branch languages (Kaqchikel and Q'eqchi') is cued by raised pitch and amplitude on the stressed syllable. Strikingly, Berinstein also finds that duration is a cue to stress in Kaqchikel, but not in Q'eqchi': she attributes this difference to the fact that vowel length is phonemic only in Q'eqchi' (section 2). This was an important early demonstration that phonetic patterning may be restricted by phonemic contrast; see Stevens & Keyser (1989), Manuel (1999), Campos-Astorkiza (2007), Dresher (2009) for more recent discussion.

Apart from Berinstein (1979), the phonetic correlates of stress in Mayan languages are underdocumented. Descriptive grammars often mention that stress is realized by some combination of pitch, loudness, and length. The validity of these claims is unclear: instrumental confirmation is rarely if ever given, and the perceived cues to word-level stress may be confounded with phrase-level phonetic phenomena like initial/final lengthening and initial/final boundary tones. Bennett & Henderson (2013) and Herrera Zendejas (2014) offer some limited instrumental data on the phonetics of stress in three languages (Uspantek, Tsotsil, Lacandon), but their findings are not conclusive. Much work remains to be done in this area of Mayan prosody.

6.2   Contrastive tone

There have been several independent cases of tonogenesis within the Mayan family. Contrastive lexical tone is attested in Yucatec (Yucatecan), Uspantek (K'ichean), Mocho' (Greater Q'anjob'alan), and San Bartolo Tsotsil (Tseltalan). Incipient tone has been reported for Mamean languages as well, primarily Tektitek (Kaufman 1969, Pérez Vail 2007), but also Mam (England 1983:32,35, England 1990). Southern Lacandon (Yucatecan) appears to have lexical tone, but the main descriptive source for this claim is an unpublished 1995 manuscript by Una Canger which is not widely available (e.g. Hofling 2006, Bergqvist 2008, and the Lacandon Cultural Heritage Project at `http://web.uvic.ca/lacandon/`). Larsen (1988:52-4) briefly alludes to some possible tonogenetic patterns related to vowel length in Zunil K'iche'.

In all clear instances of tonogenesis in Mayan the modern lexical tones are reflexes of historical laryngeals, particularly the postvocalic laryngeals in [CVhC] and [CVʔC] syllables (Kaufman 1972, Grimes 1972, Fisher 1973, Campbell 1977, Fox 1978, Palosaari 2011).[24] The

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[24]This is not to suggest that tone is *only* found in words that descend from a proto-Mayan lexeme which contained a laryngeal. In modern Uspantek, for example, tone is associated with various morphemes for which no laryngeal is reconstructed (such as the A1sg and A2sg possessive markers; Grimes 1972, Campbell 1977, Osborne 1989, Can Pixabaj 2006, Bennett & Henderson 2013).

loss of these larnyngeals conditioned the development of low tone in some languages, and high tone in others (cf. Fox 1978:Ch.4, Sobrino Gómez 2010 for different proposals). Similar patterns of 'split' tonogenesis occurred in the Athabaskan languages, where laryngealized consonants led to distinct tonal patterns in different sub-families (Kingston 1984, 2005).

The existence of contrastive tone in Yucatec was firmly established by Pike (1946). Since then there have been a number of proposals regarding the basic tonal inventory of the language: overviews can be found in Fisher (1973, 1976), Fox (1978), Kügler & Skopeteas (2006, 2007), Kügler et al. (2007), Sobrino Gómez (2010). The present consensus, following Bricker et al. (1998), Kügler & Skopeteas (2006), Frazier (2009a, 2013), Sobrino Gómez (2010), seems to be that Yucatec has the following tonal specifications:

(39) a. Short vowels [V]: no tonal specification, *kach* [kat͡ʃ] 'split'

  b. Long vowels:
      (i) High tone [V́ː], *káach* [káːt͡ʃ] 'split slowly'

      (ii) Low tone [V̀ː], *kaach* [kàːt͡ʃ] 'fragment'

  c. Rearticulated vowels [V́$_\alpha$ʔV$_\alpha$]: high-falling tone, *ka'ach* [káʔat͡ʃ] 'be split'

These tones have a fairly stable phonetic profile, though the implementation of high tone [V́ː] varies by phrasal position (Pike 1946, Kügler & Skopeteas 2006, Gussenhoven & Teeuw 2008, Frazier 2009a,b). The low tone [V̀ː] is typically realized as steady low pitch, sometimes with a gentle rise. The high tone [V́ː] may be realized with a high-falling pitch pattern, or with a high-rising pitch pattern, depending on phrasal context. The 'rearticulated' vowels [V́$_\alpha$ʔV$_\alpha$] are consistently marked by a high-falling contour, with a higher starting pitch than [V́ː] and a sharper, more pronounced pitch drop. Short vowels, which are taken to be phonologically unspecified for tone, are realized with steady pitch in the low-mid range.

Uspantek provides the only robust case of lexical tone within the K'ichean branch. There are three tonal patterns in this language, which interact with vowel length and with stress (Can Pixabaj 2006, Bennett & Henderson 2013). First, there are toneless words, which have default final stress (*kojachape'* [koχachapˈeʔ] 'You (sg.) grab us!', *xinlowisaaj* [ʃinlowisˈaːχ] 'I shepparded it'). Second, there are words with final high tone and final stress: this pattern only occurs on long vowels (*inwúuj* [inwˈúːχ] 'my paper'; long vowels are limited to the last syllable, section 2.4). Third, there are words that carry both stress and high tone on the penult; this only occurs in forms with a final short vowel (*wíxk'eq* [wˈíʃkⁱʔeqʰ] 'my fingernail'). Bennett & Henderson (2013) analyze this system as a contrast between toneless words and words with a high tone specified on the penultimate vocalic mora, [...V́$_\mu$V$_\mu$C$_0$] or [...V́$_\mu$C$_0$V$_\mu$C$_0$].[25] Tone shows extensive morphological conditioning in this language; see Bennett & Henderson (2013) for further morphological and phonological analysis, especially regarding tone-triggered stress shift.

Sarles (1966) describes lexical tone for the San Bartolo dialect of Tsotsil (see also Kaufman 1972). He reports a contrast between high and low tone, exemplified by forms like [ʔolíl] 'half' vs. [ʔólil] 'child' (low tone is unmarked). According to Sarles, tone may be morphologically conditioned, and adjacent syllables typically show an alternating tonal pattern,

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[25]Somewhat different characterizations of Uspantek stress and tone are given in Grimes (1971, 1972), Campbell (1977), Can Pixabaj (2006).

e.g. [wínikún] 'I am a man'. The minimal detail supplied in this work makes it difficult to determine whether tone is actually distinct from stress, which is mentioned (p.15) but not described. Sarles notes (p.19-26) that tone conditions consonant allophonics, which would be somewhat unusual for a true tonal system.

Herrera Zendejas (2014) provides a skeptical discussion of tone in San Bartolo Tsotsil, arguing that all systematic word-level pitch differences owe to word-final stress (pitch raising) or to the laryngealization of vowels preceding glottalized stops and [h ʔ] (pitch lowering, section 3.3). It is unclear how Herrera Zendejas would account for the apparent tonal contrast between [ʔolíl] 'half' and [ʔólil] 'child': perhaps the prosodic system of San Bartolo Tsotsil underwent a major change in the 50 years separating Herrera Zendejas (2014) from Sarles (1966). Unfortunately, Sarles (1966), Kaufman (1972) and Herrera Zendejas (2014:Ch.9) appear to be the only descriptive studies of this variety of Tsotsil.

Palosaari (2011) confirms earlier suspicions that Mocho' has contrastive lexical pitch (see references there). She proposes a distinction between toneless vowels and vowels specified for falling (or high-falling) tone: this contrast only occurs on stressed word-final syllables, and only on long vowels. The resulting three-way vowel contrast is illustrated by sets like *k'anh* [kʔaŋ] 'loud' ∼ *kaanh* [kaːŋ] 'four' ∼ *kaanh* [kàːŋ] 'sky'. Alternations like *poox* [pòːʃ] 'medicine' ∼ *pooxoom* [poːʃˈoːm] 'healer' demonstrate the neutralization of tonal distinctions in unstressed syllables. Phonemic tone does not occur on verb roots, because obligatory suffixation prevents verbal roots from bearing the word-level stress needed to support the tonal contrast.

Tektitek appears to be in the early stages of tonogenesis. Pérez Vail (2007) reports that underlying /VːʔC/ sequences are realized as [V̀ʔV́ːC], with a 'broken' vowel bearing a low-high pitch pattern. Examples like *npa'ach* /n-paːʔt͡ʃ/ → [npàʔáːt͡ʃ] 'my twin' contrast with words like *nme'al* [ŋmeʔaːl] 'my daughter' which contain an underlying /VʔVː/ string that is not realized with any additional tone.[26] This pattern may be conditioned by syllable position and/or stress (which is final), as Perez Vail does not transcribe tone in forms like *q'a'nb'il* [ɠaːʔnɓˈil] 'medicine' (p.34-6). He also observes that short vowels in /Vʔ#/ strings become tonal, carrying a broken high-low [V́ʔV̀] pitch pattern as in *qchi'* [qʰt͡ʃíʔ̥ì̥] 'our meat'. This description primarily pertains to the Tektitek spoken in Tectitán; while other varieties of Tektitek also have tones conditioned by post-vocalic /ʔ/, the conditions under which tone appears, and the surface melodies themselves, may be different (e.g. Kaufman 1969).

7 Phrasal prosody: the word and above

7.1 Intonation and phrasing

Phrase-level phonology is a comparatively understudied area of Mayan linguistics (see also section 6.1). Many descriptive sources provide a basic inventory of phrasal melodies, which expectedly differ across questions, declarative statements, and other utterance-types. Readers are directed to those works for further details. One notable pattern that recurs across Mayan is the realization of simple declarative sentences with final rising intonation (e.g. Berinstein 1991, Aissen 1992, Palosaari 2011, Shklovsky 2011): this is typologically a mi-

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[26]The orthographic system of Tektitek has some idiosyncratic conventions for vowels: phonemic vowel length is not represented, and underlying /Vːʔ/ is written as *V'V* (Pérez Vail 2007).

nority pattern (Gussenhoven 2004:Ch.4 and references there). Mayan languages with falling intonation in declaratives are also attested (e.g. England 1983:249, Knowles 1984:63, Nielsen 2005).

Dedicated studies of intonation in Mayan languages include Larsen & Pike (1949), Berinstein (1991), Nielsen (2005), Shklovsky (2011), Burdin et al. (to appear), among other work already cited above. Pye (1983, 1992) argues that final stress and intonation play an important role in language acquisition in K'iche'.

Not much work has investigated the effect of higher prosody on segmental patterning. A notable exception is AnderBois (2011), who argues that various phonological processes affecting the distribution of laryngeals in Yucatec are conditioned by word and phrase boundaries. Similar facts are given for K'iche' in Henderson (2012). Bennett (2010) reports longer periods of aspiration for phrase-final aspirated stops in Tz'utujil (section 3.4.1). Other phenomena worthy of investigation in this area were noted in sections 3.3 and 3.4.

In languages with lexical tone, phrasal intonation may interact with word-level tone specifications, sometimes masking lexical pitch distinctions (e.g. Pike 1946, Kügler & Skopeteas 2006, 2007, Gussenhoven & Teeuw 2008, Avelino 2009; Sarles 1966; Palosaari 2011; cf. the discussion of pitch accent in Hayes 1995:49-50).

7.1.1 Prosody and information structure

There is a burgeoning literature on the interaction of intonation with both *in situ* focus and focus fronting (on which see Coon this volume). Aissen (1992) uses intonational differences between left-peripheral topic and focus constituents in three Mayan languages as a diagnostic for different structural positions in the syntax (see below on related discussion of prosodically-placed clitics). She finds that a major prosodic boundary may follow fronted topics (depending on the language), but not fronted foci. Similar patterns are reported for K'iche' in Can Pixabaj & England (2011), but cf. Yasavul (2013), Burdin et al. (to appear). Velleman (to appear) discusses interactions between *in situ* focus and prosody in Kichee', arguing that prosody cannot be the sole determiner of focus for post-verbal subjects; see also Henderson (2012). Curiel Ramírez del Prado (2007) provides an extensive description of the morpho-syntax and prosody of information structure in Tojolab'al, and reports parallel facts for the prosodic marking of topic and focus in that language.

In Yucatec, prosodic marking of information structure appears to be quite limited. Kügler & Skopeteas (2007) and Gussenhoven & Teeuw (2008) find no tonal or durational differences between *in situ* (non-fronted) focus constituents and unfocused constituents occuring in the same post-verbal position. Kügler & Skopeteas (2006), Kügler et al. (2007) report a similar null result for fronted (pre-verbal) topic and focus constituents, which are both reported to show the same tonal contours as matching non-focused constituents in the post-verbal field.[27] On the other hand, Avelino (2009) observes a large pause and pitch reset following pre-verbal topics, which he takes as evidence for a prosodic boundary following fronted topics (see also Shklovsky 2011 on Tseltal). Kügler & Skopeteas (2007) found that pause breaks also followed *in situ* constituents carrying contrastive focus in post-verbal position. Both

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[27]These observations may prove difficult for theories of focus such as Zubizarreta (1998) and Szendrői (2003) which directly tie focus movement to the prosodic prominence of focused elements (see also Féry 2013, Velleman to appear and references there).

Avelino (2009) and Kügler & Skopeteas (2006, 2007) note that phrasal prosody may have different effects on words bearing different lexical tones.

The extent to which prosodic variation across Mayan languages reflects syntactic differences between those languages is not currently known (though Aissen 1992 takes some important first steps). This is partially due to the relative underdocumentation of phrasal prosody in the Mayan family. A related question is whether constituent order might itself be conditioned by prosodic factors in Mayan; Clemens (2014) suggests that post-verbal word order in Ch'ol may reflect prosodic conditions on verbs and their arguments.

7.1.2 Dependent morphemes and phrasal prosody

The term 'dependent morpheme' refers to both clitics and affixes, these being morphological elements which cannot occur in isolation. Mayan languages have a number of dependent morphemes whose appearance and/or positioning is conditioned by phrasal prosody.

Henderson (2012) shows that the distribution of certain verbal suffixes in K'iche' depends on prosodic structure: so-called 'status suffixes' like *-ik* 'ITV' are found only on verbs that appear at the right edge of an intonational phrase: phrase-medial verbs do not carry these suffixes (see also Coon this volume). Henderson also shows that several functional morphemes, such as the irrealis marker *ta(j)*, are realized as [CV] in phrase-medial position, but [CVC] in phrase-final position (see also Barrett 2007). He attributes these alternations to a preference for heavy syllables in phrase-final position, since these are better hosts for the large intonational contours that occur at the ends of phrases (e.g. Nielsen 2005). These patterns thus support a model of grammatical computation in which morphological insertion has access to pre-constructed prosodic boundaries; see Hayes (1990), Keating & Shattuck-Hufnagel (2002), Ackema & Neeleman (2003), Henderson (2012) for more discussion.

Other Mayan languages have clitics with prosodically-determined distributional patterns. Tsotsil, for example, has a semantically vacuous enclitic *un* [=un] which optionally appears at the ends of intonational phrases (Aissen 1992). This clitic is typically marked "by the possibility of a significant pause, as well as phrase-final contour". For Yucatec, Avelino (2009) observes that LH* target tones are realized somewhat later in the presence of the phrase-final topic marking enclitic [=eʔ]. Skopeteas (2010) provides a useful overview of such 'intonational clitics' as observed in the Yucatecan and Western Mayan branches (see also Furbee-Losee 1976a, Polian 2013).

Aissen (2000) argues that the distribution of the Popti' intonational enclitic *an* [=an] 'A/B1' marks out prosodic constituents (ιPs) which exactly mirror the domains in which null pronouns must find their referential antecedents. This observation, taken with the additional syntactic arguments provided by Aissen, provides evidence that the interpretation of pronouns can be prosodically rather than syntactically conditioned. For related findings outside of Mayan see Hirotani (2005) and references there.

7.2 Other clitics

Apart from the intonational clitics mentioned above, Mayan languages have a large number of word-level clitics belonging to a range of syntactic and semantic categories. A small selection is provided in (40).

(40)   a.   Kaqchikel enclitic *wi* (marks adjunct extraction, Henderson 2007)
           Akuchi xab'e wi? 'Where did you go?'

       b.   Uspantek plural enclitic *aq* (Can Pixabaj 2006, Bennett & Henderson 2013)
           jpoot'aq 'their huipils'

       c.   Mam interrogative enclitic *pa* (England 1983)
           Atpa aatz'an? 'Is there salt?'

       d.   K'iche' negative/irrealis enclitic *ta(j)* (Henderson 2012, Yasavul to appear)
           Man pa k'ayib'al ta xutijo 'It wasn't in the market that he ate it.'

       e.   Ch'ol noun class proclitic *x* (Coon 2010, Vázquez Álvarez 2011)
           x'ixik 'woman'

       f.   Sipakapense directional enclitic *el* (Barrett 1999)
           Xwor el '(S)he slept behind something.'

These clitics are distinguished from affixes and words by typical diagnostics (e.g. Zwicky & Pullum 1983, Anderson 2005): they may have a relatively low degree of selection with respect to the syntactic category of their hosts (40a,c,d); they may be unstressed, or otherwise fail to participate in word-level stress assignment (40b,f) (Bennett & Henderson 2013; Pérez Vail 2007:37-8); or they may fail to participate in word-level phonotactic processes, such as initial [ʔ]-insertion (40e) (section 2.4.3). It has also been suggested that the positioning of some clitics, such as the K'iche' negative/irrealis enclitic *ta(j)*, is prosodically-determined (Henderson 2012, Yasavul to appear). Space considerations prevent me from discussing these clitics in further detail; specifics can be found in the descriptive works cited throughout this paper.

Second-position clitics are found in the Greater Tseltalan branch of the Mayan family. Aissen (1987:9) provides Tsotsil examples like *oy la jun vinik* 'There was a man (they say)', in which the evidential marker *la* occurs following the existential predicate *oy*. See Coon (2010), Vázquez Álvarez (2011), Polian (2013) for other examples. Aissen (1987:9) writes that these clitics are "very crudely" second position; this may suggest that the positioning of these clitics is conditioned by prosody instead of (or as well as) morpho-syntax, a possibility explored by Curiel Ramírez del Prado (2007) for Tojolab'al (see also Harizanov to appear for Slavic languages).

One set of clitics merits special mention. Absolutive agreement markers may vary along two dimensions in Mayan languages: they may either precede or follow the predicate, and may be either clitics or affixes (see Coon this volume). This variation is observed both within and across languages, e.g. the Q'anjob'al B2sɢ marker in *jelan hach* [xelan=atʃ] 'you are intelligent' vs. *maxach wuqtej* [maʂ-atʃ w-uqte-x] 'I followed you' (*wuqtej* [wuqtex] is the verb in the latter example; Baquiax Barreno et al. 2005). Woolford (2011) argues that variation in the position of absolutive marking in Tsotsil is itself conditioned by phonological factors. See also Curiel Ramírez del Prado (2007) on Tojolab'al, Barrett (2011) on Sipakapense, and Bennett & Henderson (2014) on Kaqchikel.

8 Conclusion and future prospects

In this article I've tried to summarize a wide range of previous research on the phonetics and phonology of Mayan languages. In doing so I hope to make this rich body of work more accessible to non-Mayanists and to linguists who do not speak Spanish. Mayan languages have a number of typologically and theoretically interesting properties which should be of interest to linguists of any persuasion. For Mayanist readers I've tried to point out empirical domains that deserve to be investigated more closely. Despite many years of careful and intensive work on the sound systems of Mayan languages, there are quite a few gaps in our understanding which remain to be filled.

One such gap concerns the topic of prosody, at both the word and phrase levels. We need to move beyond impressionistic descriptions of stress and intonation in Mayan: these phenomena call out for more carefully controlled instrumental studies, especially given the murkiness surrounding some of the basic empirical facts in this area. The tonogenetic languages of Mayan (section 6.2) provide a particularly exciting opportunity to document the real-time birth of lexical tone. The interaction of prosody with segmental phonology, morphology, and syntax also presents numerous opportunities for fruitful research.

I suspect that instrumental phonetic studies will play a central part in future work on Mayan sound systems. The segmental phonetics of Mayan languages have yet to be documented in any serious detail. Major questions persist even for the description and analysis of glottalized stops, despite the fact that this segmental class has been studied more closely than any other topic in Mayan phonetics (sections 3.3.2 and 3.4.2). Though valuable in its own right, phonetic documentation may also help settle deeper questions about the phonological representation of segments, or about the proper characterization of allophonic variation. And as just noted, such studies will be crucial for refining our understanding of the prosody of Mayan languages. Finally, the relation between citation forms and connected speech in Mayan languages is currently unclear: large-scale corpus studies of spontaneous speech would be valuable in this respect.

While the preceding topics could be investigated using acoustic methods, I would point out that two major areas of phonetic research—articulatory phonetics and speech perception—remain essentially unexplored for Mayan languages. Work in these fields has the potential to make enormous descriptive and theoretical gains. Furthermore, articulatory and perceptual studies could help lay the groundwork for research in speech pathology and language education, areas of practical value for Mayan communities.

The study of phonetic and phonological acquisition in Mayan has not yet begun in full. Work by Clifton Pye and collaborators suggests that Mayan languages have much to offer in this regard, as patterns of acquisition in e.g. K'iche' seem to be different from English in interesting and revealing ways (Pye 1983, Pye et al. 1987, Pye 1992, Pye et al. 2008, *et seq.*; see also Straight 1976, Espantzay Serech 2006). As with studies of speech production and perception, studies of phonological acquisition could have significant tangible benefits for language education in the Mayan context. The study of phonological acquisition may also shed light on the numerous sound changes that have occurred in the development and diversification of the Mayan family (e.g. Ohala 1981, 1993).

The vast majority of information on Mayan languages is contained in written sources. Phonetic and phonological facts are not well-preserved in books: many of the empirical

questions raised above could be answered with a small number of appropriately chosen recordings. Those of us who work on Mayan sound systems should expend considerable effort to produce (and share) high-quality field recordings of those languages, ideally in collaboration with native speaker linguists and community members. In light of the uncertain future of many Mayan languages, phonetic and phonological documentation acquires an urgency that should not be ignored.

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Mayan Morphosyntax*

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This article outlines some of the basics of the morphology and syntax of Mayan languages. We begin in section 1 with a tour of the core verbal complex, including roots, stem formation, voice and valence morphology, person and number marking, and TAM (primarily aspect) morphology. The ergative alignment pattern, along with split ergativity and reflexes of syntactic ergativity, is outlined in greater detail in section 2. Looking outside of the verb stem, we turn to the noun phrase in section 3 and examine word order in section 4; this section includes a discussion of the factors governing variation in post-verbal word order, as well as preverbal topic and focus positions. Section 5.2 turns briefly to embedded clauses and nominal licensing.

1 The verb stem

A simplified general template for the Mayan verb stem is shown in (1) (see Kaufman and Norman 1984; Grinevald and Peake 2012). Examples illustrating different components of the stem are shown in (2).

(1) TAM – { ABS } – ERG – $\boxed{\text{ROOT}}$ – VOICE – STATUS.SUFFIX – { ABS }

(2) a. X-in   ha-$\boxed{\text{mitx'}}$-a'.
         ASP-B1SG A2SG-catch-TV

         'You caught me.'   (Q'anjob'al; Mateo-Toledo 2008, 49)

     b. X-oq-kee-$\boxed{\text{ch'ey}}$
         ASP-B1PL-A3PL-cure

         'They hit us.'   (Tz'utujil; Dayley 1985, 104)

     c. Ch-a-$\boxed{\text{mil}}$-at.
         ASP-B2-kill-PASS

         'You're going to be killed.'   (Tsotsil; Aissen 1987, 62)

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d. Tyi k-⟨wäy⟩-is-añ-ety.
   ASP A1-sleep-CAUS-DTV-B2

   'I made you sleep.'   (Ch'ol; my notes)

The examples in (2) illustrate important points of variation among the languages, discussed in more detail below. Verbal predicates in Mayan are typically preceded by one of a series of tense–aspect–mood (TAM, though primarily aspect and henceforth glossed as ASP) markers; "non-verbal" stative predicates lack TAM marking, discussed further in §1.4. The root is the core of the predicate and may be followed by voice or valence-alternating morphology, such as the passive in (2c) or the causative in (2d), discussed in §1.2. The stem may also appear with a "status suffix" (§1.1), such as the Q'anjob'al transitive suffix *-a'* in (2a) or the Ch'ol suffix for derived transitives in (2d). Grammatical relations are head-marked on the predicates via ergative ("Set A") prefixes and absolutive ("Set B") morphemes. Ergative prefixes precede the stem throughout the Mayan family; absolutives appear either following the aspect marker, as in (2a–c), or stem-finally, as in (2d) (§1.3). Though the basic order of the components in (1) is quite consistent across the family, languages vary not only in the location of the absolutive, but also in their inventory of "status suffixes", as well as whether and where a word boundary falls internal to this complex. The predicate may also be more complex, containing directionals or other auxiliaries, discussed in Henderson this volume.

1.1 Roots and stems

Based on their stem-forming morphology, Haviland (1994) groups Tsotsil verbal roots into three main classes—transitive, intransitive, and positional (see Henderson this volume). Transitive and intransitive stems can be classified based on whether they appear with one person marker (intransitive) or two (transitive); see §1.3. The Tsotsil root *muy* 'rise, ascend', for example, is classed as intransitive because it may directly form an intransitive stem (3a), but requires a causative suffix in order to form a transitive stem (3b).

(3) a. Ch-⟨muy⟩ xa   ta   ton noxtok.
       ASP-rise already PREP rock also

       'Next he gets up on a rock.'

    b. Ch-tal   s-⟨muy⟩-es   s-bek'tal une.
       ASP-come A3-rise-CAUS A3-flesh CL

       'She makes her flesh climb up.'   (Tsotsil; Haviland 1994, 704)

2

Other roots, such as *lik* 'get up, lift' are not so easily classifiable; *lik* may enter directly into transitive or intransitive stem forms without the addition of derivational suffixes (Haviland 1994, 715).

So-called "positional roots" form a distinct semantic and derivational class in Mayan languages. Semantically, they generally refer to physical state, configuration, shape, or surface quality, and they enter verbal or adjectival stems with a special set of stem-forming suffixes; bare positional roots have been noted to be impossible (see e.g. Haviland 1994 on Tsotsil; Polian 2013 on Tzeltal; England 1983b on Mam; Vázquez Álvarez 2011 and Coon and Preminger 2009 on Ch'ol; Smith-Stark 1981 on Pokomam; Norman 1973 on K'iche'). It is important to point out that positionals form a class of *roots*, not a class of stems (see e.g. England 1983b on Mam, contra Evans and Levinson 2009). In Tsotsil, for example, a positional root like *va'* 'standing' appears with a *-Vl* suffix to form an adjectival predicate (4a), and with the suffix *-i* to form an eventive intransitive predicate (4b).

(4) a. ali' xa   va' -al   ch-(y)-apta   noxtok-e.
       here already standing-POS ASP-A3-shout.at also-CL

       'Here he's standing up, and he's calling you.'   (Tsotsil; Haviland 1994, 711)

    b. Ch- va' -i   batel   un.
       ASP-stand-SUF sometimes CL

       '(My horse would) stand up from time to time.'   (Tsotsil; Haviland 1994, 712)

It has been noted at least for K'iche' (Larsen 1988) and Ch'ol (Coon and Preminger 2009) that positional and transitive roots share commonalities in terms of stem-forming morphology (i.e. resultative non-verbal predicates), though only the latter directly form two-place predicates.

Lois and Vapnarsky (2003, 2006) and Lois (2011) take the flexibility of Mayan roots as evidence for a Distributed Morphology-style treatment of roots as under- or un-specified with respect to grammatical category (see Halle and Marantz 1993). Coon (2012, 2013a) proposes that Ch'ol's status suffixes are instantiations of a functional head v^0; in Ch'ol, for example, intransitive v^0 is *-i* (5a), while transitive v^0 is realized as a harmonic vowel (5b) (see Bennett this volume on vowel harmony).

(5) a. Tyi wäy-**i**-y-oñ.
       PFV sleep-ITV-EP-B1

       'I slept.'

b. Tyi k-mek'-**e**-y-ety.
   PFV A1-hug-TV-EP-B2

   'I hugged you.'   (Ch'ol; Coon 2013a)

Analogous suffixes are found throughout Mayan; see e.g. Dayley 1981, as well as Henderson 2012 on K'iche'; Mateo-Toledo 2008 on Q'anjob'al; Lois and Vapnarsky 2006 on Yucatec; Furbee-Losee 1976 on Tojolab'al. Kaufman and Norman (1984) write of the status suffix in Proto-Mayan: "One of the most important features of verb inflection in proto-Mayan was the obligatory presence on every verb of a suffix to mark the status of the verb as either plain, dependent, imperative, or perfect" (Kaufman and Norman 1984, 92). Status suffixes vary with transitivity, clause type, and aspect (the latter may in turn correlate with clause type; see §2.1 below). Examples are shown in (6) for main clause verbal predicates. In some languages, certain suffixes are dropped when not phrase final (Henderson 2012 for a prosodic treatment of K'iche'; see Craig 1977 for Popti'). There is an analytical question as to whether "derived transitive" suffixes are more accurately categorized as "status suffixes" or as "voice"; see e.g. Aissen 2011 who takes the latter approach for K'iche'.

(6)

	intransitive	transitive	derived transitive
Ch'ol	*-i*	*-V$_{(harmonic)}$*	*-V*
K'iche'	*-ik*	*-o*	*-j*
Q'anjob'al	*-i*	*-V'*	*-Vj*

As the table in (6) indicates, transitives in Mayan languages are frequently subdivided into "root transitives" and "derived transitives" (e.g. Dayley 1981). Root transitives are morphologically simpler, involving a CVC root and (in some languages) a transitive status suffix (7a), while derived transitives may contain overt derivational morphology, as in (7b), or not as in (7c). These derived transitive stems are grouped as a separate class due to different morphological behavior. For example, in Popti', status suffixes are deleted when not phrase final, except from derived transitives (Craig 1977, 303), and in many languages, derived transitives require a distinct set of suffixes to form passives or antipassives (§1.2). As the Ch'ol denominal example in (7c) illustrates, derived transitives need not contain overt derivational morphology; Ch'ol root transitives require a harmonic vowel suffix, while the suffix of derived transitives is not harmonic.

(7) a. Max s-[tx'al]-**a'**.
      ASP A3SG-weave-TV

      'She wove it.'   (Q'anjob'al; Mateo-Toledo 2008, 55)

    b. Max s-[q'an-le]-**j**   heb' ha-b'i.
      ASP A3SG-word-SUF-DTV PL A2SG-name

      'They asked your name.'   (Q'anjob'al; Mateo-Toledo 2008, 55)

    c. Tyi i-[xujch]-**i**   wakax.
      ASP A3-thief-DTV cow

      'He stole cows.'   (Ch'ol, my notes)

1.2 Voice, valence, and "indexing"

As seen already in the preceding section, transitivity is overtly indicated on the Mayan verb stem, both by the head-marking of grammatical relations, as well as by status suffixes. In this section, we examine the rich systems of voice- and valence-adjusting morphology these languages possess; see Dayley 1981 and Grinevald and Peake 2012 for overviews. The reference grammars are full of descriptions of voice; for works specifically on voice see also Zavala 1997 on Akatek; Ayres 1983 on Ixil; Berinstein 1998 on Q'eqchi'; Craig 1979 on Popti'; Buenrostro 2013 on Chuj; and Lois 2011 on Yucatecan. In addition to the valence-adjusting causative, applicative, passive, and antipassive constructions, some Mayan languages also have systems of what Ayres (1983) labels "indexing", in which a particular argument is focused and triggers special verbal morphology (though the number and role of core arguments is not clearly affected). These are discussed in §1.2.6.

1.2.1 Causative

Many Mayan languages have a morphological causative, related to the Proto-Ch'olan *-es*, which applies to intransitives (Kaufman and Norman 1984; Mora-Marín 2003), as shown in (8). In the forms below, the resulting transitive stem appears with the derived transitive status suffix.

(8) a. Tyi aw-ujty-**is**-ä.
      ASP A2-finish-CAUS-DTV

      'You finished it.'   (Ch'ol; Vázquez Álvarez 2011, 184

5

b. Chi ko-lo'-**tz**-ej.
ASP A1PL-eat-CAUS-DTV

'We feed him.' (Q'anjob'al; Baquiax Barreno et al. 2005, 248)

c. X-in-kam-**sa**-j   jun masaat.
ASP-A1SG-die-CAUS-DTV one deer

'I killed a deer.' (Tz'utujil; Dayley 1985, 224)

At least in Ch'ol (Vázquez Álvarez 2011, 186), Tz'utujil (Dayley 1985, 130), Tojolab'al (Furbee-Losee 1976, 71), and Kaqchikel (García Matzar and Rodríguez Guaján 1997) some intransitives must first take a -*t* suffix, before the -*s* causative suffix may apply, as in (9). Dayley notes, for example, that Tz'utujil -*ti* is unproductive and is never used without -*sa* following it.

(9) a. Loktoraj-ix   mi i-käñ-ty-is-añ-oñ.
doctor-already ASP A3-know-SUF-CAUS-DTV-B1

'It is a doctor who teaches me now.' (Ch'ol; Vázquez Álvarez 2011, 186

b. X-Ø-b'in-**ti**-sa-aj.
ASP-A3SG-walk-SUF-CAUS-DTV

'He made her walk.' (Tz'utujil; Dayley 1985, 130)

Causatives of transitives are formed periphrastically, for example, using the verb 'give, let, cause'; this verb takes a reduced clause as its complement. See Aissen 1987 for a Relational Grammar analysis; Coon (2010) argues that the embedded clauses in Ch'ol are nominalized complements of the matrix verb.

(10) K'u yu'un mu x-av-**ak'** [k-uch'   vo'-e   ]?
why   NEG ASP-A2-let A1-drink water-CL

'Why don't you let me drink water.' (Tsotsil; Aissen 1987, 214)

(11) Ma tz'-ok   n-**q'o**-'n-a   [tx'eema-l sii'   ].
ASP B2SG-DIR A1SG-give-SUF-1SG/2SG   cut-INF   firewood

'I made you cut wood.' (Mam; England 1983a, 7)

1.2.2 Applicative

The applicative suffix, reconstructed as *-b'e*, varies in function across modern Mayan languages, all of which involve some kind of promotion of an oblique argument (Mora-Marín 2003). Here we focus on its applicative use in promoting obliques to object status; see §1.2.6 below on "instrument voice".

The modern versions of the *-b'e* suffix appear to instantiate both of the main types of applicative investigated in Pylkkänen 2002—high and low—represented in (12) and (13). The high applicative head is generated above the VP and relates an argument to an event. The low applicative denotes a relationship between two arguments, often a transfer-of-possession relation.

(12)   HIGH APPLICATIVE

```
              VoiceP
             /      \
        NP_SUBJ    Voice'
                  /      \
             Voice      ApplP
                       /      \
                  NP_BEN     Appl'
                            /      \
                        Appl       VP
                                  /    \
                                 V    NP_OBJ
```

(13)   LOW APPLICATIVE

```
              VoiceP
             /      \
        NP_SUBJ    Voice'
                  /      \
             Voice       VP
                        /    \
                       V     ApplP
                            /      \
                       NP_BEN     Appl'
                                 /      \
                             Appl      NP_OBJ
```
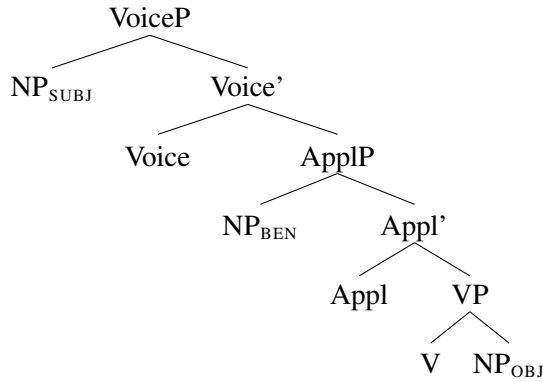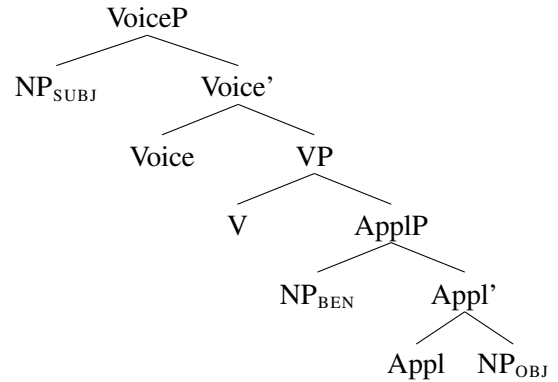
Applicatives of the languages of the Tseltalan branch exhibit properties of low applicatives (see e.g. Vázquez Álvarez 2011 on Ch'ol; Shklovsky 2012 and Polian 2013 on Tseltal; Aissen 1987 on Tsotsil; and Osorio May 2005 on Chontal). They are restricted to transitive predicates—*chom* 'sell' in (14a) and *ak'* 'give' in (14b)—and result in a predicate with two non-oblique internal arguments, generally involving a possession transfer or benefactee relationship.

(14)   a. Lah x-chom-**b**-at.
          ASP A3-sell-APPL-B2

          'She sold it to you.'   (Tseltal; Shklovsky 2012, 81)

       b. A   li   antzetik-e ep i-y-ak'-**be**   dulse li   k'ox kremotik-e.
          TOP DET women-CL lots ASP-A3-give-APPL candy DET young boys-CL

          'The women gave lots of candy to the boys.'   (Tsotsil; Aissen 1987, 256)

In Tseltalan languages, the applied argument is a primary object in the sense of Dryer 1986. It controls absolutive marking on the predicate (null for third person, discussed in §1.3), and may undergo passivization. Compare the passivized applicative in (15b), in which the applied 1st person argument from (15a) is promoted to subject.

(15) a. 'u-min-b(e)-on   nok'.
          A3-buy-APPL-B1 clothes

          'He bought me clothes.'

      b. min-b(e)-int-on   nok'
          buy-APPL-PASV-B1 clothes

          'I was bought clothes.'   (Chontal; Osorio May 2005, 30)

In at least Tseltal, Tsotsil, and Ch'ol, this same suffix is also used in external possession constructions; here the possessor of the object triggers absolutive marking on the predicate. See Aissen 1979, 1987; Coon and Henderson 2011; Shklovsky 2012; Polian 2013 for analyses and discussion.

(16) a. A-mil-**b**-on   jutuk k-ol.
          A2-kill-APPL-B1SG one   A1-child

          'You killed one of my children.'   (Tsotsil; Aissen 1987, 126)

      b. Tyi i-k'ux-**be**-y-oñ   k-ok jiñi ts'i'.
          ASP A3-bite-APPL-EP-B1 A1-leg DET dog

          'The dog bit my leg.'   (Ch'ol; Coon and Henderson 2011, 60)

Whereas in many languages with external possession, the "raised" possessor must be interpreted as affected by the action, external possession is notable in at least some Mayan languages for not having an affectedness requirement on the raised possessor, discussed in Aissen 1979; Deal 2009. This can be seem by the example in (17), in which the external possessor is inanimate.

(17) Tz-jok'-be-ik   x-ch'en-al.
      ASP-dig-APPL-3PL A3-hole-NML

      'They dig their (the bones') hole.' ('They dig a hole for the bones.')   (Tsotsil; Aissen 1979, 99)

Henderson (2007) discusses the applicative *-b'e* in Kaqchikel, demonstrating that it shows properties of *high* applicatives. The Kaqchikel applicative is not restricted to transfer-of-possession double object constructions and, unlike in the Tseltalan languages seen above, it may apply to intransitive predicates. Henderson show that locatives, datives, themes, and comitatives can all be introduced as direct verbal arguments with the *-b'e* suffix. Locative and comitative examples are given in (18).

(18) a. X-u-pal-b'e-j   jun pop ri   ixtän.
          ASP-A3SG-stand-APPL-DTV one mat DEM girl

          'The girl stood on a mat.'

b. X-u-samaji-b'e-j   w-achb'il.
ASP-A3SG-work-APPL-DTV A1SG-friend

'He worked with my friend.'   (Kaqchikel; Henderson 2007, 9–10)

Finally, note that the applicative reconstructed as Proto-Mayan *-b'e* is not attested in Huastec, which instead shows different types of applicative constructions; see Constable 1989.

1.2.3 Passive

Mayan languages have robust systems of both passive and antipassive, discussed for example in Larsen and Norman 1979 and Dayley 1981. Below, I take the core property of a passive to be the derivation of an intransitive from a transitive stem, in which the transitive object is the single argument of the resulting intransitive; see e.g. Payne 1997. Using this criteria, Popti' has four distinct passives (Craig 1977); among the Akatek inventory of passives, Zavala (1997) describes an "adversity passive", in which the patient is adversely affected by the action, as in (19a). Passives across the Mayan family also vary in whether and which types of agents may be introduced as obliques, as well as in how these obliques are introduced. Craig (1977) notes that in the *-lax* passive in (19b), only third person agents may be introduced as obliques; these use a "relational noun" discussed in §3 below. A similar restriction holds for Tsotsil by-phrases (Aissen 1987). In Ch'ol passive constructions, agentive by-phrases are introduced with the all-purpose preposition *tyi* and are only possible when the patient outranks the agent in terms of animacy (19c), discussed in Zavala 2007. These restrictions have been linked to a more general system of obviation; see Aissen 1997 on Tsotsil and Polian 2013 on Tseltal.

(19) a. Ach-ij-**cha**   w-uu   an.
        B2SG-back.carry-PASS A1SG-RN.by 1SG

        'I was able to carry you (to your detriment).'   (Akatek; Zavala 1997, 454)

    b. X-k'och-**lax**   ixim ixim (y-u   ix   ).
        ASP-shell-PASS CLF corn   A3SG-RN.by CLF

        'The corn was shelled (by her).'   (Popti'; Craig 1977, 77)

    c. Tyi ja**j**ts'-i   aj-Pedro (tyi   chajk   ).
        ASP hit.PASS-ITV CLF-Pedro   PREP lightning

        'Pedro was hit by lightning.'   (Ch'ol; Zavala 2007, 297)

9

The Ch'ol passive in (19c) illustrates a common passive across the family, frequently listed as an infix, *-j-*. A Tz'utujil form is shown in (20), which can be contrasted with the transitive in (2b) above; see Furbee-Losee 1976 on Tojolab'al; Dayley 1985 on Tz'utujil; Polian 2013 on Tseltal; and Vázquez Álvarez 2011 on Ch'ol. Coon (2013a) suggests that, at least in Ch'ol, this is not an *infix*, but rather a process affecting vowel quality; recall that orthographic *j* represents IPA [h]. While CVC→CVjC productively forms intransitive unaccusative stems from transitives, many unaccusatives with no transitive counterpart are also of the form CVjC, for example Ch'ol *majl* 'go', *yajl* 'fall', and *sujty* 'return'. See Kaufman 1971.

(20) X-ch'e**jy**-i.
      ASP-hit.PASS-ITV

      'It was hit.'   (Tz'utujil; Dayley 1985, 75)

Vowel quality productively affects voice in Yucatecan languages (Hofling 2000; Lois 2011). Contrasts in tone, vowel length, and height, as well as plain vs. glottalized vowels affect verbal valence. Lois (2011) likens the Yucatec pattern to Semitic root-and-pattern morphology and provides a Distributed Morphology analysis of the voice system following work by Arad 2003; see also Bennett (this volume).

(21) Yucatec voice (Lois 2011, 5)

CVC	active transitive	*k-u-juch'-ik*	'she grinds it'
CV'VC	passive	*k-u-ju'uch'-ul*	'it is ground'
CÝVC	middle	*k-u-júuch'-ul*	'it gets ground'
CṼVC	antipassive	*k-u-jùuch'*	'she grinds'

Derived transitives throughout Mayan require special passive morphology. For example, while most Ch'ol root transitives passivize via CVC→CVjC, derived transitives appear with the suffix *-ty*.

(22) Tyi wäy-is-äñ-**ty**-i-y-ety.
      ASP sleep-CAUS-SUF-PASS-ITV-EP-B2

      'You were made to sleep.'   (Ch'ol; Vázquez Álvarez 2002, 66)

1.2.4 Antipassive

Whereas a passive demotes an agent or external argument, antipassive demotes an internal argument, either by relegating it to oblique status, incorporating it, or omitting it entirely (Polinsky 2008). Mayan languages have a range of antipassive morphology expressing all of these possibilities (Bricker 1978; Dayley 1981; Zavala 1997). Compare the Akatek transitive in (23) with two types of antipassive in (24a–b).

(23) X-s-nooch-toj   no' txitam ixim aan.
     ASP-A3SG-eat.biting-DIR CLF pig   CLF corncob

     'The pig ate the corncob.'   (Akatek; Zavala 1997, 456)

(24) a. X-nooch-**wa**   no' txitam y-iin   ixim aan.
        ASP-eat.biting-ANTIP CLF pig   A3SG-LOC CLF corncob

        'The pig was eating on the corncob.'

     b. X-nooch-**wi**   aan   no' txitam.
        ASP-eat.biting-ANTIP corncob CLF pig

        'The pig was eating the corncob.'   (Akatek; Zavala 1997, 456)

The subject in the transitive triggers Set A/ergative marking on the verb; third person absolutive is null. In both antipassives, the object has been demoted to non-argument status and the subject now behaves as other intransitive subjects (null third person absolutive in these examples). In the "demoting antipassive" in (24a), the notional theme *ixim aan* 'the corncob' appears under a relational noun, a common strategy to introduce obliques (§3.3). In the "incorporating antipassive" in (24b), the object must be a bare, non-referential noun. It does not appear with its classifier (see §3.1), and must be adjacent to the verb, in contrast with the full transitive object in (23). Both antipassives appear with a special suffix, derived from the Proto-Mayan antipassive *-(V)w* (Smith-Stark 1978; Dayley 1981). Some languages have also adapted the Proto-Mayan Agent Focus *-n* marker for use in antipassive, as in (25); see Stiebels 2006 for discussion.

In so-called "absolutive antipassives," the notional object is absent altogether, as in the forms in (25). The Tz'utujil example in (25a) illustrates non-null marking of the 2nd person absolutive subject. The resulting verb stem also appears with the intransitive suffix *-i*. In Ch'ol, shown in (25b), antipassives (along with unergatives) always appear as nominalized complements to a light predicate; see Coon 2013a for analysis.

(25) a. X-at-ch'ey-**oon**-i.
        ASP-B2-hit-ANTIP-ITV

        'You were hitting.'   (Tz'utujil; Dayley 1981, 25)

     b. Tyi k-cha'l-e   choñ-**oñ**-el.
        ASP A1-do-DTV sell-ANTIP-NML

        'I sold (e.g. groceries).'   (Ch'ol; Vázquez Álvarez 2011, 110)

So-called "focus antipassives" are discussed in §1.2.6.

1.2.5 Reflexive

In most Mayan languages, verbs in reflexive constructions appear transitive insofar as the subject triggers Set A/ergative agreement. The apparent "object" is a possessed relational noun ("Set A" possessive and ergative prefixes are identical, §1.3), descended from Proto-Mayan *-baah* 'self, body' (Kaufman, cited in Mora-Marín 2003), as in (26); the object's possessor is coreferential with the ergative subject. Examples are shown in (26); see Ayres 1980 for an overview.

(26) a. I-**s**-mak   la **s-ba-ik**   ta   na.
       ASP-A3-close CL A3-self-3PL PREP house

       'They shut themselves up inside.'   (Tsotsil; Aissen 1987, 78)

    b. Tyi **i**-päs-ä   **i-bäj**   iwä'.
       ASP A3-show-TV A3-self here.

       'He shows himself here.'   (Ch'ol; Vázquez Álvarez 2011, 312)

    c. Ri   achy-aab' x-**ki**-ch'ay   **k-iib'**.
       DET man-PL   ASP-A3PL-hit A3PL-self

       'The men hit themselves.' or 'The men hit each other.'   (K'iche'; Larsen 1988, 442)

The possessed reflexive noun, in boldface above, is generally analyzed as the object of the transitive predicate; recall that there is no overt 3rd person absolutive marker, so the absence of transitive object marking on the verb is unsurprising; see Aissen 1987 on Tsotsil, Larsen 1988 for K'iche', and Furbee-Losee 1976 on Tojolab'al. In Ch'ol, where status suffixes appear even when not phrase-final, the verb in a reflexive clause appears with the transitive status suffix, shown in (26b). As the K'iche' form in (26c) illustrates, the same construction with a plural subject can be interpreted as either a reflexive or a reciprocal.

Nonetheless, some consistent differences are noted between reflexive "objects" and regular transitive objects across the family. While material may generally intervene between the verb and its object (the subject in VSO languages, or adverbial material), it has been noted that the reflexive object must be adjacent to the verb in languages like Tsotsil (Aissen 1987, 78), Tojolab'al (Furbee-Losee 1976), and Q'anjob'al (Coon et al. 2014). Mondloch (1981) (discussed in Larsen 1988) notes that for certain incorporation constructions involving manner adverbials, as in (27), the reflexive is the only "possessed nominal" which can serve as the incorporated object (see Ajsivinac and Henderson 2011 on this construction in Kaqchikel).

(27) Ba'aj utz   k-at-ch'aj-ow   **aw-iib'**.
      very good ASP-B2SG-wash-ANTIP A2SG-self.

      'You self-wash very well.'   (K'iche'; Larsen 1988, 531)

While transitive subjects are restricted from extraction in some Mayan languages (see §2.3), extracting the subject of a reflexive is fine in Q'anjob'al and Kaqchikel (Coon et al. 2014).

England (1983b) notes that in Mam, the reflexive object is fully incorporated to the verb, as the reflexive carries the enclitic which normally appears at the end of the verb stem, =*a* in (28). In Mam, the verb in a reflexive construction must appear with the antipassive marker; see §1.2.4 on "incorporation antipassive".

(28) Ma b'aj n-tx'ajoo-n   **w-iib'**=a.
      ASP DIR A1SG-wash-ANTIP A1SG-self-1SG

      'I washed myself.'   (Mam; England 1983b, 187)

Finally, so-called "extended reflexive" clauses—transitives in which the subject binds the object's possessor—behave similarly to reflexives in some respects, for example with respect to subject extraction patterns in Tsotsil and Q'anjob'al (Aissen 1999; Coon et al. 2014). In Q'anjob'al, just as it is grammatical to extract the subject of a reflexive, the subject of an extended reflexive may be extracted without the use of the special "Agent Focus" form, discussed in section 2.3 below. Compare the forms in (29): if the subject is extracted and no AF marking is present (see §2.3), the possessor must be interpreted as bound by the subject. If AF marking is present, a disjoint interpretation is forced, as in (29b).

(29)   a. EXTENDED REFLEXIVE

           Maktxel max <u>s-b'on</u>   **s-na**?
           who   ASP A3SG-paint A3SG-house

           'Who$_i$ painted his$_{i/*j}$ (own) house'

       b. AGENT FOCUS – DISJOINT REFERENCE

           Maktxel max <u>b'on-**on**</u> **s-na**?
           who   ASP paint-AF A3SG-house

           'Who$_i$ painted his$_{*i/j}$ house?'   (Q'anjob'al; Coon et al. 2014)

1.2.6 Voice vs. indexing

Ayres (1983) draws a distinction between voice—in which verbal valence and grammatical relations are adjusted—and what he labels "verbal indexing" (see also Smith-Stark 1978). Like voice, indexing is

morphologically marked on the verb. However, while the constructions described in §1.2.1–1.2.4 change verbal valence and/or grammatical relations, indexing serves to highlight one argument by fronting it to preverbal position (see §4), but core thematic relations are unaffected. In this respect, Mayan "indexing" may be compared to "voice" systems in Philippine languages (see e.g. Schachter and Otanes 1972 on Tagalog).

Compare the Ixil transitive in (30a) with the "instrumental voice" construction in (30b). In (30a) the instrument *machit* 'machete' is introduced by the relational noun *ta'n*; when it is fronted in (30b), the verb appears with the instrumental suffix *-b'e* (cognate with the applicative in Tseltalan languages discussed in §1.2.2) and the relational noun is no longer possible.

(30) a. N-in-tzok'   tze' ta'n <u>machit</u>.
          ASP-A1SG-cut tree by   machete

          'I am cutting the tree with machete.'

      b. <u>Machit</u>   n-in-tzok'-**b'e**   tze'.
          machete ASP-A1SG-cut-INST tree

          I am cutting the tree with a machete.'   (Ixil; Ayres 1983, 41)

Ayres (1983) contends that core grammatical relations in sentences like (30b) are unaffected. On the other hand, Dayley (1981), describing a similar pattern in Tz'utujil, proposes that this *is* a type of voice construction and that the instrument has been promoted to a core argument, indicated by the absence of the relational noun.

Henderson (2007) discusses a class of low adjuncts in Kaqchikel which trigger the post-verbal clitic *wi* when fronted, as in (31a). Ayres (1983) also describes locative indexing, as in (31b), different types of adverbial indexing, and transitive subject indexing, also known as "Agent Focus" or the "focus antipassive". This special form of the verb is required in many Mayan languages when transitive subjects (ergatives) are extracted, and is discussed further in §2.3 below.

(31) a. Pa   k'ayb'al x-in-löq'   **wi**.
          PREP market   ASP-A1SG-buy *wi*

          'In the market I bought it.'   (Kaqchikel; Henderson 2007, 1)

      b. <u>Wi'</u> <u>ka'chupul</u>   u kab'ale' ni-w-aq'ommu **kat**.
          on   second.story the house   ASP-A1SG-work *kat*

          'On the second story of the house I work.'   (Ixil; Ayres 1983, 24)

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1.3   Set A and Set B

Grammatical relations in Mayan are head-marked on the predicate with two sets of person/number morphemes, traditionally labelled "Set A" and "Set B" by Mayanists (Bricker 1977; Larsen and Norman 1979; Robertson 1980). Set A markers co-index transitive subjects (ergative) and possessors, as well as intransitive subjects in split ergative patterns (§2.1); Set B markers co-index transitive objects and intransitive subjects (absolutive). The distribution of these forms is discussed further in §2 and §3 below. Here we concentrate on the form.

As illustrated in (1) above, the Set A markers precede the stem (verbal or nominal) across Mayan languages (though things are more complicated in Huastec; see Zavala 1994). Set A markers also have prevocalic and preconsonantal allomorphs, as illustrated by the Q'anjob'al and Ch'ol forms in (32) and (33).

(32)   Q'anjob'al "Set A" (Mateo-Toledo 2008, 47)

	singular		plural	
	_C	_V	_C	_V
1st person	*hin-*	*w-*	*ko-*	*j-*
2nd person	*ha-*	*h-*	*he-*	*hey-*
3rd person	*s-*	*y-*	*s-*	*y-*

(33)   Ch'ol "Set A" (Vázquez Álvarez 2011, 77)

	_C	_V
1st person	*k-/j-*	*k-*
2nd person	*a-*	*aw-*
3rd person	*(i)y-*	*y-*

While ergative and possessive Set A forms are generally identical across the family, apparent exceptions exist. For example, in Kaqchikel, the 1st person singular ergative form is *in(w)-*, while the possessive form is *nu-/w-*. Though there may be phonological motivation for this (e.g. the possessive forms appear word-initially, while the ergative forms are generally preceded by an aspect marker), these phonological rules would need to be specific to this domain; see Kenstowicz 2013 for discussion. See also §3.3 below on a difference in tone for possessed forms in Uspantek.

Set B/absolutive morphemes have a variable position in the Mayan stem, shown in (1) above, which I will label "high" (when present, they precede the stem, between aspect and ergative marking), and "low" (following the stem). In some languages, for example Kichee' (Larsen 1988), the Set B markers consistently precede the stem. In Ch'ol, the absolutive markers always follow the stem. In Q'anjob'al, we find both options: Set B markers typically precede the stem when aspect is present and follow it in

non-verbal predicates (see §1.4). Craig (1977, 121) suggests that in Popti', which displays a similar pattern to Q'anjob'al, the absolutive morpheme moves from its initial post-verbal position to cliticize to the aspect marker when present, shown by the pair in (34).

(34) a. Winaj **hach**.
          man   B2SG

          'You are a man.'   (Popti'; Craig 1977, 120)

      b. Ch-**ach**   w-il-a.
          ASP-B2SG A1SG-see-TV

          'I see you.'   (Popti'; Craig 1977, 121)

Tsotsil, discussed in Bricker 1977 and Aissen 1987, instantiates a unique pattern within Mayan in having a high series of absolutive markers which index only person features, and a low series which index both person and number. One or both appear depending on various factors, also discussed in Woolford 2011.

(35) Ch-**i**-s-mil-**otik**.
      ASP-B1-A3-kill-B1.INCL

      'He's going to kill us$_{INCL}$.'   (Tsotsil; (Aissen 1987, 47))

Even in languages in which absolutive morphemes are high, some additional number morphology may appear following the stem, discussed below.

Across the Mayan family, Set B markers bear a clear formal resemblance to free-standing emphatic pronouns, frequently combined with a determiner or demonstrative; see e.g. Bricker 1977; Robertson 1980, 1992; Kaufman 1990, as well as individual reference grammars for forms. Q'anjob'al and Ch'ol forms are shown in (36) and (37). In Q'anjob'al, the freestanding pronouns are the absolutives preceded by *ay-* (e.g. *ayin*, *ayon*, etc.).

(36) Q'anjob'al "Set B" (Mateo-Toledo 2008, 47)   (37) Ch'ol "Set B" (Vázquez Álvarez 2011, 79)

	singular	plural
1st person	*-in*	*-on*
2nd person	*-ech*	*-ex*
3rd person	Ø	Ø

	absolutive	pronoun
1st person	*-oñ*	*joñoñ*
2nd person	*-ety*	*jatyety*
3rd person	Ø	Ø

The Q'anjob'al and Ch'ol tables above also illustrate a difference with respect to number marking. While Q'anjob'al (along with other languages of the Q'anjob'alan, K'ichean, and Mamean branches) encodes both

person and number distinctions in the core Set A and Set B forms, Ch'ol (together with other Tseltalan and, in general, Yucatecan languages) encodes only person. In Ch'ol, plurality is indicated with the addition of a suffix or clitic, which encodes plurality of either Set A or Set B markers (i.e. "omnivorous" number markers, in the sense of Nevins 2011). For example, in (38a) the suffix *-ob* indicates plurality of the 3rd person subject; the same suffix in (38b) indicates plurality of the object (recall that 3rd person absolutive/Set B is unmarked).

(38)　a.　Tyi　y-il-ä-y-ety-**ob**.
　　　　　ASP　A3-see-TV-EP-B2-PL

　　　　　'They saw you.'

　　　b.　Tyi　aw-il-ä-y-**ob**.
　　　　　ASP　A2-see-TV-EP-PL

　　　　　'You saw them.'　　　　　　　　　　　　　　　　　　　　　　　(Ch'ol, my notes)

In Q'anjob'al, the addition of number clitics/suffixes in conjunction with the prefixes in (32) encodes an inclusive/exclusive distinction between first person arguments, as well as third person plural (Mateo-Toledo 2008). Plural forms for both languages are shown in (39) and (40).

(39)　Q'anjob'al plural (Mateo-Toledo 2008, 47)

1st plural exclusive	*hon(on)*
1st plural inclusive	*heq*
3rd plural	*heb'*

(40)　Ch'ol plural (Vázquez Álvarez 2011, 83)

1st plural exclusive	*=l(oj)oñ*
1st plural inclusive	*=la*
2nd plural	*=la*
3rd plural	*-ob*

In general, plural marking is reserved for human nouns, and referentially plural nouns do not always trigger plural marking; see reference grammars, England 2011, Butler 2012, and Henderson (this volume).

The status of ergative and absolutive markers is complicated, and it appears that there is no one-size-fits-all analysis across Mayan. First, one must ask whether the morphemes behave *phonologically* as affixes (i.e. attaching word-internally), or as clitics (i.e. attaching outside of the word); see Bennett this volume. Possibly independent from this question is the *syntactic status* of these morphemes: are they *heads*, for example D^0, as in analyses of pronominal clitics? Or are they reflexes of an agreement relationship between the predicate and the nominal argument? While some grammatical descriptions explicitly address this question, others do

not provide detail, or do not address the possible distinctions between phonological and syntactic clitichood (see e.g. Kramer 2014 for an overview).

Ergative markers are described as prefixes for many languages, including K'iche' (Larsen 1988), Popti' (Craig 1977), Ixil (Ayres 1983), Tsotsil (Aissen 1987), and Ch'ol (Vázquez Álvarez 2011; Coon 2013a), and Grinevald and Peake (2012) state that ergative markers are prefixes in all Mayan languages except Huastec. Ergatives are nonetheless described as proclitics for Yucatec (Norcliffe 2009) and Tseltal (Shklovsky 2012; Polian 2013). Aissen (2010) proposes that ergative agreement takes place low in the clause in Tsotsil, also argued for Ch'ol in Coon to appear; see §5.2 below.

Absolutives exhibit more variation (Grinevald and Peake 2012). Among the languages with high absolutives, the absolutive morphemes have been described as clitics in Popti' (Craig 1977), Ixil (Ayres 1983), K'iche' (Larsen 1988), and Q'anjob'al (Mateo-Toledo 2008), but as prefixes in Mam (England 1983b) and Tsotsil (Aissen 1987). Stem-final absolutives have been analyzed as suffixes in Yucatec (Norcliffe 2009), Ch'ol (Vázquez Álvarez 2011), and Tseltal (Shklovsky 2012; Polian 2013). Kaufman and Norman (1984) state that while absolutive markers were historically clitics, they are suffixes in modern Ch'olan languages, though Coon (to appear) argues that they behave phonologically as clitics in Ch'ol.

Since third person absolutive (singular) is phonologically null across the family (see (36) and (37)), it has been suggested that the 1st and 2nd person absolutive forms are the pronouns themselves in languages such as Q'anjob'al (Mateo-Toledo 2008) and Ch'ol (Coon 2013a), and sometimes ergative and absolutive morphemes are both referred to descriptively as pronouns (Furbee-Losee 1976 for Tojolab'al and Brown et al. 2006 for Kaqchikel). The question of whether these morphemes are syntactically pronominal can be separated from their phonology; Bennett and Henderson (2014) demonstrate that absolutive morphemes in Kaqchikel behave as *phonological* clitics in certain environments, but as affixes in others. Preminger (2014) argues that the Kaqchikel 1st and 2nd person absolutive markers are syntactic clitic doubles, but that the third person "omnivorous" plural marker is the spell-out of a number head, $\#^0$; see also Coon et al. 2014 for a clitic-doubling account of Q'anjob'al absolutive.

1.4 Aspect marking and non-verbal predicates

Predicates in Mayan languages can be divided into two main types: "verbal predicates", which have been the focus to this point, and "non-verbal predicates". The former typically denote events, while the latter typically denote states (see Henderson, this volume). Verbal predicates across Mayan appear with a pre-stem aspect

marker, while non-verbal predicates do not (Grinevald and Peake 2012); variation is found in whether the aspect markers are phonologically bound or free. Below, I first discuss the preverbal aspect markers in §1.4.1. The "perfect" forms of verbs are typically formed with a stem suffix, and appear to result in a stative non-verbal predicate, discussed in §1.4.2. Non-verbal predicates are examined in §1.4.3.

1.4.1 Aspect marking

Mayan languages are frequently described as tenseless (e.g. Kaufman 1990; Bohnemeyer 2009), with preverbal temporal markers being primarily, or entirely, aspectual. Nearly all of the languages make at least a distinction between perfective/completive and imperfective/incompletive aspects, though some languages appear to bundle temporal and modal notions here as well (Grinevald and Peake 2012). Dayley (1981, 102), for example, writes for Tz'utujil that aspect, tense, and mode tend to be fused together in particular morphemes, though see Bohnemeyer 2009 for arguments against true tense in Yucatec, and see also Henderson (this volume) for discussion. The sentences in (41) show both incompletive and completive forms; I am unaware of a systematic distinction in the use of the terms "perfective"/"completive" and "imperfective"/"incompletive" and use the former set in the glosses below.

(41)   a. **Ka**-chakun-ik aree ri **x**-in-ook   uloq.
          IPFV-work-ITV when the PFV-B1SG-enter hither

          'She was working when I came in.'   (K'iche'; Larsen 1988, 163)

     b. B'ab'elal **max**-in waj-wi   sakate. **Ch**-in-waj   sakate   no chej.
          first   PFV-B1SG gather-ANTIP fodder IPFV-A1SG-gather A3SG.fodder CLF horse

          'First I gathered fodder. I was gathering the horse's fodder.'   (Q'anjob'al; Mateo-Toledo 2008, 72)

In addition to the basic distinction between perfective/imperfective, languages frequently a have potential or prospective aspect (Ch'ol (Vázquez Álvarez 2011); Mam (England 1983b); Tz'utujil (Dayley 1981); Q'anjob'al (Mateo-Toledo 2008)). In languages with a progressive aspect, this frequently involves a complex auxiliary construction (Coon 2013a and §2.1 below). Mam is described as having both a "past" and "recent past", though these are listed as aspects (England 1983b). See Henderson (this volume) for a discussion of mode. The core TAM markers are generally described as a mutually exclusive or paradigmatic set, as verbal predicates must appear with one and only one. Certain aspects are marked by the absence of an overt morpheme in some languages, not to be confused with non-verbal predicates; see for example

Mateo Toledo 2011 on Q'anjob'al. In (42a), the perfective aspect marker may be omitted, but a perfective interpretation is still forced. This differs from the non-verbal predicate in (42b) which may receive different temporal interpretations depending on context, and which never appears with an overt aspect marker. See also Carolan to appear on Chuj.

(42)   a.   (Max) hach way-i.
           ASP   B2SG sleep-ITV

           You slept.'

     b.   Yel   wal   yob' hach.
           INTS INTS bad   B2SG

           You are really mean.'   (Q'anjob'al; Mateo Toledo 2011)

Dependent embedded clauses—discussed in section 5.2 below—generally lack TAM marking (§5.2), which has thus been associated with finite Infl[0] (Aissen 1992).

1.4.2 The perfect

Perfect stems (not to be confused with *perfective*) are formed in Mayan through a set of suffixes, which may vary with transitivity. The resulting form behaves as a non-verbal predicate in disallowing TAM marking (see e.g. Larsen 1988 on K'iche'). The perfect is alternately referred to as a tense or aspect in grammatical descriptions, though generally can be characterized as denoting a resulting state; see Bohnemeyer 2009 for discussion and Alexiadou et al. 2003 for general discussion of the status of perfect.

(43)   a.   In   wa'-**naq**.
           B1SG eat-PRF

           'I have eaten.'   (Tz'utujil; (Dayley 1981, 102))

     b.   Meru bejk-**em**=bi   li   la=k-lew.
           little spill.PASS-PRF=REP DET PL.INCL=A1-lard

           'It is said that the lard was spilled a little.'   (Ch'ol; Vázquez Álvarez 2011, 117)

     c.   K-il-**oj**.
           A1-see-PRF

           'I have seen her.'   (Tsotsil; Aissen 1987, 42)

1.4.3 Non-verbal predicates

As noted above, NVPs are characterized by an obligatory absence of TAM morphology, and they generally lack the status suffixes found on verbal predicates in many languages. Almost any lexical item in Mayan can appear as a stative non-verbal predicate (NVP), including simple and derived nouns and adjectives, as well as *wh*-words and numerals, as shown underlined in (44). Certain stative verbs, often verbs for 'want' and 'know', are also obligatorily TAM-less. Depending on context and the presence of adverbs, these stative NVPs may receive different temporal interpretations. The theme of the predicate is absolutive (recall 3rd person is null) and there is no overt equative copula.

(44) a. K'oja'an in   suku'un.
          sick   A1SG older.brother

          'My older brother is sick.'   (Yucatec; Armstrong 2009, 2)

     b. At   jachinaq?
          B2SG who

          'Who are you.'   (K'ichee; Larsen 1988, 322)

     c. Ma'añ cha'-tyikil-oñ=loñ.
          NEG   two-CLF.people-B1=PL.EXCL

          'We are not two.'   (Ch'ol; Vázquez Álvarez 2011, 239)

Full DPs are unable to serve as NVPs (Armstrong 2009; Coon 2014), and in some languages NVPs do not appear with directional markers, for example in Tz'utujil (Dayley 1981, 404). These constructions contrast with certain zero-marked aspects in some languages, for example null perfective in Q'anjob'al, discussed in detail in Mateo-Toledo 2008. As obligatorily TAM-less, these constructions raise questions about finiteness (i.e. if TAM marking is believed to instantiate finite $Infl^0$); see Mateo-Toledo 2008, Pye 2011, Coon 2014, and Carolan to appear for discussion.

Finally, Mayan languages contain a dedicated existential/locative NVP predicate, *ay* in the Tseltal examples in (45); see Freeze 1976, 1992 on the relation between existentials and locatives. Like other NVPs, *ay* may not inflect with TAM.

(45) a. **Ay** chenek' ta   oxom.
          EXT bean   PREP pot

          'There are beans in the pot.'   (Tseltal; Polian 2013, 623)

b. **Ay** ta   oxom te   chenek'=e.
   EXT PREP pot   DET bean=DET

   'The beans are in the pot.'   (Tseltal; Polian 2013, 628)

The same predicate is used in combination with a possessed noun to express possession, as in (46). Like many other verb-initial languages, there is no lexical verb 'have' in Mayan.

(46)   **Ay** no' hin-txitam.
       EXT CLF A1-pig

       'I have a pig.'   (Popti'; Craig 1977, 21)

2   Ergativity

The distribution of the Set A and Set B morphemes described in §1.3 follows a basic ergative-absolutive alignment (see Comrie 1978; Dixon 1979, 1994 on ergativity and Larsen and Norman 1979 for Mayan specifically). As the Akatek examples in (47) illustrate, absolutive morphemes mark transitive objects (47a), and the subjects of intransitive verbal (47b), and non-verbal (47c) predicates. Ergative prefixes mark transitive subjects. Mayan languages are relatively rare from a typological perspective in exhibiting an ergative pattern only via head-marking on the predicate; overt nominals are not marked for case.

(47)   a. Chi-**ach**-**w**-a'   ok jun aab'il.
          ASP-B2SG-A1SG-put DIR one year

          'I will put you in jail for one year.'   (Akatek; Zavala 1997, 444)

       b. Tol chi-**ach**-kam   eyman.
          so ASP-B2SG-die quickly

          'So you die quickly.'   (Akatek; Zavala 1997, 443)

       c. Ix-**ach**.
          woman-B2SG

          'You are a woman.'   (Akatek; Zavala 1997, 444)

Though this basic pattern is present throughout the family, many Mayan languages also exhibit split ergativity and split intransitivity, discussed in §2.1 and §2.2 below. The syntactic effects of ergativity are discussed in §2.3. Though less common and not discussed in detail here, inverse alignment has also been described in some Mayan languages, for example in Huastec (Zavala 1994) and in certain dialects of Mam (Pérez Vail 2014). Nominal licensing is discussed in §5.2.

2.1 Split ergativity

Split ergativity, a common feature of ergative languages, is found throughout the Mayan family (Larsen and Norman 1979; Coon 2013a). As Larsen and Norman (1979, 352) note, splits are typically conditioned by one of three main factors, also reflected in Mayan: (i) aspect; (ii) properties of the NPs; and (iii) clause type (main vs. subordinate). In all three types of split in Mayan, the ergative pattern is replaced with what Dixon (1979) labels "extended ergativity". The ergative and "extended ergative" split patterns are shown in the Ch'ol perfective and progressive forms in (48) and (49). Note that the transitives in (48a) and (49a) consistently receive both ergative (subject) and absolutive (object) marking. The split is seen in the progressive intransitive in (49b), where the single argument triggers the ergative prefix *a-*, rather than the absolutive. The pattern in (49) has been called "nominative-accusative" insofar as both subjects receive the same marking, but note that there is no new set of morphological markers.

(48) a. Tyi k-mek'-e-y-ety.
      PFV A1-hug-TV-EP-B2

     'I hugged you.'

  b. Tyi wäy-i-y-**ety**.
      PFV sleep-ITV-EP-B2

     'You slept.'

(49) a. Choñkol k-mek'-ety.
      PROG   A1-hug-B2

     'I'm hugging you.'

  b. Choñkol **a**-wäy-el.
      PROG   A2-sleep-NML

     'You're sleeping.'   (Ch'ol; Coon 2013b, 181)

Ch'ol's split pattern is triggered by progressive and imperfective aspects; aspectual splits are found in Ch'orti' (Quizar 1994), Poqom (Santos and Benito 1998); Yucatec (Bricker 1981), Mopan (Danziger 1996), Q'anjob'al, (Mateo-Toledo 2003; Mateo Pedro 2009), Chuj (Buenrostro 2007); and Ixil (Larsen and Norman 1979); see Quizar and Knowles-Berry 1988 and Law et al. 2006 on splits in Ch'olan generally. Splits occur either only in the progressive (e.g. Q'anjob'al) or in the progressive and imperfective (e.g. Ch'ol). Even in languages which are not typically described as "split ergative", the progressive frequently requires a special construction involving a stative aspectual predicate (e.g. Larsen 1988 on K'ichee; Polian 2013 on Tseltal; Imanishi 2014 on Kaqchikel). Ch'ol's imperfective and progressive markers have been shown to behave as predicates in other environments (Vázquez Álvarez 2011; Coon 2013a) and Q'anjob'al's progressive marker *lanan* is a stative positional meaning roughly "extended" (Mateo-Toledo 2008, 55).

Larsen and Norman (1979) and Bricker (1981) suggest that split ergativity may be reducible to the fact that the aspect marker is a predicate which combines with a possessed, nominalized, verb form; recall that

possessive and ergative markers are identical ("Set A"). While Bricker (1981) proposes this as a historical motivation in Yucatec, Coon (2010, 2013a) argues that this nominalization is part of the synchronic grammar in Ch'ol.

As Larsen and Norman (1979) note, an analysis in which progressive aspect markers are predicates embedding a nominalized verb form allows for the possibility of unifying aspectual splits with "clause type splits", as shown for Popti' in (50). In the aspectless embedded clause, discussed further in §5.2 below, both transitive and intransitive subjects appear with the ergative/possessive prefix.

(50)   a. X-w-ilwe   [**hach hin**-kol-ni   ].
              ASP-A1SG-try   B2SG A1SG-help-SUF

              'I tried to help you.'   (Popti'; Craig 1977, 115)

        b. X-w-il   [**ha**-kanhalwi].
              ASP-A1SG-see   A2SG-dance

              'I saw you dance.'   (Popti'; Craig 1977, 116)

Mocho' is the only Mayan language described as having a split based on NP features (Larsen and Norman 1979; Palosaari 2011). Subjects of intransitives appear as ergative prefixes in the 1st and 2nd person (the extended ergative pattern), while 3rd person subjects of intransitives receive absolutive (zero) marking.

2.2 Split intransitivity

In addition to the aspectual splits described above, Ch'ol (Gutiérrez Sánchez 2004; Gutiérrez Sánchez and Zavala 2005; Coon 2012) and Mopan (Danziger 1996) have been described as exhibiting split intransitivity (also known as "Split-S" alignment). Specifically, these are "agentive" languages, in which "the arguments of some intransitive verbs are categorized with transitive agents and the arguments of others with transitive patients" (Mithun 1991, 511). In both languages, subjects of agentive intransitives, or unergatives, pattern differently from unaccusative intransitives in that the former appear to be simply *nouns* and require some extra verb in order to predicate. Compare the Mopan sentences in (51). The non-agentive root *nak'* 'ascend' follows the regular ergative-absolutive alignment: the 3rd person subject receives no overt marking. In (51b), the so-called "verbal noun" *lox* 'fight' expresses the agent via possession; the possessed noun is the subject of a semantically light verb, *uch*.

(51) a. $\boxed{\text{Nak'}}$ -ij   t-u-wich   tunich.
          ascend-ITV PREP-A3-face stone

          'He climbed up onto a stone.'   (Mopan; Danziger 1996, 392)

      b. Uch-ij   in-$\boxed{\text{lox}}$.
          occur-ITV A1-fight

          'I fought' (lit.: 'My fighting happened).   (Mopan; Danziger 1996, 395)

These verbal nouns—nouns which denote events like *lox* in (51b)—are discussed throughout Mayan
languages; see for example Can Pixabaj 2009 on K'ichee, Lois and Vapnarsky 2006 on Yucatecan, England
1983b on Mam, Furbee-Losee 1976 on Tojolab'al, and Mateo-Toledo 2008 on Q'anjob'al. In some
languages, these verbal nouns seem to correspond to a class of unergatives (e.g. Coon 2012 on Ch'ol). For
other languages, no clear distinction between unergatives and unaccusatives has been found (e.g. Kaqchikel,
Robert Henderson, p.c.).

    Ch'ol is further a "Fluid-S" language, in which a single lexical verb root, such as *wäy* 'sleep' in
(52), can appear in either agentive (nominal) or non-agentive (verbal) forms, with a concomitant change
in interpretation. See Gutiérrez Sánchez 2004; Gutiérrez Sánchez and Zavala 2005 for discussion. Coon
(2013a) notes that in Ch'ol, all verbal predicates require an internal argument, consistent with the fact that
unergatives must be realized as nominals.

(52) a. Tyi $\boxed{\text{wäy}}$ -i-y-oñ.
          PFV sleep-ITV-EP-B1

          'I slept.' (possibly by accident)

      b. Tyi k-cha'l-e $\boxed{\text{wäy}}$ -el.
          PFV A1-do-DTV sleep-NML

          'I slept.' (on purpose)

2.3 Syntactic ergativity

So far, we have focussed on the morphological manifestations of ergativity: in non-split environments,
transitive subjects receive one marker (Set A, ergative), while transitive objects and intransitive subjects
receive another (Set B, absolutive). The next question we must address is what, if any, reflexes of this
ergative morphology can be found in the syntax. Craig (1977, 126) ends her study of control (Equi-NP)
constructions in Popti' with a note that "the ergativity of [Popti'] is not a deep phenomenon"—subjects may

pattern alike with respect to control, regardless of transitivity. In their survey of ergativity in Mayan, Larsen and Norman (1979, 367) similarly conclude that "the kinds of typological correlates of ergativity which can be found in Mayan grammar appear to be of a rather 'shallow' sort"—i.e. the presence of antipassives and extraction restrictions, discussed below—though they go on to question whether *any* language is "deeply" ergative. Outside of control constructions, both transitive and intransitive subjects pattern alike in other respects, for example in Kaqchikel and K'iche' plural agreement is obligatory for animate subjects, but optional for objects (Henderson 2009; England 2011).

Nonetheless, ergativity does appear to have syntactic effects in some Mayan languages. England (1983a) discusses ergativity in the Mamean branch and notes that matrix ergative subjects never control the null subject of an embedded clause. In (53a), the matrix absolutive controls the embedded subject, but when the matrix subject is ergative, as in (53b), the embedded subject must be overt. In other languages, ergative subjects may control null PRO; see §5.2 on embedding.

(53)   a.   Ma **chin**-x aaj-a   [b'eeta-l   ].
            ASP B1SG return-DIR   walk-INF

            'I went to walk.'   (Mam; England 1983a, 7)

       b.   **W**-ajb'el-a   [**chin** aq'naa-n-a   ].
            A1SG-want-1SG   B1SG work-ANTIP-1SG

            'I want to work.'   (Mam; England 1983a, 8)

Perhaps the most discussed area where the syntax tracks the difference between transitive subjects on the one hand and transitive objects and intransitive subjects on the other, is in extraction. In a number of Mayan languages, ergative-agreeing transitive subjects are unable to front to pre-verbal position for focus, relativization, or wh-questions (i.e. "A-bar" extraction environments). This is shown for Popti' in (54a) and for Q'eqchi' in (54b); the former is simply ungrammatical. The latter sentence has two 3rd person arguments and is grammatical only under a reading in which the object has extracted.

(54)   a.   * **Mak x**-ach   s-mak?
            who ASP-B2SG A3SG-hit

            intended: 'Who hit you?'   (Popti'; Ordóñez 1995, 335)

       b.   **Ani ki**-x-sak'?
            who ASP-A3SG-hit

            'Who did he hit?'; *not* 'Who hit him?'   (Q'eqchi'; Berinstein 1998, 217)

Extraction restrictions of this type are also found in Mam (England 1983a), Q'anjob'al (Pascual 2007), Yucatec (Bricker 1981; Norcliffe 2009; Gutiérrez Bravo and Monforte 2009), Tsotsil (Aissen 1999), and others, though there is variation in details; see Stiebels 2006 for a comprehensive overview and Aissen to appear for a discussion of existing accounts and complications. Extraction restrictions are notably absent in Greater Tseltalan languages (except Tsotsil (Aissen 1999)), as well as in Mopan, Lakandon, Itzaj, and Tojolab'al; see Tada 1993; Coon et al. 2014.

As in other ergative languages, antipassives (§1.2.4) may be employed in order to demote a transitive subject to intransitive subject status, thus avoiding the restriction on extracting ergatives. However, Mayan languages also possess a special construction, Agent Focus (also known as "focus antipassive" or "agent voice"), used only in cases where a transitive subject undergoes A-bar extraction. The K'ichee sentence in (55) illustrates core properties of the AF construction: (i) the extracted agent, here a *wh*-word, appears in preverbal position; (ii) the verb appears with a special AF suffix, here *-ow*; and (iii) despite having two non-oblique arguments, the verb does *not* appear with ergative agreement. In languages with status suffixes, the intransitive status suffix appears.

(55)   Jachin x-paq'-**ow**   ri   sii'?
       who   ASP-split-AF DET firewood

       'Who split the firewood.'   (K'ichee; Larsen 1988, 501)

On distinctions between AF and antipassive, see Smith-Stark 1978; Craig 1979; Ayres 1983; Stiebels 2006; Tonhauser 2007; Coon et al. 2014.

Though the above-listed core properties of AF are found fairly consistently in languages that have the construction, variation also exists in (i) whether the construction is obligatory or optional for all types of extraction (see Stiebels 2006); (ii) whether it occurs with all subject–object combinations (e.g. Q'anjob'alan languages only show AF with 3rd person extracted subjects and in Tsotsil, AF is linked to obviation and appears only in constructions with two 3rd person nominals (Aissen 1999)); as well as (iii) which argument controls absolutive marking; see Aissen to appear for further discussion. While the object always triggers absolutive agreement in Q'anjob'alan AF, in K'ichean-branch languages absolutive marking is triggered by the highest-ranked argument along a hierarchy—1/2≫3PL≫3SG—regardless of grammatical function (see Smith-Stark 1978; Dayley 1978; Norman and Campbell 1978, as well as Preminger 2014 for analysis). In the K'iche' AF examples in (56), for example, absolutive marks the 1st person argument regardless of

whether it is the subject (56a) or object (56b).

(56) a. In x-**in**-il-ow   le   ak'al-ab'.
         1SG ASP-B1SG-see-AF DET child-PL

       '*I* saw the children.'   (K'ichee; Davies and Sam-Colop 1990, 531)

     b. E are' le   ak'al-ab' x-**in**-il-ow   in.
         PL FOC DET child-PL ASP-B1SG-see-AF 1SG

       '*The children* saw me.'   (K'ichee; Davies and Sam-Colop 1990, 531)

The restriction on extracting transitive subjects is not absolute: ergative-marked transitive subjects may extract in many languages in reflexive and extended reflexive constructions (Smith-Stark 1978; Aissen 1999; Coon and Henderson 2011), as well as with certain bare objects (Aissen 2011). As noted by Larsen and Norman (1979), the restriction on extracting transitive subjects is clearly not a problem with ergative/possessive morphology, per se, as *intransitive* subjects which trigger Set A agreement in split constructions (§2.1) may also nonetheless extract.

See Ordóñez 1995; Aissen 1999; Stiebels 2006; Tonhauser 2007; Norcliffe 2009; Aissen 2011; Coon and Henderson 2011; Coon et al. 2014; Weisser et al. 2011; and Erlewine to appear for formal analyses of the ban on extraction and the AF construction, as well as Aissen to appear for discussion. See also Clemens et al. to appear for a processing study.

3   The noun phrase

The focus to this point has been on the verb stem; core nominal arguments in Mayan may be dropped and, in many languages, overt pronouns appear only emphatically. Overt nominals appear with no case marking; obliques are introduced by relational nouns or one of a small set of prepositions (some Mayan languages have only a single preposition). As discussed in §1.4 above, nouns and adjectives may appear as non-verbal predicates. In this section we focus on the structure of the noun phrase, including determiners, demonstratives, and classifiers (§3.1); attributive adjectives and relative clauses (§3.2); and possession and relational nouns (§3.3). Though variation exists across the family, demonstratives, determiners, numerals, classifiers and some adjectives precede the head noun, while possessors, some adjectives, and relative clauses follow. Parallels between noun phrases and verb phrases (or DPs and CPs) have been noted in Mayan; see Aissen 1996; Lois and Vapnarsky 2006; Coon 2010 for discussion.

3.1 Determiners, demonstratives, and classifiers

Determiners and demonstratives generally precede the head noun in Mayan languages, though Craig (1977) discusses postnominal demonstratives in Popti', which she likens to other post nominal modifiers. While demonstratives and definite determiners force a definite interpretation, in some languages bare nouns may also receive a definite interpretation (Henderson this volume). Demonstratives and determiners can cooccur; see e.g. Dayley 1981, 312 on K'iche'. In languages such as Tsotsil (Aissen 1987), Tseltal (Polian 2013), and Ch'ol (Vázquez Álvarez 2011), determiners and demonstratives may trigger a noun-phrase final enclitic. The numeral 'one' serves as an indefinite determiner in many languages.

Mayan languages have an interesting range of noun and numeral classifier systems, described in the reference grammars as well as Berlin and Romney 1964; Craig 1986; Zavala 2000; Hopkins 2012; Bale and Coon 2014; and Henderson (this volume). Classifiers are required with numerals in languages like Tseltal (Polian 2013) and Ch'ol (Arcos López 2009; Vázquez Álvarez 2011). Berlin and Romney (1964) identified at least 557 possible numeral classifiers in Tseltal—a number which is easier to understand when coupled with the fact that classifiers are derived from transitive and positional roots using the CVC→CVjC process also found in passives (§1.2.3). The same is true in Ch'ol: in (57a) the positional root *koty* forms a stative predicate and in (57b) we observe the same root in classifier form.

(57) a. **Koty**-ol   jiñi wakax tyi   cholel.
         standing.on.4.legs-POS DET cow   PREP field

      'The cow is standing in the field.'

   b. Tyi k-choñ-o   cha'-**kojty**   wakax.
      ASP A1-sell-TV two-CLF.animals cow

      'I sold two cows.'   (Ch'ol, my notes)

In many Mayan languages, Spanish numerals are used to count larger numbers; in Ch'ol, borrowed Spanish numerals never appear with a classifier, a fact which Bale and Coon (2014) use to argue against the theory that classifiers are required because of semantic properties of the noun (Chierchia 1998).

While Q'anjob'alan languages have a smaller inventory of numeral classifiers (Craig (1986) lists three: human, animal, and inanimate), these languages are unique in Mayan for having a series of *nominal* classifiers (Craig 1986; Zavala 2000; Hopkins 2012; Bielig 2015). Popti' has twenty-four such classifiers which "classify concrete objects of the world and spiritual entities" (Craig 1986, 245). The classifiers are

derived from nouns, as illustrated by the subset presented in (58).

	noun		classifier	for ...
	ch'en	'rock'	*ch'en*	rocks, metal
	te'	'tree'	*te'*	plants
(58)	*nok'*	'animal'	*no'*	animals
	ixim	'corn'	*ixim*	corn-related elements
	ix	'woman'	*ix*	females (non-kin)
	winaj	'man'	*naj*	males (non-kin)

The noun classifiers appear preceding nouns in referential contexts, as in the boldfaced forms in (59a), and the second form in (59b) (Craig's glosses are simplified). The first classifier in (59b) illustrates the pronominal function of the classifiers, where here *no'* refers back to the rabbit.

(59)   a. Ahatoj **no'** ni'an conejo swi' **te'** chulul.
         is.up   CLF small rabbit on.top CLF injerto.tree

         'The little rabbit was perched on top of the injerto tree.'   (Popti'; Craig 1986, 266)

      b. ... lanhan sloni **no'** hune' **te'** tahnaj ulul.
           while eating CFL a   CLF ripe   injerto.fruit

         '... while he was eating a ripe injerto fruit.'   (Popti'; Craig 1986, 267)

Non-referential nouns, like the antipassive object in (60), may not appear with a classifier.

(60) Poh-o'   si'   xwu.
      cut-ANTIP wood I.did

      'I was cutting wood.'   (Popti'; Craig 1986, 268)

As Craig notes, the classifiers cannot be labelled as definite determiners, since they may cooccur with the indefinite *hune'* (59b); she concludes that the classifier functions as a marker of "thematic importance". Interestingly, non-concrete abstract nouns, as well as nouns referring to objects of classifierless substances, like plastic, do not appear with classifiers.

3.2 Modifiers and relative clauses

The class of underived adjectives in Mayan is small; Terrence Kaufman (reported in England 2004) estimates the number at around fifty in both historical and contemporary grammars, though England (2004) notes

difficulties in classifying adjectival roots, in particular, in distinguishing them from the class of positional roots (§1.1 and Henderson this volume). While the class of adjectival roots is small, there are a number of means to derive adjectival stems from other root classes or stems; see England 2004 on Mam and Martínez Cruz 2007 on Ch'ol.

In attributive function, adjectival elements generally precede the head noun. England notes that in Mam, adjectives may follow the noun when an indefinite determiner precedes the noun, though this may be interpreted as a relative clause. That adjectives in postnominal position are relative clauses is clear in Ch'ol, a language unique in having a special relative clause marker, the second position clitic =*bä* (borrowed from Zoque; Martínez Cruz 2007). This marker is obligatory on postnominal adjectives, but optional when the adjective is pronominal.

(61) a. li   chächäk(=bä) bu'ul
          DET red-REL   bean

          'the red beans'

      b. li   bu'ul chächäk=*(bä)
          DET bean red-REL

          'the beans that are red'   (Ch'ol, my notes)

Outside of Ch'ol, relative clauses in Mayan are generally restricted to postnominal position and do not have an overt marker of relativization, as shown by the examples in (62); recall that in languages with extraction restrictions, like K'iche', the AF form of the verb is required for transitive subject relatives, as in (62b). See Clemens et al. to appear for a processing study of relativization in Ch'ol and Q'anjob'al.

(62) a. X-inw-il   ri   aaq [(ri) x-uu-kam-isa-j   ri   achii].
          ASP-A1SG-see DET pig   DET ASP-A3SG-die-CAUS-DTV DET man

          'I saw the pig that the man killed.'   (K'ichee; Larsen 1988, 501)

      b. X-inw-il   ri   achii [(ri) x-kam-isa-n   ri   aaq].
          ASP-A1SG-see DET man   DET ASP-die-CAUS-AF DET pig

          'I saw the man who killed the pig.'   (K'ichee; Larsen 1988, 502)

      c. La j-nuts   te   chij [te   kol   beel=e].
          ASP A1SG-follow DET deer DET escape DIR=CL

          'I followed the deer that escaped.'   (Tseltal; Polian 2013, 783)

3.3 Possession and relational nouns

Across Mayan, possessors trigger Set A (ergative) agreement on the possessed noun. Just as subjects follow the verb, the (non-*wh*) possessor follows the possessum, as shown in (63); see §4 on word order. Possessive constructions can also be complex, as in (63b).

(63) a. **s**-p'in li Maruch-e
          A3-pot DET Maruch-CL

          'Maruch's pot'   (Tsotsil; Aissen 1996, 454)

      b. **t**-was [**t**-b'an-al   axi'n]
          A3-food A3-good-NML corn

          'his food of good corn' (lit.: 'his food of corn's goodness')   (Mam; England 1983b, 142)

Mayan languages distinguish at least two major classes of nouns with respect to possession: (i) those that can appear unpossessed without a special suffix (alienable), and (ii) those that require a special suffix in order to appear without a possessor (inalienable); see e.g. Freeze 1976 on Q'eqchi', Polian 2013 on Tseltal, Brown et al. 2006 on Kaqchikel. The latter class, shown in (64), generally corresponds to kin and body part terms and is ungrammatical in bare noun form. The Ch'ol example in (64c) illustrates that nouns appearing with this suffix may then be possessed, but retain their alienable reading.

(64) a. qa-ch'ek; ch'ek-**aj**
          A1PL-knee knee-NML

          'our knees; knee'   (Kaqchikel; Brown et al. 2006, 147)

      b. s-me';   me'-**il**
          A3-mother mother-NML

          'his mother; mother'   (Tseltal; Polian 2013, 422)

      c. i-ch'ich'; ch'ich'-**lel**; i-ch'ich'-**lel**
          A3-blood blood-NML A3-blood-NML

          'her blood (in her veins); blood; her blood (e.g. from the butcher shop)   (Ch'ol, my notes)

Possessive morphology is also found in the class of "relational nouns", used in Mayan linguistics to refer to a class of elements which serve to introduce oblique elements. Larsen (1988, 127) writes that these are "like prepositions in that they are placed before an 'object' noun phrase to indicate the case of that noun phrase, but unlike prepositions they are formally possessed nouns with the following object noun phrase being formally the possessor of the relational noun" (Larsen 1988, 127). Some relational nouns,

mostly locative ones, are themselves preceded by one of a generally small class of prepositions. Q'anjob'al relational nouns are shown in (65) (Mateo-Toledo 2008).

(65)

-in	theme, locative	*-uj*	agent, causative, benefactive
-b'a	reflexive, reciprocal	*-etoq*	comitative, instrument
-ib'an	locative, theme	*-et*	genitive, temporal
-intaj	'behind, back'	*-alan*	'under, below'
-ul	'inside'	*-sataq*	'in front of'
-sat	'on (flat surface)'	*-nan*	'in the middle of'

Examples of relational nouns in their thematic and locative functions are shown in (66). The relational noun (boldfaced) precedes the introduced nominal (underlined), which in turn triggers Set A (possessive) agreement on the relational noun. As with possessors, the noun itself may be dropped, as in (66b).

(66) a. Max k'och-lay ixim nap **y-uj**   cham winaq.
          ASP shell-PASS CLF corn A3SG-RN.by CLF   man

        'The corn was shelled by the old man.'   (Q'anjob'al; Mateo-Toledo 2008, 70)

     b. Mayal kol-waj   ok cham **j-etoq**. . .
         already help-ANTIP DIR CLF   A1PL-RN.with

        'He has already helped with us.'   (Q'anjob'al; Mateo-Toledo 2008, 153)

     c. Max j-aw   an k'um **y-alan**   te k'isis.
         ASP A1PL-plant CLF squash A3SG-under CLF cypress

        'We planted the squash under the cypress.'   (Q'anjob'al; Mateo-Toledo 2008, 60)

Despite these apparent similarities, Bennett and Henderson (2013) show that relational nouns in Uspantek (K'ichean) show a different phonological (i.e. tonal) pattern than other possessed nominals in the language. While possessed nouns, like *ixk'eq* in (67a) appear with a high tone, the high tone is not present on relational nouns bearing the same "Set A" morphology, as shown by the comitative relational noun in (67b). In fact, transitive verbs with ergative morphology also do not appear with this tone. They suggest that the high tone is specific to possessive structure, and that the structure of relational nouns must therefore be different.

(67) a. ixk'eq; w-íxk'eq
         fingernail; A1SG-fingernail

        'fingernail; my fingernail'

b. -ik'il;   w-ik'il;   *w-ík'il
   RN.with; A1SG-RN.with; A1SG-RN.with

   'with; with me'   (Uspantek; Bennett and Henderson 2013, 602–603)

4   Word order

Mayan languages are generally considered to be verb-initial, though as discussed by Brody (1984) and England (1991), defining "basic" word order is not always straightforward. Especially in Yucatec, there has been debate over whether SVO or VOS is most basic (Durbin and Ojeda 1978; Gutiérrez Bravo and Monforte 2010; Skopeteas and Verhoeven 2011), and Quizar (1994) lists SVO as basic in Ch'orti'. Because nominal arguments may be pro-dropped, and because arguments front to preverbal position for topic and focus, the most frequently used order may not line up with a "discourse neutral" order. Larsen (1988), for example, gives VOS as the most basic order in K'iche', noting that it is extremely rare in actual discourse. See Clemens 2014; Clemens and Polinsky to appear for a theoretical discussion of verb-initial word order with focus on Mayan.

4.1   Post-verbal word order

Though arguments frequently appear fronted to preverbal positions (§4.2), it is generally agreed that for most Mayan languages, nominals appear post-verbally (or post-predicate, in the case of NVPs) in declarative discourse-neutral environments (England 1991). Some languages, for example Q'anjob'al, are rather rigidly VSO (Mateo-Toledo 2008), while others, like Tsotsil (Aissen 1987) are VOS. Still others, like Tojolab'al (Brody 1984), Ch'ol (Coon 2010), and languages of the K'ichean branch (England 1991) show VOS/VSO variation.

Norman and Campbell (1978) propose that Proto-Mayan contained both VOS and VSO orders; VSO was most often used when both arguments were of equal animacy, while VOS was found when the subject outranked the object, a situation which is mirrored in some of the contemporary languages. As England (1991) notes, however, it is not only animacy that affects the ordering of post-verbal NPs, but also definiteness and complexity or "heaviness" of the NP in question.

Aissen (1992) proposes that VOS order is the result of a parameter which orders the subject and possessor specifiers (*lexical* specifiers) to the right. Analogously, possessors are base-generated in right-side

specifiers in the DP. Much following work on Mayan assumes a base-generated VOS order.

In Ch'ol, VOS order is impossible in sentences in which the object appears with a definite determiner or demonstrative (68); interestingly, the same sentence is fine if the subject is either fronted or pro-dropped, suggesting that this is not a problem with definite objects in general. Coon (2010), following Massam's (2001) proposal for the Polynesian language Niuean, argues that verb-initial order is the result of VP-fronting and that definite objects must evacuate the VP before it fronts.

(68) Tyi i-ch'il-i   (*ili) ja'as   jiñi x-k'aläl.
      ASP A3-fry-TV DET banana DET CLF-girl

      'The girl fried (*these) bananas.'   (Ch'ol; Coon 2010, 359)

Clemens (2014) suggests that prosodic conditions may account for post verbal ordering or arguments (see Bennett this volume); her argument focuses on Niuean, with discussion of extensions to Mayan.

England (1991) discusses restrictions on definite objects with indefinite subjects in VOS in some K'ichean languages (K'iche', Kaqchikel); in others (Poqomam, Q'eqchi'), there appears to be a more general restriction against this combination of arguments, regardless of word order. England points to discourse motivations for this restriction (see DuBois 1987), suggesting, citing Larsen 1988, that VOS is basic and that VSO with "heavy", animate, or definite objects may be the result of an object postposing rule.

4.2   Pre-verbal word order

In addition to possible variation in the order of postverbal nominals, one or both arguments may appear in preverbal topic and focus positions. Aissen (1992) analyzes topic and focus in Tsotsil, Popti', and Tz'utujil, identifying three positions at the left edge: focus, internal topic, and external topic. Aissen locates focussed elements in the specifier of IP and proposes that these move there from their base thematic positions. Focussed elements, as in (69), do not appear with determiners; semantically, they involve a presupposition (here, that the man was planting something), and an assertion (here, that corn was planted).

(69)   a. 'I'm planting. I'm planting stones, I'm planting trees,'

        b. Pero **chobtik** tztz'un   un.
            but   corn   he.plants CL

            'But it was corn he was planting.'   (Tsotsil; Aissen 1992, 49)

Topics, on the other hand, do not "lend themselves to a logical characterization", and Aissen discusses differences between the topics of Tsotsil and Popti', on the one hand, and Tz'utujil on the other (see also Bielig 2015 for high topics in Chuj). In Tz'utujil, topics appear to be part of the same intonational phrase as the verb phrase, and Aissen proposes that these are located in the specifier of CP and arrive there by movement. In Tsotsil and Popti', however, topics are in a separate intonational phrase and Aissen provides evidence that these "external topics" are base generated high in the structure, adjoined to CP. See also Can Pixabaj (2004) on topics in K'iche'.

Interrogative words must front to preverbal position across Mayan (see e.g. (54) above), taken to be Spec,CP (Aissen 1992, 1996); *in situ* wh-phrases are impossible and multiple wh-questions are either highly marginal or ungrammatical (Aissen 1996). Interrogative possessors must also appear *preceding* the possessed noun, as shown in (70a). In at least Tsotsil (Aissen 1996) and Ch'ol (Coon 2009), possessors may subextract out of NPs in internal argument position, as shown by the Tsotsil forms in (70). In (70b) the wh-possessor has extracted from the unaccusative subject, which remains post-verbal.

(70)   a. [**K'uxi** s-tojol   ]$_i$ ch-toy   ___$_i$?
              what A3-price   ASP-rise

           'The price of what is rising?

    b. **K'usi**$_i$ ch-toy   [s-tojol   ___$_i$]?
       what ASP-rise A3-price

       'The price of what is rising?'   (Tsotsil; Aissen 1996, 456–457)

Subextraction may not take place from transitive or unergative subjects, as shown by the ungrammaticality of (71b). See Henderson (this volume) for more on interrogatives.

(71)   a.   [**Buch'u** x-ch'amal]$_i$ y-elk'an chij?
             who   A3-child   A3-steal sheep

         'Whose child stole sheep?'

    b. * **Buch'u**$_i$ y-elk'an chij   [x-ch'amal ___$_i$]?
         who   A3-steal sheep   A3-child

        intended: 'Whose child stole sheep?'   (Tsotsil; Aissen 1996, 460)

5   Nominal licensing and embedding

As discussed in §2, Mayan languages follow a general ergative-absolutive pattern of head-marking grammatical relations on the predicate. This section briefly covers nominal licensing (i.e. abstract Case), as well different types of embedded constructions.

5.1   Licensing

Transitive subjects have been proposed to stay low in Tsotsil (Aissen 1992) and Ch'ol (Coon 2010); to my knowledge, evidence for subjects consistently raising to a higher clausal position has not been found in Mayan languages. This is consistent with proposals that ergative Case is assigned low in the structure, for example by transitive v^0 or Voice^0 (Woolford 1997). Aissen (2010) and Coon (to appear) propose that ergative agreement markers are the result of a low agreement relationship between v^0 and the ergative subject. Imanishi (2014) argues that ergative is a default case in Kaqchikel, assigned to the highest unlicensed nominal in a phase.

Coon et al. (2014) propose, following work by Legate (2008), that "absolutive"—while a useful descriptive term for the common patterning of transitive objects and intransitive subjects—is not a unified theoretical category. They argue that in some Mayan languages (e.g. Q'anjob'al), absolutive arguments are consistently licensed by the head of the finite clause, Infl^0, on par with nominative in nominative-accusative languages (Legate's "ABS=NOM"). In other Mayan languages (e.g. Ch'ol), transitive objects are licensed by transitive v^0 (accusative), while intransitive subjects are licensed by Infl^0 (nominative); the two receive the same phonological spell-out (Legate's "ABS=DEF"). Evidence for this division is found in the behavior of the non-finite embedded clauses discussed below, as well as extraction restrictions (§2.3). Coon et al. (2014) propose that the division between ABS=NOM and ABS=DEF licensing patterns corresponds to the distinction between languages in which absolutive is expressed high, preceding the verb stem, and those in which it is expressed low; see §1 above.

5.2   Embedding

Work on embedding in Mayan languages typically distinguishes between fully finite embedded clauses, such as those shown in (72), and one or more types of non-finite embedded clauses.

(72) a. Na-x-naw   [naq   ink'a x-in-war   ].
ASP-A3SG-know   COMP NEG ASP-B1SG-sleep

'He knows that I have not slept.'   (Q'eqchi'; Kockelman 2003, 28)

b. Chi w-oche-j   [tol   ch-ach   way-i   ].
ASP A1SG-want-DTV   COMP ASP-B2SG sleep-ITV

'I want you to sleep.'   (Q'anjob'al; Mateo-Toledo 2003, 10)

For example, Kockelman (2003) divides Q'eqchi' non-finite clauses into "non-finite" and "nominalized"; Vázquez Álvarez (2013) describes "less finite" and "nonfinite" embedded clauses in Ch'ol; Mateo Toledo (2011) distinguishes "non-finite" and "infinitive" forms in Q'anjob'al; and England (2013) describes "infinitives" and "aspectless clauses" in Mam.

In general, the division among different kinds of not-completely-finite embedded clauses seems to be a recognition of the fact that while all of these clauses lack TAM marking, differences exist in whether and how much person marking appears. In general, these differences correlate with transitivity. Embedded intransitives frequently appear with no person marking (when there is person marking in the matrix clause, but see §2.1 above on personless aspectual predicates), as in the forms in (73). In many Mayan languages, non-finite embedded intransitives appear with nominal suffix, like *-el* in (73b), and have been argued to be nominal or nominalizations (e.g. Larsen and Norman 1979; and Bricker 1981 on Yucatec, Mateo Pedro 2009 on Q'anjob'al; Coon 2010 on Ch'ol).

(73) a. N-inw-aj   [xik sa' li   k'ayil].
ASP-A1SG-want   go into DET market

'I want to go to the market.'   (Q'eqchi'; Kockelman 2003, 30)

b. K-om   [wäy-el   ].
A1-want   sleep-NML

'I want to sleep.'   (Ch'ol, my notes)

In the embedded transitives in (74)—Kockelman's "nominalized" clauses and Vázquez Álvarez' "less finite" clauses—the embedded clause may not appear with higher clausal material such as negation, complementizers, or TAM marking (cf. (72)). Both embedded clauses appear with ergative/possessive person marking, though an important difference arises: in Q'eqchi', the embedded person prefix co-indexes the notional *patient* (the pineapple), while in Ch'ol the person prefix co-indexes the notional *agent*. Kockelman, following other work on Mayan languages, proposes that the embedded clause is nominalized

and that the pineapple is the grammatical possessor of the nominalized verb (literally, 'I want the pineapple's buying'). Coon (2010) similarly argues that the Ch'ol embedded clause is nominalized—despite the absence of overt nominalizing morphology—but here the possessor is the agent (literally, 'I want my buying the pineapple'). See also Coon and Carolan 2015.

(74) a. T-inw-aj   [**x**-loq'-bal   li   ch'op   ].
        ASP-A1SG-want   A3SG-buy-NML DET pineapple

       'I want to buy the pineapple.'   (Q'eqchi'; Kockelman 2003, 32)

    b. K-om   [**k**-mäñ jiñi pajch'   ].
       A1-want   A1-buy DET pineapple

       'I want to buy the pineapple.'   (Ch'ol, my notes)

Kaqchikel patterns similarly to its K'ichean cousin Q'eqchi', and Imanishi (2014) argues that the difference between the K'ichean-style embedded clause and the Ch'ol-style embedded clause boils down to differences in the availability of abstract Case assignment. Following the proposal in Coon et al. 2014, Imanishi proposes that in K'ichean, all absolutive nominals are licensed by finite Infl^0 (Legate's (2008) "ABS=NOM"), and thus consistently absent from nonfinite embedded contexts. In order to be embedded, a transitive must first detransitivize, either via passive or antipassive morphology (see also England 2013 on Mam). In Ch'ol, intransitive subjects are licensed by finite Infl^0, but transitive objects are licensed by transitive v^0 or Voice^0 (Legate's "ABS=DEF") and thus expected to be possible in nonfinite environments. Imanishi argues that the equivalent of the Q'eqchi' form in (74a) is a passive; ergative marking in embedded contexts can thus be constantly described as cross-referencing the subject. While Imanishi takes the embedding facts as evidence that ergative case is a syntactic "default", assigned at the phase boundary when no other licensing mechanism is available, Coon (to appear) argues that the ergative markers in forms like (74) are grammatical possessors, controlling null pronouns inside the nominalized predicate.

For more on complex predicate constructions—such as directionals and auxiliaries, as well as secondary predication—see England 1976; Haviland 1993; Aissen 1994; Mateo-Toledo 2008; Mateo Toledo 2012, the collections of Aissen and Zavala 2010 and Palancar and Zavala 2013, as well as Henderson this volume.

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Mayan Semantics[*]

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1   Overview

This article has two interlocked goals. The first is to highlight the strands of research that have played an important role in shaping our understanding of Mayan language semantics. The second is to acquaint non-Mayanists, and especially semanticists, with empirical phenomena that might prove especially interesting on typological or theoretical grounds. Given its particular dual mandate, this article cannot be an exhaustive survey of Mayan semantics, but it should instead be seen as introduction to those aspects of Mayan languages that have had an impact on the wider field of semantics, and that are current research hotspots. That said, I do want to acquaint the reader with a broad range of phenomena, and so the paper is organized like a grammar would be, first considering lexical categories, then phrase- and clause-level phenomena, and finally issues of discourse and information structure. In particular, section 2 considers the semantics of major lexical categories. Section 3 looks at three aspects of verbal semantics that have been subject to sustained research, namely space, time, and modality. Section 4 reviews work on clause typing, including polarity and questions. Section 5 discusses topic, focus, and those aspects of obviation in Mayan that concern information structure and reference-tracking. Finally, section 6 provides a brief conclusion.

2   Lexical Semantics

2.1   Verbs

In virtue of containing more than 30,000 lexical stems, Laughlin's (1975) *The Great Tsotsil Dictionary of San Lorenzo Zinacantán* has permitted the most detailed work on the morphological and lexical-semantic distribution of verb roots in Mayan. What is most striking is how small the relevant categories are. Out of 2,715 roots, Haviland 1994a finds only 45 unambiguously intransitive roots and 157 unambiguously transitive roots. In addition to these, there are another 380 roots whose derivational possibilities prevent a clear classification. Almost all of these are roots that cross-classify as transitive verbs and positionals.[1] In addition, there are two smaller classes of roots (about

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[1]Positionals are a morphologically distinguished root class distinguishable from the roots for stems of more familiar categories like noun or verb. Very broadly, positionals lexicalize interval states (sitting, standing, lying down, etc.) as well as gradable properties (broken, fat, flexible, etc.). Section 2.3 takes up the question of positionals in detail.

30 each). The first accept both intransitive and positional derivations, while the second accept transitive, intransitive, and positional derivations. The take-away is that your average Mayan verb root is polycategorical, but at least shares the formal properties of an ambiguously transitive verb root. At the other end of the spectrum, we find that intransitive verb roots are comparatively rare.

While no Mayan language verbal lexicon has received a comprehensive lexical semantic classification in the style of Levin 1993, Haviland 1994a does further categorize these roots into semantic classes, as illustrated in the following tables.

<div align="center">UNAMBIGUOUSLY INTRANSITIVE ROOTS</div>

BIOLOGICAL	sweat, awaken, grow, die
PHYSICAL EVENTS AND STATES	catch fire, split, open, close, escape, fill, dry out, ooze, melt
BEGINNING AND ENDING	start, finish, finish (something disagreeable)
MANNER OF MOTION	jump, fly, fall, come, go, ascend, descend

<div align="center">UNAMBIGUOUSLY TRANSITIVE ROOTS</div>

BIOLOGICAL	cry, drink, stutter, swallow, smoke, gag, revive, eat
MENTAL	count, believe, teach, want, know, remember
PERCEPTION	hear, see, look
SPEECH	ask, say, answer, tell, summon
HUMAN ACTIVITIES	sow, weave, set up weaving, harvest
HITTING	strike, bash, punch butt
HOLDING	grab, carry, lift, hold, press, punch, touch
SEPARATION	grind, hew, split, rip, crack
OPENING AND CLOSING	open, close, cover, wrap, hide, husk
INSERTING AND EXTRACTING	stab, poke, pull out, prick, dig out, uproot
TRANSITIVE MOTION	bounce (baby), turn, whirl, chase, shoo
WASHING	wash, wipe, rinse (interior), rinse (exterior), anoint
SURFACE EFFECT	smooth, scratch, scrap, sweep

While these notional categories illustrate some of the variation and unity of the Tsotsil lexicon, motivating such classes on event-structural and argument-structural grounds awaits further research.

Even though there are many open questions about the fine-grained structure of the verbal lexicon, some aspects of verbal lexical semantics have received considerable attention. Classificatory verbs are one example. Mayan languages do not have the kind of pervasive suppletive classificatory verb systems familiar from Athabaskan languages---that is, where a large number of verbs paradigmatically vary according to the same set of object categories (Aikhenvald 2000). It is very common, though, for Mayan languages to lexicalize the same verbal concept a large number of times depending on fine-grained properties of an argument's spatial or physical properties. An example of this is Berlin's (1967) classic study of Tseltal verbs of eating. Tseltal has seven transitive verb roots that mean `to eat', which suppletively alternate depending on the physical properties of the object.

tun	eating in general
ch'up	chewy object with pulp expectorated
ti'	meat
lo'	mushy or gelatin-like objects
k'ux	individuated hardish objects
we'	bread-stuffs
buch'	foods that dissolve in mouth with little mastication

We find similar phenomena across the family with verbs of handling, as well as verbs with affected patients, like verbs of cutting and breaking (Haviland 1994b; Furbee-Losee 1976: 238-242; Pye 1996). For instance, in his study on K'iche' verbs of cutting and breaking, Pye 1996 reports the following seven transitive verb roots meaning `to pick', which differ in terms of the physical properties of the plant picked.

ch'up	something large
b'oq	whole (including roots)
jach'	corn
mak	small beans
q'ol	leaves (broad)
xul	with stem

One promising area for future research would be to determine exactly how far away Mayan languages are from having a paradigmatic verbal classifier system. Careful quantitative work on the lexicon might find more regularities than currently acknowledged.

Aktionsart, or lexical aspect, is another fundamental part of verbal lexical semantics. While lexical aspect has not been thoroughly investigated for many Mayan languages, there are good studies from isolated languages. Intriguingly, there appear to be significant differences between languages. I will focus on the coding of telicity, which has been best studied. Hendrick Krueger 1986: 181-200 translates the classic tests from Dowty 1979 / Vendler 1967 into Kaqchikel and runs them against a number of Kaqchikel verbs. She finds that the sentence-frame tests are generally applicable and are able to sort Kaqchikel verbs into achievements, accomplishments, activities, and statives. For instance, Kaqchikel has two types of temporal adverbials, the first built on Kaqchikel's only preposition *pa*, and the second built on the relational noun *--ichin*, which canonically marks benefactive arguments.[2] Hendrick Krueger 1986 shows that these adverbials approximate in-adverbials and for-adverbials respectively and allow one to probe verbs for telicity.

(1) *Ri achin x-u-xajon   (r-ichin)   /#pa ka'i' ora.*
     the man COMPL-A3SG-dance (A3SG-RN) / in two hour

     `The man danced for / # in two hours.'

(2) *X-apon   #r-ichin   / pa ka'i' ora.*
     COMPL-arrive A3SG-RN / in two hour

     `He arrived # for / in two hours.'

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[2]Note that the relational noun *--ichin* is actually optional in the for-adverbial construction.

While Kaqchikel supports classic aspectual tests, other Mayan languages do not morphologically code the relevant distinction adverbially or on aspectual verbs, and so tests based on syntactic frames do not work. For instance, Bohnemeyer 2001 shows that Yucatec does not make a distinction between durational adverbials describing culminating and non-culminating events. Consider the following pair, which both employ the preposition *ichil ti'*, even though the former contains a predicate that intuitively describes an activity, while the latter contains a predicate that intuitively describes a discrete change of state.

(3) *Maria=e' t-u=pax-ah   piyàano ich-il ti'   ka'-p'èel òora.*
     Maria=TOP PFV-A3SG=play-COMPL(B3SG) piano in-RN PREP two-CLF hour
     `Maria, she played the piano for two hours.'

(4) *T-u=xot-ah=xan   hun-kùul che' Pedro ichi-il ti'   ka'=p'èel òora.*
     PFV-A3SG=cut-COMPL(B3SG)=also one-CLF tree Pedro in-RN PREP two-CLF hour
     `Pedro also cut a tree in two hours.'

Similarly, Yucatec verbs can be freely embedded in frames like `spend X time' and `take X time' whether or not they intuitively denote inherently bounded events. While aspectual properties like telicity cannot be diagnosed in Yucatec via co-occurrence restrictions, unlike in Kaqchikel, there are other tests based on semantic entailments that support the existence of lexically-encoded telicity in Yucatec. For instance, the following frame tests whether an aborted event is realized.

(5) *Pedro=e'   ts'-u=chúun-ul   u=VERB,   káa=h=t'a'n-ih,   káa*
     Pedro=TOP TERM=A3SG=start.ACAUS-INC A3SG=VERB káa=PFV=call.PASS-B3SG káa
     t-u=p'at-ah.   Ts'-u=VERB   Pedro?
     PFV-A3SG=leave-COMPL(B3SG) TERM-A3SG=VERB Pedro
     `Pedro, he had started to VERB, (when/and then) he was called (and) quit. Had Pedro VERB-ed?'

As predicted, the entailment generally goes through for atelic, but not telic verbs. Interestingly, while lexically encoded telicity can be identified through tests like (5), Bohnemeyer finds variability across his telicity tests by lexical item. In particular, cognate object intransitives like *nàay* `dream' or *k'áay* `sing' behave like activities on some tests, but pattern as telic on the test in (5). Further research is clearly needed on these lexical-semantic categories in Mayan. What we can conclude from the existing work is that categories like telicity are clearly relevant at the level of the root in Mayan, but how these aspectual categories are formally coded varies across the family. In Kaqchikel, temporal adverbials and aspectual predicates like *start* and *finish* make direct reference to telicity in ways that they do not in Yucatec.

Another phenomenon that is closely related to lexical aspect, and pervasively marked throughout the Mayan family is pluractionality. First discussed in the context of Chadic languages (Newman 1980, 1990), pluractionality is now recognized as a widespread phenomenon, though one that occurs especially frequently in the languages of the Americas (e.g., Mithun 1988; Wood 2007). Canonically, pluractional morphology derives verbs that make reference to plural events. While the character of these event pluralities is known to vary depending on the particular pluractional construction, pluractional events tend to vary crosslinguistically along the same set of parameters (Wood 2007;

Lasersohn 1995). We see a similar range of variation across the pluractional markers in the Mayan family. For instance, languages often have a series of pluractional markers that exhibit fine-grained control over the amount of downtime between the repetitions that compose an appropriate plural event. In his work on Tseltal expressive predicates, Pérez González 2012 describes a series of affixes that derive verbs which must describe multi-event scenarios. Crucially, they differ in how they structure those repetitions. Consider the three-way opposition between *-C$_1$on*, *-Vnaj*, and *-lajan* described below.

> *-C$_1$on*   `multiple repetitions with intermediate pauses'
> *-Vnaj*   `multiple (fast) periodic repetitions'
> *-lajan*   `multiple chaotic repetitions'

The difference between these suffixes can be described in terms of downtime between the events that compose the plural event. For instance, *-Vnaj* requires periodic downtime that is not too long, *-C$_1$on* requires pauses that are unstructured, though potentially longer than in the case of the other two suffixes, and *-lajan* requires unstructured downtime where the events do not repeat at an even interval.

The second parameter along which pluractionals vary is whether they derive predicates of events that are construed as a single event, or whether each of the events that belong to that plurality is independent. In the literature, this is called the event-internal / event-external contrast. Henderson 2012 builds an extended argument that this contrast exists in the Kaqchikel pluractional system, but it is clearly detectable in other languages. For instance, in his discussion of expressive affixes, Pérez González 2012 discusses what he calls the subevent property, which clearly maps to event-internality. For instance, the following example has a verb derived by *-Vnaj* from a positional meaning to be elevated. Since *-Vnaj* requires a plurality of events with minimal downtime between them, the result is a predicate that means something like to wobble.

(6) *X-pich-unaj*   *y-it.*
    ASP-elevated-PLRC A3SG-butt.
    `He's wobbling his butt.'   Pérez González 2012: ex. 4a

The point here is that lifting your butt once, or even repeatedly, has a different quality than wobbling your butt. The latter results when the events are repeated rapidly, and then construed as constituting a single atomic event.

A final parameter on which pluractionals differ is whether they can by satisfied by participant plurality. That is, only if a plurality of participants each engages in just one event of the relevant sort, does this plurality of event count as a pluractional event. Pérez González 2012 discusses a pluractional with this property, namely *-lajan*, which has already been discussed. With respect to example (7), Pérez González 2012: p. 220 says that it does not describe a situation where one frog gets to its feet many times, but is true in a situation where a plurality of frogs each starts to come to its feet.

(7) *X-tejk'-lajan*   *jajchel ts'iin te   pokok=e.*
    ASP-de.pie-PLRC DIR   then DET frog=ENCL
    `and then the frogs start to come to their feet.'   Pérez González 2012: ex. 12

Another example of this type of pluractionality is discussed in detail for Kaqchikel by Henderson (2014) under the heading of distributive pluractionality. For instance, (8) can be true in a scenario where the kids receive a group hug. In contrast, with the pluractional suffix *-la'*, example (9) most naturally describes a situation where each kid is hugged once. The sum of these individual hugging events is what satisfies the pluractional.

(8) *X-e'-in-q'etej*   *ri* *ak'wal-a'.*
     ASP-B3PL-A1SG-hug the child-PL
     `I hugged the children.'

(9) *X-e'-in-q'ete-la'*   *ri* *ak'wal-a'.*
     ASP-B3PL-A1SG-hug-PLRC the child-PL
     `I hugged the children individually.'   Henderson 2014: ex. 85

It is clear that within the Mayan family we find the full range of pluractionality attested in the typological literature. The Mayan languages are thus the perfect laboratory for exploring the connections between categories like pluractionality on hand, and other categories like aspect and plurality in the nominal domain. In relation to this latter point, one of the interesting facts about plural morphology in Mayan is that it often has a cross-categorial distribution. That is, the same morphology that derives plural nominals can also affix to verbs indicating a plural argument (see section 2.2 for examples). The connection between plural marking of this sort and participant-based pluractionality, both historically and in synchronic grammars, is ripe for further exploration.

A final aspect of Mayan verbal lexical semantics I want to consider concerns the lexicalization of path information, that is, the lexicalization of the (relative) motion of a participant in the event denoted by the verb. Languages can be classified typologically into those that are verb-framing and those that are satellite-framing (Talmy 1985, 2000). Verb-framing languages lexicalize path information on the verb, while satellite-framing languages lexicalize it elsewhere, most notably on prepositions. Mayan languages stand out on this continuum in virtue of being `radically verb-framing' (Bohnemeyer et al. 2007, 2008). They completely avoid lexicalizing path information outside of verb roots. Consider the following minimal pairs presented by Bohnemeyer et al. (2008: ex. 7-8) comparing Yucatec and the canonical verb-framing language Spanish. Notice how the noun *the box* is marked as it appears in different spatial roles, where the LOCATIVE role indicates the ground, the SOURCE role indicates the beginning of a path, and the GOAL indicates the end of a path.

(10) a. *El carro estaba en la caja.*
          `The car was in the box.'   LOCATIVE
      b. *El carro entró en la caja.*
          `The car went into the box.'   SOURCE
      c. *El carro salió de la caja.*
          `The car went out of the box.'   GOAL

(11) a. *Le=kàaro=o'*   *ti'=yàan*   *ti'*   *le=káaha=o'.*
          DET=cart=DEIC PREP-exist(B3SG) PREP DET=box=DEIC

          `The cart, it is [lit. in] the box.'   LOCATIVE

      b. *Le=kàaro=o'*   *h-òok*   *ti'*   *le=káaha=o'.*
          DET=cart=DEIC PFV-enter(B3SG) PREP DET=box=DEIC

          `The cart, it entered [lit. in] the box.'   SOURCE

      c. *Le=kàaro=o'*   *h-hòok*   *ti'*   *le=káaha=o'.*
          DET=cart=DEIC PFV-exit(B3SG) PREP DET=box=DEIC

          `The cart, it exited [lit. in] the box.'   GOAL

Example (10) shows that Spanish marks the path relative to the ground NP *caja* `box' with a combination of verb and prepositional phrase. It is clearly more verb-framing than English, which is shown in the glosses to be able to code all of this information on prepositions. In contrast, Yucatec uses the same preposition across these three constructions in (11). The path information relative to the ground is necessarily lexicalized on the verb. This is true across the family, where most languages have only one or at most two prepositions.

A consequence of having no prepositions that encode path, almost all Mayan languages have verbal clitics, called directionals, that enrich verbs with path information.[3] For instance, the verb *-torij* `throw' in Kaqchikel conveys no information about the path of the projectile. Furthermore, because Kaqchikel has only one locative preposition *pa* `in', the directionals in examples (12-13) are what determine whether the projectile should land inside or outside the building.

(12) *T-a-torij*   *el*   *pa*   *jay.*
      IMP-A2SG-throw DIR PREP building

      `Throw it out [lit. in] the building!'

(13) *T-a-torij*   *ok*   *pa*   *jay.*
      IMP-A2SG-throw DIR PREP building

      `Throw it in [lit. in] the building!'   (fieldnotes)

Directional systems in Mayan typically include expressions for movement relative to the deictic center (*go*, *come*), movement relative to an enclosure (*enter*, *exit*), and vertical movement (*ascend*, *descend*), as well as a directional for movement across (or through) a point and a directional for remaining at a point. That said, the systems can become even more complex. For instance, England 1983 gives the following 12 simple directionals for Mam.

xi	`away from'	*tzaj*	`toward'
ul	`there to here'	*pon*	`here to there'
kub'	`down'	*jaw*	`up'
el	`out'	*ok*	`in'
kyaj	`remaining'	*aj*	`returning from here'
iky'	`passing'	*b'aj*	`complete'

[3]It is reported by Osorio May 2005: 32 that Chontal does not have directionals, nor do the Yucatecan and Wastekan languages (Zavala 1993: 48).

In addition, whereas some Mayan languages allow only one directional per verb (as in Kaqchikel above), Mam allows a large number of complex directionals like *ajk* `returning down' (from *aj kub'*) and *jax* `up away' (from *jaw xi*). While not all combinations are attested, the complex directionals contribute 16 more to the Mamean inventory. The Mam system is large and compositional, but an upper-bound for complex directionals is provided by Tsotsil, which allows up to 4 per verb. Haviland 1993 further reports that there is preferred ordering among the Tsotsil directionals when they co-occur based on semantic considerations. In particular, those that convey movement across a boundary precede those that convey vertical movement which precede the deictic movement directionals. The directionals that can have aspectual meanings like *likel* `arise / start' come last.

   While it is not clear from the glosses, across the family, the directional particles are indistinguishable from root intransitive verbs. For example, the Kaqchikel directional *ok* in (13) is of the same form as an intransitive verb root meaning `to enter'. In this way, the directional construction looks like a serial verb construction, where the object of the transitive verb *torij* 'throw' is simultaneously the thematic argument of the intransitive verb *ok* `enter'. This is precisely how Mateo Toledo 2008 analyses directionals in Q'anjob'al.

   Q'anjob'al is an especially interesting case because the language has extensively elaborated on this general form observed in the directional construction---a monoclausal construction with multiple verbs roots sharing arguments.[4] Mateo Toledo 2008 describes a resultative construction illustrated in (14), which is also attested in Akatek (Zavala 1992; Francisco Pascual 2008), Popti' (Ramírez Pérez et al. 1996), and Chuj (Hopkins 1967: 111) . Note that the object of the transitive verb *hoq* `hit' is simultaneously the single thematic argument of the intransitive verb *poj* `break'.

(14)   …*tol hoq ma' poj   naq jun   iglesya.*
       that POT hit break CLF INDF church

       `…that he will break the church by hitting it.'   Mateo Toledo 2008: ex. 3

In addition to the resultative, there is also a complex predicate causative construction, illustrated in (15), which has an analog in a larger number of languages, including Popti' (Craig 1977: ch5), Chuj (Hopkins 1967: 111), Tsotsil (Aissen 1987: ch11), Akatek (Zavala 1992: ch5), and Tseltal (Polian 2013: 448-451). While best translated with the verb `feed' in English, the Q'anjob'al verb phrase could be more literally translated as `make the cat eat'. Once again, the causee---*no mis* `the cat'--- is simultaneously the transitive object of the causative verb *a'* `give' and the thematic argument of the intransitive verb *lo* `eat'.

(15)   *Y-uj   k'al   k'am ch-y-a'   lo-w   naq no mis ix ix   tu'….*
       A3SG-by always NEG INC-A3SG-give eat-ANTIP CLF CLF cat CLF woman DEM

       `Only because he does not feed that woman's cat…'   Mateo Toledo 2008: ex. 10

While these constructions are surface similar, Mateo Toledo 2008 shows that they have radically different event structures. The resultative describes a single event, while the causative requires two sequentially ordered events. Finally, both constructions can be distinguished from directionals, some of which have the ability to induce argument-structure alternations (in addition to affecting

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   [4]Complex predicate constructions beyond the directional type are apparently restricted to a subset of the Western-branch languages, and centered on the Q'anjob'alan subgroup.

event-structure). Consider the contrast in (16). With the directional *ok*, the verb *chuk* `stick' takes a GOAL object, otherwise it takes a THEME object.

(16) a. *Ch'-ul   s-chuk   w-ichin   ti   y-etoq   s-q'oqoch.*
          INC-come A3SG-stick A1SG-back DEM A3SG-with A3SG-walking.stick
          `He comes to stick my back with his walking stick.'

      b. *At   y-in   w-ichin   ti   at   ch'ul   chuk-ok q'oqoch   tu.*
          there A3SG-at A1SG-back DEM there INC-come stick-DIR walking.stick DEM
          `It is on my back that he comes to stick with his walking stick.'Mateo Toledo 2008: ex. 87

The picture we come to is that Mayan languages tend to use sequences of verbs to build complex events, change argument structure, and code aspectual / spatial information where other languages would use prepositional or biclausal constructions.

2.2   Nouns

Section 2.1 discusses suppletive verbal classifiers in Mayan, which is only quasi-systematic. The story is completely different in the nominal domain. The majority of Mayan languages have fully grammaticalized systems of nominal classification, and often multiple such systems that only partially overlap. We will not be considering the K'ichean languages, as they have no, or only minimal grammaticalized systems of nominal classification.[5]

Numeral classifiers are the family's most widespread form of nominal classification. The classic study is Berlin 1968, which finds over 400 morphemes like those below in Tseltal.

kuh	thick-bodied, non-pointed head
kul	thick-bodied, pointed head
tel	thin-bodied, non-pointed head
t'el	wedge-like, symmetrical ends
hen	large sphere, flattened bottom
pis	ball

Whenever a noun is quantified, one of these 400 classifiers must suffix the numeral, as with *pis* `ball' in (17) where *manko* `mango' is quantified by the numeral *ox* `three'. Without such a suffix, the expression is ungrammatical.

(17) *Te   kerem-e' ox-pis-bal   manko lah s-lo'?*
      DET boy-CLF three-CLF-Q mango PFV A3SG-eat
      `The boy, was it three mangos that he ate?'   Shklovsky 2012: ex 119

In this way, Tseltal, as well as other languages from the Ch'olan, Yucatecan, and Q'anjob'alan branches are similar to classic numeral classifier languages like Mandarin. Mayan languages have recently become important for theoretical debates about the semantics of numeral classifiers first raised for East Asian languages. In particular, Ch'ol, like Tseltal has obligatory numeral classifiers, but they

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[5]See, for instance, the discussion below on plural marking in K'ichean languages, which acts as a kind of nominal classification, even if not as elaborate as plural classifiers in the Q'anjob'alan languages.

are only obligatory for the numerals of Mayan origin. Numerals that were historically borrowed from Spanish ban classifiers. Crucially, the historical origin of the noun does not matter, as shown in (18).

(18) a. *Tyi k-mäñä ux-p'ej mansana.*
         ASP A1SG-buy three-CLF mansana

         `I bought three apples.'

    b. *Tyi k-mäñä nuebe mansana.*
        ASP A1SG-buy nine mansana

        `I bought nine apples.'   Bale et al. 2014

Bale et al. 2014 uses this kind of data from Ch'ol to argue that numeral classifier languages have numerals with special properties (Krifka 1998), not noun roots with special properties (Chierchia 1998).

While numeral classifiers are the most widespread classificatory device found across the family, the Q'anjob'alan and Mamean languages spoken around the Guatemalan state of Huehuetenango (Q'anjob'al, Akatek, Popti', Chuj, Mam, and Ixil) have innovated nominal classifiers. Akatek, for instance, has 14 such classifiers (Zavala 2000).

naj	man	*ts'an*	thread
'ix'	woman	*tx'otx'*	soil, dirt
k'o	honorific	*a'*	water
yab'	familiar	*ka'*	fire
te'	tree	*'atz'an*	salt
ch'en	rock	*an*	vegetable
('i)xim	corn		

These classifiers either occur unstressed inside a noun phrase or stressed as an independent pro-form, a contrast shown in (19).

(19) a. *tatol   chinchax an   yuu naj smam konob'.*
         because.if find   B1SG by CLF king

         `...because if I am found by the king.'

    b. *chinsma' kam naj an*
        he.kill.me   CLF B1SG

        `He is going to kill me.'   Zavala 2000: ex. 37

Importantly, the use of nominal classifiers is never morphosyntactically conditioned in Akatek or other Q'anjob'alan languages (see Craig 1986 for Popti' or Mateo Pedro 2004 for Q'anjob'al). That is, Akatek would allow for a null pronoun in (19b) or a plain definite NP in (19a). Instead, the use of classifiers is controlled by discourse factors that, while not having been completely investigated, are related to notions of definiteness and topichood. We see something similar for the Mamean languages with nominal classifiers. In Mam, classifiers are not NP-internal, but instead optionally suffix verbs, non-verbal predicates, and relational nouns with third person pro-drop arguments

(England 1983: p. 158). Thus, nominal classifiers in Mam are already restricted to contexts with discourse-old referents.

A final interesting property of these nominal classifiers is that because their distribution is not strictly morphosyntactically governed, their use is open to the affect of other pragmatic and discourse factors. Mateo Pedro 2004 describes a striking case of this in the Q'anjob'al of Santa Eulalia. In this dialect, the classifier *ix*, which is usually used with NPs that have human female referents, can replace the classifier *naq*, which is usually used for NPs with human male referents. As he describes, this only happens for jocular speech when all of the interlocutors are male. In this way, a classifier that is generally used to indicate definiteness has been extended, not to reflect properties of the nominal referents in question, but to reflect social relations between interlocutors.

The final type of widespread classificatory system we find in Mayan is closely related to another aspect of nominal semantics, namely plurality. For this reason, I will consider them both simultaneously. Intuitively, plurality is conceptually posterior to some notion of individuation. Any noun phrase that makes reference to more than one of the individuals given under the particular notion of individuation should be marked plural. Of course, the facts on the ground are much richer, and Mayan languages, taken as a whole, exemplify this richness. First, it is well known that the typological distribution of plural marking is conditioned by animacy (Smith Stark 1974). We see this tendency across the Mayan family. For instance, in the K'ichean-branch languages only a small number of nouns are obligatorily marked for plurality. These nouns uniformly denote humans or culturally important animals. For instance, consider the following examples from Tz'utujil (Dayley 1981: p. 198).

winaq ∼ *winaqii'*	person ∼ people
xten ∼ *xtenii'*	girl ∼ girls
ch'uuch' ∼ *ch'uuch'aa'*	baby ∼ babies
k'ooy ∼ *k'ooyaa'*	monkey ∼ monkeys
mama' ∼ *mama'ii'*	rooster ∼ roosters

This kind of restriction of plural marking to sentient animates has been further elaborated in the Q'anjob'alan languages and now forms a simple classificatory system. Craig 1986 describes a system in Popti' with a plural marker for humans (*heb'*) and plural marker for animals (*hej*), which contrasts with a zero plural marker for inanimates. In this way, the plural markers partially track the nominal and numeral classifiers, which we discussed previously. We can see all three occurring in the following examples.

(20) a. *ka-waŋ*   *heb'*   *naj*   *winaj*
         two-NUM.HUMAN   PL.HUMAN   CLF.HUMAN   man
         `the two men'

     b. *ka-k'oŋ*   *hej*   *no'*   *noq'*
         two-NUM.ANIMAL   PL.ANIMAL   CLF.ANIMAL   animal
         `the two animals'

     c. *ka-b'*   *Ø*   *te'*   *ŋah*
         two-NUM.INANIMATE   PL.INANIMATE   CLF.PLANT   house
         `the two houses'   Craig 1986: ex. 2

While plural marking has partially unified with nominal classification in the Q'anjob'alan languages, this has not happened in the Yucatecan and Ch'olan languages, even though they have numeral classifiers. Instead, these languages often have multiple, cross-categorial plural markers that operate somewhere in-between the verbal, nominal, and pronominal realms. Ch'ol, for instance, has the suffix *-ob'* that marks plural third person nominals as in (21).[6]

(21) a. *ili   x-k'aläl-ob*
          DET CLF-girl-PL

          `these girls'   Vázquez Álvarez 2011: p. 85

      b. *li   ñox-ob-tyak*
          DET elder-PL-PL

          `(some of) the elders'   Vázquez Álvarez 2011: p. 87

At the same time, we see *-ob* on verbs to indicate that at least one of the participants is third person plural.

(22) *Tyi y-il-ä-y-ob.*
      ASP A3-see-ITV-PL

      `They saw him/her.'
      `S/he saw them.'
      `They saw them.'   Vázquez Álvarez 2011: p. 84

Even though *-ob* is morphosyntactically different than K'ichean-style plural marking, there are some similar pressures. In particular, Vázquez Álvarez 2011: p. 85 reports that *-ob* is ungrammatical on non-human nouns and strongly dispreferred on verbs to crossrefererence non-human nouns. Where they most diverge, though, is that nouns in K'ichean-branch languages that accept the plural affix must be marked plural when having plural reference. This is not the case for Ch'ol and other Western-branch languages. For instance, it is possible for nouns, even human nouns like *k'aläl* `girl' in (21a) to have plural reference without *-ob*, as example (23) shows.

(23) *X-ixik,   x-k'alä, mu'=bi i-kuch   majl-el.*
      CLF-woman CLF-girl ASP=REP A3-carry away-INF

      `Women, girls, he takes them all away.'   Vázquez Álvarez 2011: ex. 43

The optionality of plural marking in these languages raises the question of when nouns with plural reference are actually marked as such. This question has started to be explored experimentally for languages like Tseltal (Foushee 2013) and Yucatec (Butler 2011; Butler et al. to appear). For instance Yucatec has a plural affix *-o'ob*, which like Ch'ol *-ob*, optionally marks nouns as plural.

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[6]Example (21b) gives an example of one of the other plural markers in Ch'ol, in this case *-tyak*, which indicates an indefinites plural partitive NPs, i.e., `some of the X' (Vázquez Álvarez 2002: p. 82).

(24) a. *le   x-ch'úupal*
   DET CLF-girl
   `the girl' / `the girls'

   b. *le   x-ch'úupal-o'ob*
   DET CLF-girl-PL
   `the girls'   Butler et al. to appear: ex. 6-7

Butler et al. to appear use timed translation and timed picture description tasks to investigate features that bias the use of *-o'ob*. On the picture description task, the major semantic result was that plural marking is significantly greater when describing a scene with many individuals satisfying a predicate rather than a simple plurality of two individuals. This reinforces an effect that was found in the translation task in which NPs like *two girls*, where plurality is semantically recoverable, were significantly less often marked plural than both translations of simple plural NPs like *the girls* and NPs describing scenes with only two girls. These results only emphasize what we have already seen. Plural marking in Mayan is generally not merely a reflection of prima facie plural reference, but a function of animacy, cardinality, the availability of other plural-marking strategies (like plural agreement and plural quantifiers), and almost certainly discourse-level properties like topicality.

2.3 Positionals and adjectives

Just as Mayan languages have CVC root nouns and verbs, they also all have a morphosyntactically distinct class of adjectival roots. Where adjectival roots stand apart is in their size. In contrast to nouns and verbs (and the class of positional roots to be discussed in this section), Mayan languages have small adjectival inventories. For instance, England 2004 counts about 50 adjectival roots in Mam. As expected, the majority fall into those semantic classes that are most commonly expressed by adjectives, including dimensions (e.g., *big*, *thick*, *small*), colors (e.g., *red*, *blue*), physical properties (e.g., *heavy*, *cold*, *dirty*), evaluatives (e.g., *bad*, *good*), and human propensities (e.g., *fierce*, *stubborn*). Not only are the number of bona fide adjective roots few, but adjective semantics in Mayan has been poorly studied. The extant data, though, is sufficient to at least partially contextualize their place in current crosslinguistic work. Adjectives are the canonical gradable predicate, that is, predicates expressing properties like *big*, which are most naturally held only relative to some contextually salient degree. There has been a lot of recent research on the universality of degree denoting expressions (Bochnak 2013), as well as how languages express canonical degree constructions like the comparative (e.g., Bogal-Allbritten 2013; Beck et al. 2009; Schwarzschild in press). Mayan languages make use of familiar strategies. For instance, they have a variety of degree expressions, both free and bound morphemes, that alter the standard of comparison of gradable adjectives, like *yiin* `somewhat', *matiij* `very', *-xax* `very', etc. in (25-26) from Mam.

(25) a. *nuxh yiin*
   small ATT
   `somewhat small'

   b. *matiij weena*
   big   very
   `very big'

c. *puura k'ook'j*
very   delicious
`very delicious'   England 2004: p. 136

(26) a. *naach-xax*
ugly-INTS
`very ugly'

b. *spiiky'an-ka*
clear-ATT
`somewhat clear'   England 2004: p. 131

Moving to comparative constructions, we find that Mayan languages generally follow one of two strategies, both common. First, in some languages, mostly Eastern-branch languages, there is no comparative marker, like *more* or *--er* in English. Only the comparative standard is marked, and it is done so with a locative relational noun---an obligatorily possessed nominal expressing spatial or other relations commonly marked in other languages via prepositions. The relation noun in example (27b) from Mam is *twiz* `face' or `front', and so the comparative is literally `Juan is tall in front of Pedro'.

(27) a. *B'ala kya'   meeb'a-x t-oo'   ky-witz nemass nasyoon.*
maybe like.that poor-still EXT-B3PL A3PL-RN the.rest nation
`Maybe because of that we are poorer than other nations.'

b. *Nim-x t-qan   Xwan t-witz   Luuch.*
big-still B3SG-FOOT Juan A3SG-RN Pedro
`Juan is taller than Pedro.'   England 2004: ex. 65-66

In many Western-branch languages, though, the locative relational noun standard marker is supplemented with a comparative morpheme. For instance, Popti' in (28) uses the *ka'* `very / more'.

(28) *ka'   icham hin s-sataj   naj Pel.*
more old   I   A3PL-RN CLF Peter
`I am older than Peter.'   Craig 1977: ex. 122

Some of the languages with a comparative standard marker have borrowed Spanish *más* in this function e.g, Tsotsil (Aissen 1987: p. 187).

While Mayan languages have small adjective inventories, the functional load is made up by a special class of roots that have come to be called *positionals*. Positionals are defined as a root class in virtue of their canonical CVC form and unique derivational morphology. The definitory derivation is generally taken to be the affix that derives a stative predicate from a positional root, which is usually of the form *-Vl*. The following examples from Sakapultek illustrate positional roots and their corresponding positional stative predicates.

(29) a. *Jun achin k'oq-ol-ek   chu' ni-teem*
       a   man seated-POS-ITV in A1SG-chair
      `A man is seated in my chair.'

    b. *Li yaab' katz'-al-ek.*
       the sick lying.down-POS-ITV
      `The sick person is lying down.'   Mó Isém 2006: ex. 408-409

The most frequently encountered positionals, like those above, describe physical configurations that are lexicalized as (interval stative) verbs in English. That said, Mayan languages have many hundreds of these positionals, most of which have meanings that are lexicalized as adjectives in languages with large adjective inventories, as the following Sakapultek examples show.

> *kup*   short
> *yun*   weak
> *pan*   fat
> *tak'* tall

<div align="right">Mó Isém 2006: ex. 417</div>

Given the large number of positional roots, their formal parity with the roots of more familiar lexical classes like verbs and nouns, and their evocative semantics, the lexical semantics of positional roots have received detailed attention in the literature. The primary issue that has occupied previous researchers is to determine the semantic field in which positionals denote and to develop a classification of positional roots based on these semantic categories. The classic study in this domain is Martin 1977, a book-length treatment of positional morphology and semantics in Q'anjob'al. Martin 1977 identifies six semantic categories that positionals express: size, shape, texture, angle (aperture), flexibility, and quantity. More importantly, though, she shows (building off of Norman 1973), that positionals show rampant conflation of these categories in the meanings of single roots. This gives positionals their strikingly specific meanings. For instance, while the K'iche' roots *san* and *b'ol* both describe cylindrical objects, the latter also requires those cylinders to have a horizontal orientation, as well as a different cluster of physical properties (Norman 1973: p. 2).

san	cylindrical, thick, solid (though not hard)	shape + physical property
b'ol	horizontal, cylindrical, long	shape + orientation + physical property
pich	long, thin, straight, vertical	shape + orientation + physical property

In addition to these descriptive dimensions, Haviland 1994a emphasizes that Mayan positionals are also often conflated with evaluative content. He gives the following example from Tsotsil to illustrate the phenomenon. If someone asks where their scarf is, and receives the reply in (30), they do not just get the information that their scarf is lying flat on the ground, but also that the speaker is critical of this fact. The positional *pak'al* is used for things that aren't just lying flat, but carelessly thrown down. As Haviland says, example (30) ``criticizes as much as it locates.''

(30) Where is my scarf?
Te   pak'al   ta   lum
there lying.flat PREP ground
`It's lying flat on the ground.'   Haviland 1994a: p. 698

The majority of work on positional semantics has continued in this vein, grouping them into classes based on some set of notional semantic categories, and then looking at patterns of conflation across these categories (e.g., Haviland 1994a; Knowles 1983; Martin 1977). There are studies that take a different route, though. First, Brown et al. 2007 asks not what semantic criteria allow for a felicitous subgrouping positionals, but what unifies positionals as a semantic class. They build off of the observation that positionals, in their positional stative predicate form, canonically appear in the basic locative construction as answers to *where*-questions. Semantically, then, Brown et al. 2007 treat positionals as primarily spatially concerned. They express additional information about the configuration of the figure in a Figure-Ground construction. Interestingly, they find that Mayan languages differ in how readily speakers use positionals to answer simple *where*-questions. In Tseltal, the positionals are an integral part of the basic locative construction, while in Yucatec, they are most often used to answer a *where*-question when the context makes salient the possible contrasting configurations of a figure. Brown et al. 2007 comes to propose that Tseltal speakers have a general preference for expressing as much information about the theme as possible. Positionals, which impose fine-grained selectional restrictions on the theme of an existential predicate, are thus the ideal kinds of predicates to use in the basic locative construction.

Finally, some newer works have been able to branch out, exploring not just the notional semantics of positional roots, but how certain semantic properties correlate with properties of argument structure. The standout work in this vein is Sántiz Gómez 2010, which investigates the syntax and semantics of positionals in the Tseltal of Oxchuc. Sántiz Gómez splits the positionals first into those that occur in the basic locative construction and those that do not. They are then further split according to whether they participate in any of the following two diathesis alternations. In the first, a locative argument *jk'ab* `my hand' is promoted to the theme of the positional predication. In the second, the locative and theme arguments--*yal k'abil* `finger (lit. son of hand)' and *ch'okow* `ring', respectively--are switched with no apparent semantic difference.

(31) a. *Loch'-ol   ta   j-k'ab   te   ixim=e*
        contenido-POS PREP A1SG-hand DET corn=ENCL
        `The corn is contained in my hand.'

    b. *Loch'-ol   te   s-k'ab=e*
        contenido-POS DET A3SG-hand=ENCL
        `My hand is in the form of a container (to receive corn).'   Sántiz Gómez 2010: ex. 62-63

(32) a. *Xoj-ol   ta   y-al   k'ab-il   te   ch'okow-il=e*
        inserted-POS PREP A3SG-son hand-B3SG DET ring-B3SG=ENCL
        `The ring has the finger inserted in it.'

    b. *Xoj-ol   ta   ch'okow-il te   y-al   k'ab-il=e*
        inserted-POS PREP ring-B3SG DET A3SG-son hand-A3SG=ENCL
        `The finger is inserted in the ring.'   Sántiz Gómez 2010: ex. 46-47

The diathesis alternations can then be used to support notional semantic classifications of positionals. For instance, all of the positionals expressing properties of intervals between two reference points anchored on the figure also fail to occur in the basic locative construction. In addition, many participate in the diathesis alternation in (32). In contrast, the positional roots that express notions of containment are also distinct in occurring in the basic locative construction, as well as frequently undergoing both diathesis alternations. The future of research on positionals will surely take place at this intersection between syntax and semantics, looking for alignments between semantic categories and argument structure, and then trying to explain why we find the particular patterns we do.

2.4 Ideophones

Ideophones express complex sensory phenomena. In addition, they often have a restricted syntactic distribution and their own morphology, allowing them to be grouped together as a lexical class. Mayan languages have a clearly identifiable class of ideophones that are well-integrated into the CVC root system. Ideophonic roots in Mayan are canonically used underived in a light-verb construction. Notice in (33) that Tseltal uses the verb *chi* `say', while the Kaqchikel example in (34) has *b'än* `do'.

(33) *pura ch'il-bil, tsok'   x-chi   ta   mantekat.*
      puro frito-ASP IDF.frying ASP-say PREP manteca
      `completely fried, they go *tsok'* in the fat.'   Pérez González 2012: p. 154

(34) *Tzër   x-u-b'än ru-tzijb'al pa   q'equ'n ri   achin.*
      IDF.match.striking ASP-A3SG A3SG-match PREP darkness the man
      `In the darkness the man's match went *tzër*.'   Cojtí Maracario et al. 1998: p. 369

Pérez González 2012, which focuses on Tseltal, provides the most detailed study of ideophones in any Mayan language. In addition to identifying the basic construction for introducing ideophones, he also surveys their semantics and the semantics of their derivations. As expected, the class is dominated by those that depict sounds, but other modalities are represented, in particular, the visual as in (35).

(35) a. *Teme t'ul   x-chi   k'oyel=e.*
          is   IDF.drop ASP-say arrive.there=ENCL
          `Yes, it arrived going *t'ul*<being in the form of a drop>.'
      b. *Eh pe yak s-nuk'   moel pom   x-chi=la   x-ch'ail-el   s-may.*
          eh buy ASP A3SG-blow DIR IDF.puff ASP-say=REP A3SG-smoke-POS A3SG-tobacco
          `Eh, but he was smoking and the smoke from his cigarette went *pom*<in puffs>.' Pérez
          González 2012: p. 183

From a semantic perspective, one of the more interesting facts about ideophones in Tseltal is that their category-specific reduplicative derivations track closely the pluractional derivations discussed in section 2.1 (Pérez González 2012: p. 189-190). If the root is reduplicated twice in the *chi*-contruction, the stimulus is understood to occur repeatedly, though with regular pauses. If the root is reduplicated three times, the stimulus occurs with contiguous repetition. Finally, when the root is reduplicated four times, it is understood that the stimulus reoccurs in an intense and chaotic manner.

The main take-away is that there is clearly a close connection between pluractionality in the verbal domain and ideophonicity that has still only been partially explored.

3 Space, time, and modality

3.1 Space

The overview of positionals and directionals has already hinted at the depth of the discussion on spatial language in Mayan semantics. This section focuses on three different areas where Mayan languages have informed the wider literature on spatial language.

Crosslinguistic work has identified a variety of strategies for locating objects in the horizontal plane, where there isn't a universal perceptually salient anchor like gravity for vertical plane. Consider English, where speakers most frequently and naturally use an egocentric reference frame, locating objects to the right, left, front, and back of some salient individual (e.g., the bathroom is to the left when you walk in). A different approach is found in some Mayan languages. In particular, there is a large literature documenting the use of absolute reference systems based on altitude in Tseltal.[7] As described in Levinson 2003; Brown et al. 1992, 1993, Tseltal speakers most freely locate objects within an absolute reference frame imposed by the slope of the land on one axis, and a crossways direction on the other axis fixed on visible or known landmarks. For instance, in a task described in Brown et al. 1992, speakers of Tenejapa Tseltal were asked to tell a second speaker to put a wooden man with flexible arms and legs into certain positions. Overwhelmingly, speakers chose to encode space in absolute terms, as in (36-37).

(36)   A: But one of his legs doesn't touch the ground.
       B: Ja' bal ta   alan?
       it-is Q   PREP downhill
       `The downhillwards one?'

(37)   *k'atal   x-bichoj   bel ta   Turuwit,*
       crossways ASP-extend DIR PREP Turuwit
       `It [arm] is extending crossways towards Turuwit,'

For instance, in (36), the first speaker asks for the location of the dolls leg, which the second speaker locates, not with an egocentric coordinate like right or left, but an absolute direction based on the slope of the earth. Crucially, example (36) does not say that the leg is downhill, merely that it is oriented in the same direction as downhill. The second example above shows the preferred strategy when an object cannot be located on the uphill-downhill plane relative to some reference point. In these situations, the objects is located as being *k'atal* `crossways' relative to the uphill-downhill plane in the direction of some landmark, in this case, the mountain Turuwit.

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[7]Tseltal is by no means the only Mayan language where the use of absolute reference frames to locate objects in local space has been described. Bohnemeyer 2011 found that while not the dominate strategy, adult male speakers of Yucatec, when speaking to each other, do use cardinal points to locate the relative position of small, manipulable objects in the same visual field, which is unheard of languages that by default use relative reference frames. This is part of his evidence that Yucatec speakers use a mixed system.

The fact that some Mayan languages like Tseltal privilege absolute reference frames for semantically encoding space has raised the question of whether there are wider cognitive consequences. In particular, since being a competent Tseltal speaker means locating objects relative to features of the environment like elevation, does that mean that Tseltal speakers attend better to those features than speakers of languages that use egocentric reference frames? The data here are mixed. There is clear experimental evidence that Tseltal speakers more readily encode experience in memory in terms of absolute reference frames. For instance, Majid et al. 2004 and Pederson et al. 2004 both describe experiments that force participants to reconstruct a scene from memory after rotating 180°. If a speaker imposes an absolute reference frame on the scene while memorizing it, then after rotating, it should be reconstructed in a way that flips all left/right relations of objects in the scene relative to the body. If the speaker imposes an egocentric reference frame on the scene as it is encoded in memory, then it should be reconstructed after rotating in a way that preserves left/right-relations among scene objects. What they find is that speakers of Tseltal consistently prefer to reconstruct such scenes relative to an absolute frame of reference, while speakers of languages like Dutch reconstruct scenes using an egocentric reference frame. It follows that Tseltal speakers must be attending to some pair of points anchoring the absolute reference frame that speakers of Dutch can safely ignore.

Even though Tseltal speakers are quicker to impose an absolute reference frame on a scene, does this mean that they are adept than speakers of languages like English at manipulating absolute references frames (and are English speakers inversely better at dealing with egocentric reference frames)? Li et al. (2011) find that this is not the case. They run a series of experiments that force speakers to use either an absolute or an egocentric reference frame. They find that speakers of Tseltal perform on par or better than English speakers on tasks that require the use of an egocentric reference frame. Moreover, they find that across language populations, tasks that require an egocentric reference frame are, in fact, easier to perform than those that require an absolute reference frame. The primary conclusion is that facts about language, like the left/right lexical gap in Mayan, might affect what kind of reference frame is preferentially used, but it does not seem that these facts constrain cognition.

Experimental work has shown that Tseltal speakers strongly prefer to use an absolute reference frame based on elevation. Intriguingly, this privileged spatial reference frame in Tseltal has spread into other areas of the grammar, in particular, temporal reference. While Tseltal has a full complement of temporal adverbials, speakers additionally impose an absolute reference frame on the passage of time, with the future uphill (and to the north) and the past downhill (and to the south) (Brown 2012). This allows for the reuse of the preferred spatial vocabulary in talking about time, as the following examples illustrate.

(38) *Alan   ya s-k'an   ya s-na' s-toj-ol*
      downhill INC A3SG-want INC A3SG A3SG-strait-NML
      `He wants to know beforehand [lit. downhill].'   Brown 2012: ex. 20

(39) *Moel ya x-ben   y-u-il,   ya x-mo   bel   te ja'wil=e*
      ascent INC A3SG-walk A3SG-month-NML INC ASP-ascent away DET year=ENCL
      `The months go upwards, the years ascend awaywards.'   Brown 2012: ex. 22

(40) *Ya ko-tes-be   s-k'al-elal   te junta=e.*
      INC A1SG-descend-CAUS A3SG-day-NML DET meeting=ENCL
      `I lower the date for the meeting.' [i.e., make it earlier]   Brown 2012: ex. 24

While languages like Tseltal are famous for privileging absolute reference frames over egocentric reference frames, there are other strategies for locating objects that are also unfamiliar from a euro-centric perspective, even more widespread across the Mayan family. In particular, when describing the location of something relative to a ground object, one can take either the perspective of some external viewer or the perspective of the object itself. For instance, imagine there is a car in front of us, but it is pointing away so that we are looking at its trunk. If I say that an object is behind the car, this is most naturally interpreted as being at the car's front. That is, we assume our perspective, treating *behind* what lies to the non-visible side of the ground. An alternative is to assume the perspective of the ground object, whose behind is clearly where the trunk is located. This is called an intrinsic reference frame. Within this frame, describing an object being behind the car would place it, in the current scenario, between us and the car.

The MesoSpace project (e.g., Bohnemeyer et al. 2012) has experimentally confirmed that intrinsic reference frames are the dominate strategy across Mesoamerica, including within the Mayan languages. Mopan provides a prime example. For instance, Danziger 2001 describes an experiment where one speaker has to describe the position of a boy relative to a tree to a speaker who does not share the same visual field. The second speaker must then appropriately arrange representations of a boy and tree. Across all trials there were no instances of speakers using anything but an intrinsic reference frame, as illustrated in the following example.

(41) [The boy is standing to the left of the tree with his back to it.]
      Ka'-a-käx-t-e'   *a nene' tz'ub' a la a t-u-pach ke'en a top'o.*
      you-should-find-him the little child who is.here who at-his-back is-located the bush

      `You should find the little child here who at his back is located the bush.'   Danziger 2001: p. 208

Example (41) shows that where an English speaker would most naturally use a prepositional phrase like *to the side* or *to the left*, Mopan speakers prefer to use the equivalent of *behind*, but which is interpreted intrinsically relative to the figure's body. An even more striking example comes from how the use of words like *left* and *right* are themselves used. In one case, the picture under discussion had the boy standing to the right of the tree facing the speaker. After the speaker described the boy as having the tree to his side, the listener asked for clarification as in (42a), and received the reply in (42b).

(42) [The boy is facing the viewer with his right hand extended toward the tree.]

      a. *Ich lef waj ich rait?*
           at left or at right
           `Is it at the left of the right?'

      b. *Ich rait ke'en   a top'o.*
           at right is.located the bush
           `The bush is located at the right.'   Danziger 2001: p. 208

From the perspective of a language like English, which does not normally use an intrinsic frame of reference, it is surprising that Mopan speakers use the English borrowings *lef* and *rait* to describe the location of the tree from the perspective of the boy. When the speaker utters (42b), it is clear that both speakers assume that a word like *rait* is to be interpreted intrinsically as the boy's right, not the interlocutors right, as it would normally be English.

There is an interesting twist on the fact that intrinsic reference frames are often used in many Mayan languages. In those same languages, it has been shown that on non-linguistic cognitive tests, speakers often prefer an absolute reference frame, in contrast to speakers of European languages (Bohnemeyer 2011; Danziger 2001; Le Guen 2011). This has bolstered the claim that intrinsic reference frames make a poor default frame, and so speakers of such languages often use a fluid mixing of reference frames based on the particular task at hand (Bohnemeyer 2011; Le Guen 2011).

3.2 Time

The typology of tense systems has been a major focus of semantic work across theoretical frameworks. One contentious question, in the generative literature in particular, is whether there are languages that are tenseless. That is, languages which lack expressions that locate the runtime of events relative to the utterance time. Mayan languages have played a central role in this debate due to Bohnemeyer's (2002) extensive argument that Yucatec is tenseless. Instead of tenses, Bohnemeyer describes for Yucatec a rich system of aspectual / mood markers that cross-classify with a three-way aspectual classification system for verb stems. The following examples illustrate the core properties of the system. Example (43) shows the contrast between perfective and imperfective aspect, which co-occur with the incompletive and completive verbal status suffixes respectively. In example (44), note that the progressive and terminative aspectual predicates both trigger the incompletive status suffix, while the prospective marker *mukah* co-occurs with the null subjunctive marker.

(43) Bound Aspect Markers

    a. *K-in   xok-ik   le   periyòodiko-o'.*
       IPFV-B1SG read-INC DET newspaper-DEIC.

       `I (used to) read the paper.'

    b. *T-in   xok-ah   le   periyòodiko-o'.*
       PFV-B1SG read-COMPL DET newspaper-DEIC

       `I read the paper.'   Bohnemeyer 2002: p. 4

(44) Aspectual Predicates

    a. *Táan in   xok-ik   le   periyòodiko-o'.*
       PROG B1SG read-INC DET newspaper-DEIC.

       `I /am/was/will be/ reading the paper.'

    b. *Ts'o'k in   xok-ik   le   periyòodiko-o'.*
       TERM B1SG read-INC DET newspaper-DEIC.

       `I /have/had/will have/ read the paper.'

c. *Mukah in xok le periyòodiko-o'.*
PROSP B1SG read DET newspaper-DEIC.

`I am/was/will be/ going to read the paper.'   Bohnemeyer 2002: p. 5

While example (43b), which has perfective aspect, is best translated with English past tense, we know it is not a tense because it does not necessarily locate events that take place before the speech time, as the following example shows.

(45) *Le káa t-uy a'l-ah u ts'o'k-s-ik le ba'x k-u bèet-ik-e',*
DET káa PFV-A3SG say-COMPL A3SG end-CAUS-INC DET what IPFV-A3SG do-INC-TOP
ts'o'k in kim-il.
TERM A1SG die-INC.

`By the time he finishes [lit. says the end of] what he is doing, I shall be dead.' Bohnemeyer 2002: p. 255

Note that in (45), the speaker is still alive at the utterance time, and thus on pain of contradiction, the doer of the deeds that bring about the speaker's death must not be finished with what he is doing. Yet, the introductory clause in (45) is still marked perfective. This would clearly be impossible if perfective necessarily located events in times anterior to the speech time, as we can see from how awkward English past tense would be in this introductory temporal clause. Instead, Yucatec perfective is a true perfective. It merely presents events as a whole, which in the case of telic predicates like *finish* in (45) means that they are presented as complete, without regard to their runtime. Similar arguments show that the use of *incompletive* marking and the aspectual predicates is not constrained by the utterance time.

Something similar to this core system is found across the Mayan family, that is, a system with bound perfective and imperfective aspect markers, aspectually conditioned status suffixes, and independent predicates expressing aspectual notions like progressive and terminative. Yucatec goes further though, and in addition to these more common aspectual markers, also has a series of aspectual predicates that most closely approximate the graded tenses most familiar from Bantu languages (Comrie 1985; Dahl 1985).

Graded Distance Markers
ta'itik   proximate future
táant   immediate past
sáam   recent past
úuch   remote past

(Bohnemeyer 2002: p. 328)

These expressions are crucially not merely temporal adverbials. As we can see from the following examples, they preclude a second aspectual marker and themselves condition a verbal status suffix, just like the aspectual markers already discussed.

(46) a. *Táant in xok-ik le periyòodiko-o'.*
IMM B1SG read-INC DET newspaper-DEIC.

`I had/have/will have just read the paper.'

b. *Úuch in xok le periyòodiko-o'.*
REM B1SG read DET newspaper-DEIC.

`I read/had read/will have read the paper a long time ago.'   Bohnemeyer 2002: p. 328

While superficially similar to the gradable tenses reported in the literature, once again, it can be shown that these expressions are not tenses. They do not make reference to the utterance time. For instance, (46b) can be used to locate an event of reading the paper that took place in the distant past relative to the utterance time, but it can also locate an event of reading the paper that takes place in the future, but which is itself in the remote past of some far future topic time. The temporal distance markers show once again how Mayan languages eschew tense in favor of locating an event relative to a topic time, which is itself never obligatorily located with respect to the moment of utterance.

3.3   Modality

The most well-studied aspect of Mayan modality is what is called irrealis marking in the literature. Irrealis marking is most often a verbal affix or clitic, and is most commonly encountered as obligatorily accompanying negation. For instance, example (47) provides an example from Tz'utujil, where the irrealis clitic *ta* must co-occur with the negative particle.

(47) *Ma x-war ta.*
NEG COMPL-sleep IRR

`He didn't sleep.'   Dayley 1981: p. 113

Irrealis in Tz'utujil is also obligatory in the formation of counterfactual conditionals, as shown in (48), but it otherwise has a fairly narrow distribution. It is not required in future-marked clauses or in the complement of non-veridical predicates, like desideratives.

(48) *Wi ta xa k'o n-paq n-in-b'e ta.*
if IRR only EXT A1SG-money ASP-B1SG-go IRR

`If I had money, I would go.'   Dayley 1981: ex. 149

Moving both north and westward from the K'ichean-branch languages, we find Mayan languages where irrealis plays a larger role. For instance, Martin 1998 describes the place of irrealis in the Q'anjob'alan language Mocho'. Here we find that it is not only used in the scope of negation, but can affix both nominals and functional elements like numerals and interrogative pronouns to express epistemic uncertainty.

(49) *la iix-i ma' kaab-oq ma' haabil...*
and live-ITV perhaps two-IRR year

`And she lived (there) perhaps about two years maybe...'   Martin 1998: ex. 4

(50) *Huun-e' tíra x-poch'-o' kene hach-oq ch'in.*
one-NUM time A3SG-kill-TV DIR2:remain Q-IRR children

`All at once, he killed who knows how many children.' Martin 1998: ex. 12

(51) *Ook-i ch-antiil-oq óso.*
enter-ITV A3SG-wife-IRR wife

`She became the bear's (so-called) wife.' Martin 1998: ex. 19

In addition to these irrealis, or modal uses of *-oq*, Martin 1998 also shows that irrealis marking appears in a variety of syntactic contexts that do not appear to be semantically related (see Hofling 1998 for similar data in the Yucatecan language Itzaj). In particular, irrealis marking appears on intransitive complements of intransitive verbs and on intransitive complements of positional stems, regardless of their particular lexical semantics. This raises the question of whether there is one *--oq* or two. In the latter case, we would have an *--oq* that compositionally contributed irrealis semantics, as in (49) and (51), and a second *--oq* that marked certain types of subordination. Mateo Toledo 2008: p. 57-58 takes the second route for Q'anjob'al and its cognate irrealis marker *--oq*. He argues that one *--oq* marks irrealis, namely complements of negation, potential aspect, and desiderative predicates. A second *--oq* is actually an infinitive suffix that is found across all inflectionless clauses. Future work might be able to unify these two contexts by saying that the events introduced by infinitive and irrealis verbs are instantiated (or fail to be instantiated) in the same way. For now, though, this is an open question.

Whether we choose to analyze *--oq* in the Q'anjob'alan and Yucatecan languages as one or two morphemes in the synchronic grammar, the affix has clearly undergone a significant amount of semantic change. Tseltal provides a limit case for the semantic diversification of irrealis marking in Mayan. As described in Polian 2007, a detailed account of the semantic distribution of the suffix *--uk*, cognate to *--oq*, irrealis marking in Tseltal now appears across a wide variety of modal and evaluative constructions. In particular, it not only marks negation, counterfactuality, certain types of embedding, and epistemic uncertainty (as with approximation), but it also appears in various optative, interrogative, and emphatic constructions. For instance, when *--uk* affixes preverbal aspectual markers, as in (52), the clause is interpreted as optative.

(52) a. *Yak-uk x-ju' aw-u'un a-koltay-on.*
INC-IRR INC-poderse-b3sg A2SG-RN A2SG-help-B1SG

`I hope you can help me.' Polian 2007: ex. 55

b. *Ya-uk=la x-ba jk-il-tik=e.* A1SG-*see*-PL1=ENCL-*help*
INC-IRR=REP INC.I-go a1sg-go

`I hope we go to see it.' Polian 2007: ex. 25

When used with polar questions, irrealis marking does not indicate doubt, as one might expect, but instead generates a question with affirmative bias. This is shown in examples (53-54).

(53) *me we'-k-at=ix?*
yes COMPL.I-eat-irr-B2SG=already

`You already ate, right?' Polian 2007: ex. 54

(54) *me jich-uk=to?*
      yes thus-irr=DEM
      `It's like this, right?'   Polian 2007: ex. 57

Finally, *--uk* plays a role in the answering of questions. In particular, it can be used for emphatic
positive answers. As discussed below in section 4, Tseltal polar questions are preferentially answered
by repeating the question's preverbal auxiliary (or the verb root if the question has none). When
the affirmation bears *--uk* it is interpreted as emphatic.

(55) a. *Ja'-at   a-wol   winik xi?*
          FOC-B2SG A2SG-address-B3SG man   say
          `You're going to address the people, he said?'

      b. *Ja'-uk!   la   jk-ut.*
          FOC-IRR COMPL.T A1SG-say-IRR
          `Yes! I told him.'   Polian 2007: p. 61

4   Clause-typing

4.1   Polarity

The expression of polarity in Mayan, and negative polarity in particular, is striking for the amount
of language internal morphological variation that exists. What we find is that the expression of nega-
tion is often conflated with other syntactic and semantic categories. For instance, consider the fol-
lowing three-way contrast in Chontal described in Knowles-Berry 1987. First, examples (56a-56b)
show that negating a transitive verb in perfective aspect proceeds uneventfully by merely adding the
negative particle *mach*.

(56) a. *'A   k'ux-i.*
          A2SG eat-PRF
          `You ate it.'
      b. *Mach 'a   k'ux-i.*
          NEG   A2SG eat-PRF
          `You didn't eat it.'   Knowles-Berry 1987: ex. 25-26

In contrast, in imperfective aspect we get a series of splits based on person marking and verb class. If
the verb phrase contains a CVC root transitive with a third person object, negating it requires the use
of imperative, not imperfective morphology (even though the interpretation remains imperfective).

(57) a. *'A   k'ux-e'.*
          A2SG eat-IPFV
          `You eat it.'
      b. *Mach 'a   k'ux-u.*
          NEG   A2SG eat-IMP
          `I don't eat it.'   Knowles-Berry 1987: ex. 21-22

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When the verb is a derived transitive, negation precludes the use of imperfective aspect marking.

(58) a. *Kï   tz'ib'-ï-n.*
          A1SG write-TV-IPFV
          `I write it.'

      b. *Mach kï   tz'ib'-ï.*
          A1SG write-TV
          `I don't write it.'   Knowles-Berry 1987: ex. 30,34

What we have, then, is a situation where negation and syntax co-condition the distribution of aspect and mood marking.

   Q'anjob'al is another language where the conflation of negation and aspect is readily seen. Q'anjob'al has a general purpose clausal negation particle *toq* that negates the aspectless existence predicate as well as clauses of all aspect classes. In addition, the language has three other markers of clausal negation whose distribution is conditioned by aspectual concerns. First, examples (59) and (60a) show that *k'am* negates imperfective clauses and existential clauses, though in the latter case the existential predicate disappears (compare to (60b) with *toq*).

(59) *K'am ch-a-man   jun no' txutx   kaxhlan tu'.*
      NEG INC-B3SG-buy DET CLF mother chicken DEM
      `You do not buy that hen.'   Mateo Pedro 2011: ex. 3b

(60) a. *K'am anima b'aytu.*
          NEG people DEM
          `There are no people there.'   Mateo Pedro 2011: ex. 4b

      b. *Toq ay anima b'aytu.*
          NEG EXS people DEM
          `There are no people there.'   Mateo Pedro 2011: ex. 5b

The negative particle *man* is specialized to negating clauses in potential aspect, and cannot negate existential clauses.

(61) *Man hoq-ach   lo-w   yekal.*
      NEG POT-B2SG eat-ANTIP tomorrow
      `You will not eat tomorrow.'   Mateo Pedro 2011: ex. 2

Finally, Q'anjob'al has *maj*, which conflates negative polarity and completive aspect. The latter cannot appear when *maj* does, as the following contrast shows.

(62) a. *Max-ach   lo-w   ewi.*
          COMPL-B2SG eat-ANTIP yesterday
          `You ate yesterday.'

      b. *Maj hach lo-w   ewi.*
          NEG b2SG eat-ANTIP yesterday
          `You didn't eat yesterday.'   Mateo Pedro 2011: ex. 2

Like in Chontal, the expression of aspect in Q'anjob'al is not uniform under negation, and simultaneously, aspect conditions the particular morphological expression of negation.

Negation is not only conflated with aspect. There are also cases where negation interacts with aktionsart. For instance, Coon 2006 describes two negators in Ch'ol, *mach* and *ma'añ*. In the terminology of Carlson 1977, the former occurs with individual-level predicates, while the latter occurs with stage-level predicates. Thus, properties of individuals, like those in (63), are negated with *mach*, while properties of spatiotemporal stages of individuals are negated with *ma'añ*, as in (64).

(63) a. *Mach bi'tyik-ety.*
          NEG   ugly-B2SG
          `You're not ugly.'   Coon 2006: ex. 14a

      b. *Mach lichikyañ-oñ.*
          NEG   stupid-B1SG
          `I'm not ugly.'   Coon 2006: ex. 14c

(64) a. *Ma'añ mich'-oñ.*
          NEG   angry-B1SG
          `I'm not angry.'   Coon 2006: ex. 15a

      b. *Ma'añ 'ach' hiñi pisil.*
          NEG   wet   DET clothes
          `The clothes aren't wet.'   Coon 2006: ex. 15c

The primary conclusion the data point to, though it is has not been explored from a theoretical perspective, is that negation in Mayan is not merely a boolean operator. It instead concerns how events are presented, and is better treated as part of the aspectual system.

While there has been no work in Mayan concerning negative polarity items, there are cases of clausal negation interacting with negative quantifiers under concord. Tandet 2013 gives the most extensive treatment of such phenomena for the language Chontal. For instance, the Chontal *ni'untu* `nobody' must be licensed by clausal negation. The following examples show that this holds whether *ni'untu* is subject, object, or oblique.

(65) a. *Mach kä-chän-en   ni'untu.*
          NEG   A1SG-see-IPFV nobody
          `I don't see anyone.'   Tandet 2013: ex. 75a

      b. *Ni'untu mach u   ta.*
          nobody NEG   IMFV come
          `Nobody comes.'   Tandet 2013: ex. 74a

      c. *Mach x-ik-et   tok ni'untu.*
          NEG   go-OPT-B2SG with nobody
          `Don't go with anyone.'   Tandet 2013: ex. 80

Chontal negative concord diverges from more well-known cases in that it is not clause-bound. Clausal negation in a matrix clause can license *ni'untu*, as the following example shows. In this way, it is more like a negative polarity item.

(66) a. *Mach ko   kä-chän-en   ni'untu.*
    NEG   want.1SG.IPFV A1SG-see-IPFV nobody

    `I don't want to see anyone.'   Tandet 2013: ex. 78

 b. *Mach ko   t-ik   ni'untu.*
    NEG   want.1SG.IPFV come-OPT nobody

    `Nobody comes.'   Tandet 2013: ex. 112

While not all Mayan languages exhibit concord with negative quantifiers, such expressions often have other licensing requirements. In particular, it is common for negative indefinites and expressions under constituent negation to be obligatorily preposed. For instance, this is described for Kaqchikel in García Matzar et al. 1997: p.226-7, 408-421. Example (67) shows a preposed negative indefinite, while (68) has a preposed relational noun under constituent negation.

(67) *Majun   ru-k'am-on   pe.*
    nothing A3SG-bring-PRF DIR

    `He brought nothing.'   García Matzar et al. 1997: ex. 320

(68) *Man r-uk'in   ta machit xti-qa-chöy   wi.*
    NEG A3SG-with IRR machete POT-A1PL-cut FOC

    `It wasn't with a machete that we cut it.'   García Matzar et al. 1997: ex. 397e

This suggests that negation in Mayan is closely related to focus. Durbin et al. 1978 makes this connection explicit in Yucatec, where negation co-occurs with particle *--i'*, which independently indicates the scope of an answer to a question under discussion. That is, it is new, or focal information.

4.2   Questions

The formation of constituent and polarity questions in most Mayan languages is fairly standard. The former is done with intonation alone, or with the support of a polarity question particle, as the following examples show.

(69) Tsotsil
    Mi l-a-'ay   ta Tuxta?
    Q   COMPL-B2SG go Tuxtla.

    `Did you go to Tuxtla?'   Aissen 1987: ex. 28

(70) Ch'ol
    mu'=ba i-tyemp-añ-o'   i-bäj   li wakax y-ik'oty li bajläm?
    IPFV=Q A3SG-meet-TV-PL A3SG-RN DET COW   A3SG   DET jaguar.

    `Do the cows and jaguars meet?'   Vázquez Álvarez 2011: p. 287

(71) K'iche'
La x-in-wa'   k'ut?
Q   COMPL-B3SG-eat Q.
`Did I eat?'   Can Pixabaj 2010: ex. 15

Constituent questions, in contrast, are often formed with a special set of interrogative pronouns.

(72) Mam
Tqal x-tzaj   t-q'o-'n-a   q-ee-ky'?
what ASP-DIR a2sg-give-DIR-2sg A1PL-RN-1pl.
`What did you give us?'   England 1983: ch. 7, ex. 160

(73) Chuj
Mach ix-y-il   winh?
who   ASP-A3SG-see PRON
`Who did he see?'   (fieldnotes)

Being morphologically unexceptional, the semantics of questions in Mayan have been largely unexplored. The one exception is in the Yucatecan branch, where questions are quite different from the other branches. In particular, these languages have almost no dedicated question morphology. Instead, questions are formed by borrowing morphology from other domains and using it in concert with the focus construction. For instance, Yucatec constituent questions are formed with a focused indefinite, as in (74), while polar questions are formed with a focused partial disjunction (75). We know that the indefinite *máax* `someone' and the partial disjunction *Juan wáaj* `Juan or' are focused because they appear in the preverbal focus position, triggering the agent focus form of the verb.

(74) *Máax   uk'   le sa'-o'?*
someone drink.AF the atole-DEIC
`Who drank the atole?'   AnderBois 2012: ex. 1

(75) *Juan wáaj uk'   le sa'-o'?*
Juan or   drink.AF the atole-DEIC
`Was it Juan who drank the atole?'   AnderBois 2012: ex. 4

These examples raise issues about how question meaning is compositionally determined. For instance, how does disjunction and focus in (75) combine to generate the effect of a polar question? AnderBois 2012 is directed at this question. He shows that the data in (74-75) have an elegant account within particular theory of meaning, called Inquisitive Semantics, which keeps track of both the informative content of an expression, but also the implicit questions that are raised by receiving that content (Groenendijk 2009; Groenendijk et al. 2009; Mascarenhas 2009). For instance, using an indefinite in a sentence like `someone drank the atole' provides the information that someone drank the atole, but also raises the issue of who exactly did the drinking. AnderBois 2012 then shows that when used in the Yucatec focus construction, like (74), the informative aspect of the indefinite is stripped away as a presupposition that standardly accompanies focus. This leaves only the inquisitive meaning, making it a question. The Inquisitive Semantics research program is still

young, but Yucatec questions have provided the most extensive empirical testing ground for its core ideas.

It's not just questions that have been of wider interest to the linguistics community, but answers as well, especially answers to polar questions. The reason is that some Mayan languages, like Yucatec, are among the world's languages that do not have response particles. Instead, a positive answer to a polar question involves repeating the auxiliary of the question at hand, and in case there is no auxiliary, the verb root itself is repeated (Bohnemeyer 2002: §4.2.1.4).

(76) a. *Táan wáah u hats'ik-ech?*
          PROG Q   A3 beat-INC-b2sg
          `Is he beating you?'   Verhoeven 2007: ex. 99b

      b. *Táan.*
          PROG
          `He did.'   Verhoeven 2007: ex. 99b'

A negative response merely requires using clausal negation, as if you were negating some elided repetition.

(77) a. *Pero, k-u   ts'u'uts?*
          but   IMP-A3SG smoke
          `But, does he smoke?'

      b. *Ma'. Mix   jim-p'éel clase vicio yaan ti',   jach jumpuli', mina'an.*
          NEG not.even one-CLF type vice EXT PREP very ever   not.exist
          `No. He does not even have a single vice, never, none.'

Finally, example (78) shows that when there is no auxiliary to deploy, the root itself is repeated.

(78) a. *K'aja'an wa teech ba'ax aanyo-i?*
          recall   Q you what year-DEIC
          `Do you recall what year it was?'   Bohnemeyer 2002: p. 268

      b. *K'aja'an.*
          recall
          `Yes (I do recall).'

The most extensive study of question responses is Brown 2010 for Tseltal. What it finds in a corpus of more than 400 question/response pairs is that while Tseltal has polarity response particles, as in (79), speakers prefer repetition, and in completive aspect, the Yucatec-like repetition strategy shown in (80).

(79) a. *Ya x'-och-ex   tal i   bi k-antzil.*
          INC ASP-enter-B2PL DIR DEIC Q A1SG-daughter
          `You all are coming inside are you, my girl?'

      b. *Yak.*
          yes
          `Yes.'   Brown 2010: ex. 36

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(80) a. *La   y-ich'   s-k'u'   y-u'un-ik   ek' tz'in.*
     COMPL 3ERG.SG-get 3ERG.SG-clothes 3ERG.SG-RELN-PL too EVID

     `They got their own (Tenejepan) clothes too then?'

   b. *La.*
     COMPL

     `They did.'   Brown 2010: ex. 32

One also commonly finds examples of full repetition in answering questions (modulo indexicals), as in (81) in Tseltal or (82) in Yucatec.

(81) a. *Ma'yuk to ba   ay te'ye?*
     NEG.A still where EXT EVID

     `There's none there yet [young corn]?'

   b. *Ma'yuk to ba   ay ajan.*
     NEG.A still where EXR young.corn

     `There's no young corn yet.'   Brown 2010: ex. 29

(82) a. *T-u   hats'ik-ech   wáah?*
     PFV-A3 beat-COMPL-b2sg Q

     `Did he beat you?'   Verhoeven 2007: ex. 99a

   b. *T-u   hats'-ah-en.*
     PFV-A3 beat-COMPL-B1SG

     `He did.'   Verhoeven 2007: ex. 99a'

Once again, this goes slightly against the general preference crosslinguistically for omitting given information, especially in focal contexts (see, for instance, Merchant 2008 on MaxElide). This fact is most likely related to the important place repetition plays in structuring discourse in Mayan more widely (e.g., Brown 2010 for Tseltal).

5   Information structure

5.1   Topic and focus

Informational structural concerns like topic and focus have been mostly studied from a syntactic perspective, the goal being to understand the structure of clauses deviating from the canonical verb-first word order. For instance, in a classic paper Aissen (1992) shows that Mayan languages have preverbal topic and focus positions into which arguments and adjuncts move from their thematic positions. In contrast, there is a second `external' topic position that involves the base-generated adjunction of expressions to the root clause. The fine-grained semantic properties of topic and focus constructions in Mayan have not been as well studied, but that is beginning to change in recent work. For instance, as we have already seen, the account of Yucatec polar questions in AnderBois 2012 crucially depends on the existential presuppositions of the focus construction. In particular, AnderBois confirms that a topic-marked sentence like (83) can be used in a context where the hearer does not know that someone has drank the atole, while the focal sentence in (84) cannot be.

(83) *Juan-e' t-u   yuk'-aj le sa'-o'.*
Juan-TOP PFV-a3sg drink.TV the atole-DEIC

`Juan drank the atole.'   AnderBois 2012: ex. 33

(84) *Juan uk'   le sa'-o'.*
Juan drink.AF the atole-DEIC

`It's Juan who drank the atole.'   AnderBois 2012: ex. 32

In recent work, Can Pixabaj et al. 2011 and Yasavul 2014 go further, showing that K'iche' has two species of focus constructions that differ both in terms of syntax and semantics. On the semantics side, the distinction conforms to the difference between informational and identificational focus described first in Kiss 1998. Informational focus is used to present new information that answers a current question under discussion (in the QUD model of Roberts 1996). It is marked, as shown in (85), by simple preposing. Note here that we have identified as the context the current question under discussion.

(85) *Context:* Who slept?
A   Raul x-war-ik.
CLF Raul COMPL-sleep-ITV

`Raul slept.'   Yasavul 2014: ex. 3

The second focus construction also involves preposing, but is additionally marked with the particle *aree*. This construction, like that in (85), is used to provide answers to the question under discussion, but as a form of identificational focus, carries both existential and exhaustive presuppositions. The contrast between (86) and (87) shows that *aree*-focus can only be used when the context entails the existence of some individual satisfying the prejacent. The informational focus construction is licit in both contexts.

(86) *Context:* An inspector from the Ministry of Education is visiting the community. He's surveying all the primary school teachers about their students and asking them questions like the following: *Who (in your class) has a computer? Who has more than two siblings? Whose parents are divorced?* Maria, a teacher, knows that in her class, Raul has a computer. When the inspector asks his first question, she says:

   a. *A   Raul (k'o jun u-kematz'ib').*
      CLF Raul EXT one a3sg-computer
      `Raul (has a computer).'
   b. *#Aree a   Raul (k'o jun u-kematz'ib').*
      FOC CLF Raul EXT one a3sg-computer
      `It's Raul (who has a computer).'   Yasavul 2014: ex. 5

(87) *Context:* Same as in (86) except that the principal or another teacher told the inspector about Maria's class and Maria knows that the inspector knows about this. When the inspector asks his first question, she says:

a. *A   Raul (k'o jun u-kematz'ib').*
    CLF Raul EXT one A3SG-computer
    `Raul (has a computer).'

b. *Aree a   Raul (k'o jun u-kematz'ib').*
    FOC CLF Raul EXT one A3SG-computer
    `It's Raul (who has a computer).'   Yasavul 2014: ex. 5'

In addition to the existence presupposition, the *aree*-focus construction also has a presupposition that it provides an exhaustive answer to the question under discussion. The contrast between (88a) and (88b) shows that one can append answers to the informational focus construction, but not the one providing identificational focus.

(88) *Context:* Raul and Roberto are talking about an exam that Raul had taken that has just been graded. He says that the teacher gave a piece of candy to those who got 100%. Roberto asks *Who got 100%?* Raul replies:

a. *A   Juan r-ichb'il   al   Maria. W-eta'm   taj we k'o jun chik.   / Al*
    CLF Juan A3SG-companion CLF Maria A1SG-know NEG if   EXT one another / CLF
    Juana xuquje'.
    Juana too
    `Juan and Maria. I don't know if anyone else did. / Juana did, too.'

b. *Aree a   Juan r-ichb'il   al   Maria. #W-eta'm   taj we k'o jun chik.   /*
    FOC CLF Juaj A3SG-companion CLF Maria A1SG-know NEG if   EXT one another /
    #Al Juana xuquje'.
    CLF Juana too
    `Juan and Maria. # I don't know if anyone else did. / # Juana did, too.' Yasavul 2014: ex. 7

While these facts need to be replicated across the Mayan family, they show that at least some, and most likely many Mayan languages have a variety of focal constructions, where the canonical one bearing focus morphology most likely has the semantic properties of English clefts, if not their syntax.

In addition to the two focal constructions, Can Pixabaj et al. 2011 also find variation in the topic constructions of K'iche' based on data from texts. In particular, they find that K'iche' makes a distinction between two kinds of topics. The first kind of topic construction involves preposing with a pause between the topic and the prejacent. It is used to establish the local topic, that is, some individual that has been previously introduced and is now most likely to antecede subsequent pronouns. For instance, example (89) has `the hunter', who was first mentioned in the previous clause, in topic position. The speaker then goes on to mention the hunter in the next three clauses anaphorically.

(89) *Ri k'aq-an-eel,   iii b'yeen u-b'an-om   k'ax ch-k'e   s-taq-a'waj-iib'.*
DET hunt-ANTIP-NML eh INTS   A3SG-do-PFV bad PREP-A3PL-RN AFF-PL-animal-PL

`The hunter had done much damage to the animals.'   Can Pixabaj et al. 2011: ex. 8

In addition to promoting salient individuals to topic status, the same construction can re-establish an individual as topic who is first mentioned several clauses back, so long as that individual is still part of the same scene, or generally topical. For instance, Can Pixabaj et al. 2011 discusses example (90), which establishes `the bread' as topic. It was first mentioned seven clauses ago, but has not been mentioned for five clauses. Example (90) reaches back into the discourse and makes it the local topic.

(90) *i   kwando ri' ri   kaxlanwa, k-u'-riq-a*
and when   DET DET bread   INC-A3SG-DIR-find-TV

`and the bread, when he found it...'   Can Pixabaj et al. 2011: ex. 9

While the vanilla topic construction can promote a recently unmentioned entity to local topic, Can Pixabaj et al. (2011) draw a distinction between this and the bona fide switch-topic construction, which is marked with a pause the particle *are k'u*. They describe this construction as signaling a reset of the discourse state. It is as if it signals that we are not only going to be talking about this new topic individual, and that we are not going to be talking about those other potential topic individuals. For instance, in the story discussed early about the hunter, at some point, the speaker uses this construction to signal a switch between talking about what the hunter does when he goes hunting to what the master of the hill does.

(91) *Tonse are k'u ri   r-ajaw-al   u-winaq-il   ri'   ri   jyub', jawi*
well   FOC PART DET A3SG-master-NML A3SG-person-NML DEM DET ill   where

r-qas   k-e'-k'aqa-n-a   wi, x-tak'-i'   r-oyowaal.
DET-always INC-DIR-hunt-ANTIP-TV EMPH COMPL-stand-POS A3SG-anger

`Well, on the other hand the master of that hill, where he always went to hunt, got mad.' Can Pixabaj et al. 2011: ex. 25

This same construction is also used to do contrastive focus, for example, in pair-list answers. For instance, if the current questions under discussion is who made what, one can answer as in (92). Note that only the final clause in the list bears *are k'u*. The other clauses have the normal topic construction with the pause.

(92) a. *Ri   al Ixchel, x-u-tzak   kinaq',*
DET CLF Ixchel COMPL-A3SG-cook beans

`Ixchel cooked beans,'

b. *Ri   al Ixkik', x-u-k'ili-j   iik,*
DET CLF Ixkik' COMPL-A3SG-toast-tv chili

`Ixkik' toasted chilis,'

c. *Are k'u ri   al Nikte' x-u-lej   ri   wa.*
FOC PART DET CLF Nikte', COMPL-A3SG-make.tortilla DET tortilla

`while Nikte' made tortillas'   Can Pixabaj et al. 2011: ex. 26

Finally, it is interesting to note that the *are* in *are k'u* is the same morpheme that appears in the indentificational focus construction discussed previously. The switch, or contrastive topic construction, thus appears to be a hybrid between identificational focus with *are* and the standard topic construction with its pause. Future work is needed to see if *are* and the pause can be given denotations that can compositionally derive their apparent interaction in cases like (91) and (92).

5.2 Obviation and reference tracking

Obviation is most well known from Algonquian languages, and refers to systems of ranking third person arguments within some stretch of discourse along the lines of animacy, agentivity, and topicality. These rankings have morphological consequences in languages with obviation systems, where the highest ranked argument is marked proximate and the other, lower-ranked arguments are marked obviative. In addition, when obviation rank and grammatical function do not align (e.g., when the subject/agent is obviative and object/patient is proximate), the verb must appear in a special form called inverse. Both obviation and inverse have been shown to play a part in the grammars of Mayan languages (Aissen 1997, 1999; Zavala 1997). Here I want to focus on those aspects that are related to semantic notions like topicality and coreference.

Aissen 1999 analyses the agent focus construction of Tsotsil as a type of inverse construction sensitive to obviation rank. Agent focus is used in Tsotsil when the agent of a transitive verb with two third person arguments undergoes A'-extraction. As example (93) shows, the clause remains syntactically transitive, that is, with two direct arguments, but becomes morphologically intransitive in that the verb bears no ergative agreement morpheme.

(93) *Buch'u i-kolta-on   li   tzeb-e?*
     who   COMPL-help-AF the girl-ENCL
     `Who helped the girl?'   Aissen 1999: ex. 3a

Tsotsil is different from some Mayan languages in that omitting agent focus under the A'-bar extraction of the ergative argument is not strictly ungrammatical. Example like (94) are attested.

(94) *Pero buch'u s-tam?*
     but   who   A3SG-take
     `But who took it?'   Aissen 1999: ex. 13a

Aissen 1999 shows that this variation is not random, but conditioned by the factors that condition inverse in languages with more extensively grammaticalized obviation systems, including topicality and coreference. First, in every agent focus clause in her text sample, Aissen found that the object was definite, and almost always pronominal. Moreover, these clauses almost always had indefinite subjects. This means that the use of agent focus coincides with clauses that have topical objects, but subjects that introduce new discourse referents, and thus cannot be topical. This makes sense if agent focus is an inverse construction and topics rank higher on the obviation hierarchy.

Coreference also plays a critical role in the distribution of agent focus morphology in Tsotsil. The reason is that coreferential arguments must share the same obviation rank. In a clause where an argument and the possessor of a second argument are coreferential, this can completely determine whether or not the clause has inverse status. This is because possessors always outrank possessed

entities in obviation rank. Thus, an example like (95) must be inverse because the object and the possessor are coreferential, and so must rank over the subject, which is possessed. Crucially, example (95) must bear agent focus under the given coreferential reading.

(95) *S-tz'i'   nox i-ti'-on.*
     A3SG-dog just COMPL-bite-AF
     `It was his own dog that bit him.'   Aissen 1999: ex. 49b

We also find cases where coreference bans agent focus marking because the clause simply cannot have inverse status. Consider the case of reflexives. Here the subject and object are coreferential, which means that they must share obviation rank, which means that the object cannot outrank the subject in obviation status. If the latter relation is what conditions agent focus, then reflexive clauses should ban it, which is that case.

(96) a. *Ch'abal much'u x-(y)-il   s-ba   ta ak'ubaltik?*
        NEG.EXT who   NT-A3SG-see A3SG-self at night
        `But who took it?'
     b. **Ch'abal much'u x-'il-on   s-ba   ta ak'ubaltik?*
        NEG.EXT who   NT-see-AF A3SG-self at night
        `But who took it?'   Aissen 1999: ex. 56

Finally, cross-clausal coreference also determines the distribution of the agent focus construction. In particular, agent focus is necessary when the subject of a matrix clause is coreferential with the object of its complement clause. This follows naturally if, as Aissen 1997 proposes, matrix clause arguments outrank embedded clause arguments in the obviation hierarchy modulo coreference. The subject of the matrix clause in (97) must be proximate, and so its coreferential object also ranks over the obviative WH-argument, leading to an inverse embedded clause requiring agent focus marking.

(97) *Li Petul-e$_i$ i-ch'ay   x-(y)-a'i   much'u i-'ak'-b-on   tak'in pro$_i$.*
     the Pedro-ENCL COMPL-lose NT-A3SG-feel who   COMPL-give-APPL-AF money PRON
     `Pedro$_i$ forgot who had given money to him$_i$.'   Aissen 1999: ex. 63

While Tsotsil agent focus is not exactly like agent focus across the rest of the family, there are clear parallels. For instance, the ban on agent focus in reflexive clauses or when the subject binds an object possessor are widespread. A obviation-based account of agent focus across the family highlights the importance of semantic notions like topic and coreference in controlling the fined-grained morphosyntactic structure of clauses in Mayan.

6 Conclusions

The work has aimed to provide non-Mayanists with a bird's eye view of a variety of semantic phenomena in Mayan languages, while highlighting some of the work that has had an especially large impact on the wider subfield of semantics. The discussion was organized by increasing syntactic complexity of the relevant expressions, starting with lexical semantics and growing outward until reaching discourse-level phenomena like information structure and reference tracking. While a variety of empirical areas are covered, I tried to highlight reoccurring motifs that illustrate overarching

themes in the literature on Mayan semantics. One example of this would be the semantics of spatial language, which makes an appearance across multiple sections.

While setting a future research program has not been a goal of this paper, surveying the literature has revealed certain lacunae and interesting open areas for future work. Many of these are identified in the body of the text, though there are some larger ones. For instance, nominal quantifiers and their compositional properties (scopal in particular), have played major role in semantic theorizing. It is intriguing, then, that very little is known about the structure of Mayan quantifier inventories and the semantics of those quantifiers. This is certainly an important area for future work. While research on the syntax and semantics of Mayan nominal quantification is immediately pressing, we must recognize we are still in the early days of Mayan semantics. There is still much to be learned, even in the areas discussed above. That said, interest in the semantics of underrepresented languages is growing rapidly, along with the methodological tools, including experimental ones, to do that work. It is my sincere hope, then, that this article is soon made obsolete.

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