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Argument and event structure in Yukatek verb classes

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In Yukatek Maya, event types are lexicalized in verb roots and stems that fall into a number of different form classes on the basis of (a) patterns of aspect-mood marking and (b) priviledges of undergoing valence-changing operations. Of particular interest are the intransitive classes in the light of Perlmutter's (1978) Unaccusativity hypothesis. In the spirit of Levin & Rappaport Hovav (1995) [L&RH], Van Valin (1990), Zaenen (1993), and others, this paper investigates whether (and to what extent) the association between formal predicate classes and event types is determined by argument structure features such as 'agentivity' and 'control' or features of lexical aspect such as 'telicity' and 'durativity'. It is shown that mismatches between agentivity/control and telicity/durativity are even more extensive in Yukatek than they are in English (Abusch 1985; L&RH, Van Valin & LaPolla 1997), providing new evidence against Dowty's (1979) reconstruction of Vendler's (1967) 'time schemata of verbs' in terms of argument structure configurations. Moreover, contrary to what has been claimed in earlier studies of Yukatek (Krämer & Wunderlich 1999, Lucy 1994), neither agentivity/control nor telicity/durativity turn out to be good predictors of verb class membership. Instead, the patterns of aspect-mood marking prove to be sensitive only to the presence or absense of state change, in a way that supports the unified analysis of all verbs of gradual change proposed by Kennedy & Levin (2001). The presence or absence of 'internal causation' (L&RH) may motivate the semantic interpretation of transitivization operations. An explicit semantics for the valence-changing operations is proposed, based on Parsons's (1990) Neo-Davidsonian approach.

1. Introduction

It is a well-established fact about many languages that they show two broad classes of intransitive verbs which differ from each other in some formal respect. Some languages show a split in the encoding of intransitive verb arguments; e.g. Guaraní (Klimov 1974) and Acehnese (Durie 1987). Others use different auxiliaries with different classes of intransitive verbs in certain tense-aspect categories; e.g. Dutch (Zaenen 1993), German (Shannon 1992), and Italian (Van Valin 1990). Yet others have constraints on certain constructions that allow some classes of intransitive verbs to occur in them but not others; this is e.g. the case with the intransitive resultative construction in English (Levin & Rappaport Hovav 1995 [L&RH]). All these phenomena have come to be considered in connection with the unaccusativity hypothesis advanced by Perlmutter (1978). According to this hypothesis, some intransitive subjects are base-generated as external arguments, while others originate as internal arguments like transitive

objects and are subsequently moved to an otherwise unfilled subject position (in Burzio's 1986 reformulation in the GB framework). Intransitive verbs that select for the former type of argument are 'unergative' verbs; intransitive verbs that take the latter kind of argument are 'unaccusatives'. For example, verbs with a single argument (optionally) marked like a transitive object in Acehnese may be argued to be unaccusatives, and the same goes for verbs that take the auxiliary *zijn* in the Dutch perfect or that enter the intransitive resultative construction in English. It has been a matter of debate to what extent the unergative or unaccusative behaviour of a verb can be predicted on grounds of its semantics. While Rosen (1984) denies semantic motivation of the unergative-unaccusative distinction, authors such as L&RH, Van Valin (1990), and Zaenen (1993) have amounted considerable evidence to the effect that unaccusative verbs are overwhelmingly if not exclusively either non-agentive verbs or telic verbs or both. However, instead of a single parameter controlling the distinction across languages, these authors found the aspectual parameter of telicity to be a key determinant in Dutch (Zaenen 1993) and Italian (Van Valin 1990), but participant structure features like causativity or agentivity to be the key determinants in English (L&RH) and Acehnese (Van Valin 1990). Van Valin (1990) argues that agentivity plays a role in Dutch as well, but no role in Italian (see Rappaport Hovav & Levin [RH&L] 2000 for counter evidence). Mithun (1991) finds similar differences across languages with split-intransitive argument encoding.

Yukatek, a Mayan language spoken by approximately 800,000 people living across the Yucatán peninsula (in the Mexican states of Campeche, Quintana Roo, and Yucatán; in northern Belize, and in some villages of the Petén province of Guatemala), distinguishes among several classes of intransitive verb stems in two ways: First, aspect-mood inflection on the verb is realized by suffixes. Each of these suffixes has a set of allomorphs. Selection among these allomorphs depends on the verb stem class. And secondly, intransitive stem classes differ in their privileges of undergoing valence-increasing derivations and of being produced by valence-decreasing derivations. The classes distinguished by aspect-mood allomorphy and by transitivity alternations are largely but not completely coextensive. In this paper, the intransitive verb classes of Yukatek are inspected in view of the research on unaccusativity outlined above. In the course of the investigation, the patterns of aspect-mood allomorphy emerge as motivated aspectually. However, the key determinant proves not to be telicity, but rather the presence or absence of an entailment of state change in the predicate, supporting the view advanced by L&RH and RH&L (echoing work by Abusch 1985 that is not concerned with unaccusativity as such) against the assumption, advocated by Van Valin (1990) and Zaenen (1993), that telicity is the crucial aspectual parameter in determining unaccusativity. The classes distinguished by valence alternations are shown to be motivated in terms of participant structure features. It is argued that the parameter determining class membership in this case is not control or agentivity, but causativity, again in line with L&RH and RH&L.

Yukatek also shows a split pattern of argument encoding in intransitive (but not in transitive) clauses. This split is, however, not (directly) lexically conditioned. One aim of the present paper is to lay the foundations for an investigation of the mechanisms that control the argument encoding system (see Krämer & Wunderlich 1999 for one possible analysis). Because it remains unclear how the linking of participant roles onto syntactic arguments works in Yukatek, and because the organization of grammatical relations in this language likewise remains unclear, no claim is made here to the effect that unaccusativity is 'syntactically encoded' in Yukatek, in the sense of Burzio (1986), L&RH, Perlmutter (1978), and Rosen (1984). It is merely argued that certain formally distinguished verb classes of Yukatek correspond semantically to unergative or

unaccusative classes in languages such as Dutch, English, German, or Italian. The theoretical interest of this study is twofold: the Yukatek evidence is brought to bear on the question of what semantic parameters control the unergative-unaccusative distinction and on the question of how closely features of lexical aspect correlate with features of participant structure cross-linguistically. What makes the Yukatek verb class system interesting on both counts is the fact that it is motivated in terms of both participant structure features and aspectual features.

The following section introduces the formal properties of the Yukatek verb class system. After that, the theoretical backdrop is laid out against which aspectual semantics and participant configurations are discussed in the remainder of the investigation.

2. Background on Yukatek clause structure and predicate classes

Yukatek may be characterized as a mildly polysynthetic language. It has predominantly agglutinative morphology, and the maximum complexity word forms reach is modest compared to certain other Mesoamerican languages (e.g. of the Mixe-Zoquean or Uto-Aztekan families). But Yukatek is an exclusively head-marking language, and it displays rich productive incorporation of nouns and adverbs. The organization of grammatical relations in Yukatek remains unclear; 'pivots' in the sense of Van Valin & LaPolla (1997) seem to align with different arguments in different constructions. Therefore, the labels 'subject' and 'object' will be avoided here, resorting instead to Dixon's (1994) 'A' (for transitive arguments receiving an 'actor' macro-role), 'O' (for transitive arguments receiving an 'undergoer' macro-role), and 'S' (for the single argument of intransitives). The basic constituent order is fairly rigidly V-S in intransitive clauses and V-O-A in transitive clauses.

The basic structure of verb clauses in Yukatek is illustrated in Figure 1:

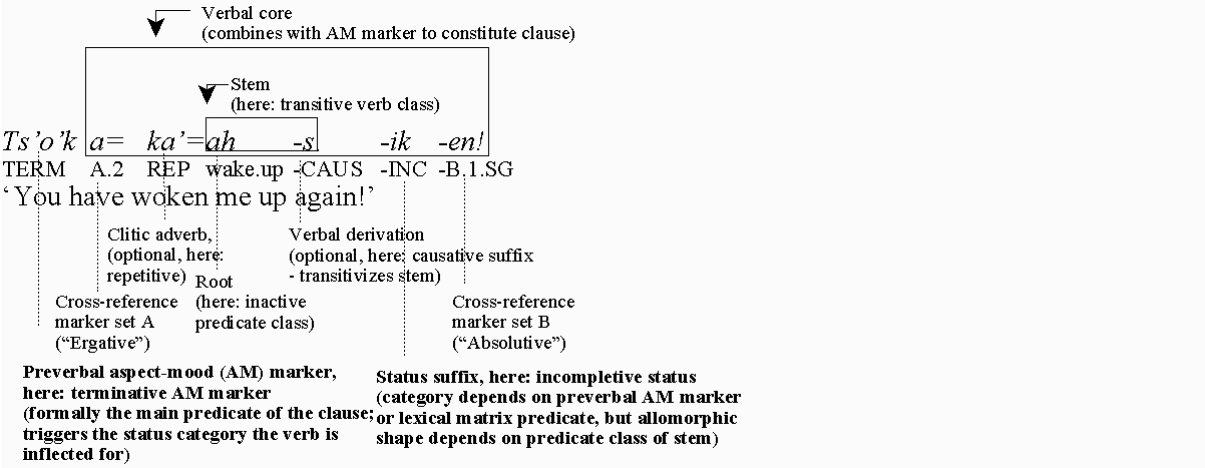

Figure 1. *Basic verb clause structure*

arked obligatorily in two positions: by a preverbal marker (a prefix in some cases and a morphologically independent form in others), called 'Aspect-Mood' (AM) marker here, and by a verb suffix, termed 'status' suffix. In Figure 1, the preverbal slot is occupied by the 'terminative' AM marker, which conveys a perfect-like reading (but without a component of deictic tense), and the suffix slot is occupied by a suffix marking 'incompletive' status. There are 15 AM markers and three status categories (incompletive, completive, and subjunctive; a fourth category does not occur in main clauses). Selection of the status category depends on selection of the AM marker. Figure 2 (overleaf) states for each AM marker the status category it triggers. A detailed analysis of the system of

AM marking and status inflection is given in Bohnemeyer (1998). There, the status categories are analyzed in terms of aspectual boundedness and modal 'assertiveness'. On this account, completive status marks boundedness (or perfectivity) and assertive modality; incompletive status indicates unboundedness (or imperfectivity) and assertive modality, and subjunctive status marks boundedness and non-assertive modality.

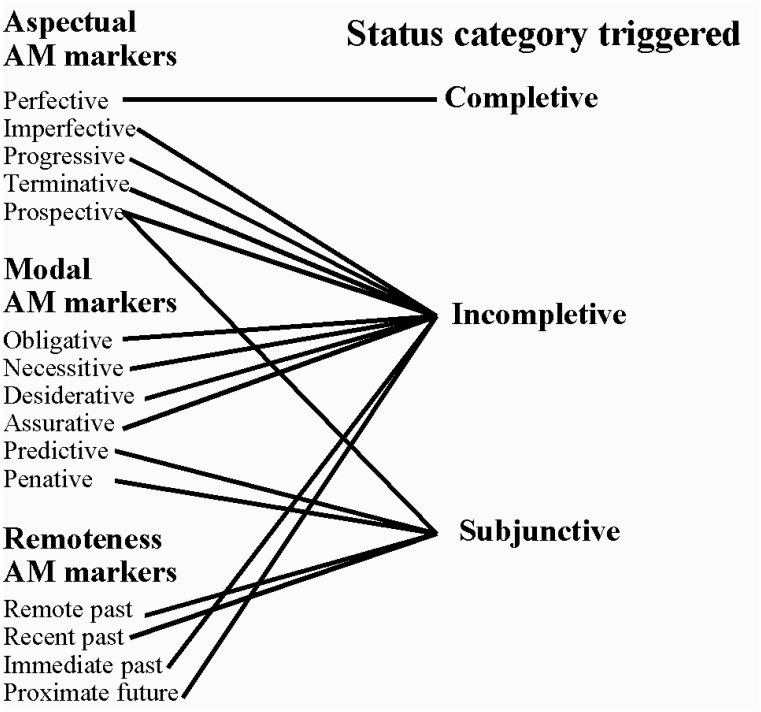

Figure 2. *AM marking and status inflection in main clauses*

S-arguments show a split marking pattern: they are marked by set-A clitics with incompletive status (1a), but by set-B suffixes with the other status categories (2a). In contrast, encoding of transitive A and O is independent of status inflection (compare (1b) and (2b)):[1]

[1] The examples in section II are simplified for expository purposes, but all verb forms shown are in evidence in elicited and/or recorded data. Examples in the other sections were elicited by me unless indicated otherwise. The orthographic representation in this paper is morphemic rather than morpho-phonemic. The orthography applied is based on Lehmann (1996). In the interlinear morpheme glosses, the following conventions are used: '-' for affixes; '=' for clitics; '+' for compounding; '/' for subsegmental realization or infixation. Abbreviations in the glosses include the following: 1 – 1st person; 2- 2nd person; 3 – 3rd person; A – set-A ('ergative'/possessor) clitics; ACAUS- anticausative derivation; ALL – universal quantifier; ALT – 'alternative' particle (question focus, conditional protasis, disjunctive connective); APP – applicative derivation; ATP – antipassive derivation; B – set-B ('absolutive') suffixes; CAUS – causative derivation; CAUSE – causal prepposition; CL (numeral/possessive) classifier; CMP – completive status; CON – connective particle; D1 – proximal deixis; D2 – distal/anaphoric deixis; D3 – textual deixis; D4 – negation final particle; DEF – definite determiner; EXIST – existential/locative/possessive predicate; GIV – Gerundive derivation; IMPF – Imperfective AM;

(1) a. *Intransitive incomplete*
k-**u**=kim-**il**
IMPF-**A.3**=die-**INC**
'he dies'

b. *Transitive incomplete*
k-**u**=hats'-**ik-en**
IMPF-**A.3**=hit-**INC-B.1.SG**
'he hits me'

(2) a. *Intransitive completive*
h=kim-**ɩ-ih**
PRV=die**(CMP)-B.3.SG**
'he died'

b. *Transitive completive*
t-**u**=hats'-**ah-en**
PRV-**A.3**=hit-**CMP-B.1.SG**
'he hit me'

The marking pattern of S-arguments instantiates a 'fluid-S' linking pattern on Dixon's (1994) typology.[2] It does not depend on the lexical verb class, so Yukatek is not an 'active-stative' language: compare the state-change verb *kim* 'die' in (1a), (2a) to the activity verb *meyah* 'work' in (3a,b):

(3) a. *Intransitive incompletive (activity verb)*
k-**u**=meyah-**ɩ**
IMPF-**A.3**=work**(INC)**
'he works'

b. *Intransitive completive (activity verb)*
h=meyah-**nah-ih**
PRV=work-**CMP-B.3.SG**
'he worked'

However, while S-marking does not depend on lexical class membership, status marking does. Patterns of status allomorphy distinguish a system of five verb stem classes. Each class has a unique set of status allomorphs, listed in Table 1.[3]

In view of the split argument encoding pattern of Yukatek and the unclear organization of grammatical relations in this language, the label's 'unergative' and 'unaccusative' are not understood here as predicting a verb's overt linking properties as assumed e.g. in Baker (1997), Grimshaw (1990), Hale & Keyser (1993), Levin & Rappaport Hovav [L&RH] (1995), etc. However, it is argued below that Yukatek unaccusatives entail a 'theme' or 'patient' role, and

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IN – inanimate (classifier); INC – incompletive status; IRR – irrealis modality; LOC – generic preposition; NEG – negation; PASS – passive derivation; PROC – inchoative derivation; PROX – proximate future AM; PL – plural; PLANT – plant (classifier); PROG – progressive AM; PRV – perfective AM; REL – relational derivation (nouns); RES – resultative derivation; SG – singular; SR – subordinator; TERM – terminative AM; TOP – topic marker.

[2] This would make Yukatek the only language in evidence with an aspect-controlled fluid-S pattern. There has been much controversis around this phenomenon. Most Mayanists (e.g. Bricker 1981; Kaufman 1990; Robertson 1992) have read the pattern as an extension of the split-ergative patterns found in some other Mayan languages. Diachronically, this is uncontroversially the case. However, several authors (e.g. Dayley 1981, Straight 1976, Pustet 1992) have stressed the fact that Yukatek differs from the cases considered to be split-ergative in that it shows split intransitivity in main clauses. Krämer & Wunderlich (1999) acknowledge the fluid-S pattern, but argue for an underlying ergative linking mechanism.

[3] /V/ represents a morphophoneme the phonological realization of which is determined by the root vowel.

that this semantic property is reflected in their morphosyntactic properties. In this respect they may be compared to unaccusatives in other languages. The hypothesis pursued in the remainder of this paper is, then, that Yukatek active intransitives correspond to unergatives in other languages, while members of the inactive, inchoative, and positional classes correspond to unaccusatives.

Status category / Verb class		Incompletive	Completive	Subjunct.ve	Extrafocal
unergative	active	*-ɩ*	*-nah*	*-nak*	*-nah-ik*
unaccusative	inactive	*-Vl*	*-ɩ*	*-Vk*	*-ik*
	inchoative	*-tal*	*-chah*	*-chahak*	*-chah-ik*
	positional	*-tal*	*-lah*	*-l(ah)ak*	*-lah-ik*
transitive	(active)	*-ik*	*-ah*	*-ɩ / -eh*	*-ah-il*
	(passive)	\'/ *...-Vl* / *-a'l*	\'/ *...-ab* / *-a'b*	\'/ *...-Vk* / *-a'k*	\'/ *...-ik* / *-a'b-ik*

Table 1. *YM status inflection according to verb classes*

Root members of the 'active' intransitive class include equivalents of *walk*, *sing*, *dance*, *sneeze*, etc. 'Inactive' roots include equivalents of *be born*, *die*, *burst*, *enter*, *exit*, etc. 'Inchoative' stems are all derived from stative roots; they designate the uncaused processes that yield the corresponding states. 'Positional' stems are derived from stative or transitive roots and designate uncaused processes that yield spatial configurations (e.g. 'sit', 'stand', 'hang', 'be between two things').

As Table 1 shows, active stems are zero-marked for incompletive status, while inactive stems are zero-marked for completive status. This distribution has led several researchers to suggest a motivation of the verb class system in terms of 'lexical aspect'. Thus, Krämer & Wunderlich (1999) argue that active stems are 'inherently imperfective', while inactive stems are 'inherently perfective'. More explicitly, Lucy (1994) posits that active stems denote Vendlerian activities and are atelic; inactive stems denote Vendlerian achievements and are telic, and transitive stems denote Vendlerian accomplishments and are telic.

However, as pointed out by Lehmann (1993) and Lucy (1994), there is also substantial reason to believe that the system of intransitive classes is motivated in terms of participant structure features such as agentivity, control, causativity, and state change.[4] This evidence comes from the different privileges of members of the intransitive classes to occur as the input or output of certain valence changing operations. Thus, only active intransitives produce applicative stems in *-t*, adding an applied object:

[4] A 'participant structure' is understood here as a set of thematic relations entailed by a verb root or stem as specified in the lexicon, while an 'argument structure' is a lexical information structure that determines the linking of a verb root or stem's thematic role to morphosyntactic arguments, to the extent that it is not determined by general linking rules (cf. Grimshaw 1990).

(4) *Applicative derivation*

a. Túun meyah ich u=kòol.
PROG:A.3 work in A.3=clear\ATP
'He's working on his milpa [cornfield].'

b. Túun meyah-t-ik u=kòol.
PROG:A.3 work-APP-INC(B.3.SG) A.3=clear\ATP
'He's working his milpa.'

(5) *Applicative derivation*

a. Túun bàaxal yéetel le=bòola=o'.
PROG:A.3 play with DEF=ball=D2
'He's playing with the ball.'

b. Túun bàax-t-ik le=bòola=o'.
PROG:A.3 play-APP-INC(B.3.SG) DEF=ball=D2
'He's playing the ball.'

And only inactive intransitives undergo causative derivation, adding a causer linked to the A-argument and reassigning the participant linked to the erstwhile S-argument to O:[5]

(6) *Causative derivation*

a. Túun kim-il Pedro.
PROG:A.3 die-INC Pedro
'Pedro's dying.'

b. Juan=e' túun kim-s-ik Pedro.
Juan=TOP PROG:A.3 die-CAUS-INC(B.3.SG) Pedro
'Juan, he's killing Pedro.'

(7) *Causative derivation*

a. Túun lúub-ul le=che'=o'.
PROG:A.3 fall-INC DEF=tree=D2
'The tree is falling.'

b. Juan=e' túun lúub-s-ik le=che'=o'
Juan=TOP PROG:A.3 fall-CAUS-INC(B.3.SG) DEF=tree=D2
'Juan, he's felling the tree.'

There are a number of interesting exceptions to these generalizations.[6] Thus, *péek* 'move', 'wiggle' is an active stem by its status pattern, but takes causative rather than applicative derivation:

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[5] Inchoative and positional unaccusatives take distinct causative morphemes *-kVns*/*-kVnt* (where the vowel V depends on the stem vowel and realization of the dental as /*s*/ or /*t*/ is in free variation); however, the semantics of these processes is identical to the semantics of the *-s-* causativization of inactives.

[6] Beside the exceptions discussed here, there is a number of verbs that have either irregular incompletive status inflection (*bin* 'go', *máan* 'pass', and *tàal* 'come' – these are misclassified as members of the active class in Krämer & Wunderlich 1999) or the segment */Vl/* as part of their root (e.g. *bàaxal* 'play'; *òokol* 'rob', 'steal'; *pak'al* 'plant'; *tukul* 'think', etc. – these are misclassified as members of the inactive class in Krämer & Wunderlich 1999). In these cases, only the full status paradigm can clarify class membership.

(8) A*ctive* péek *'move', 'wiggle' undergoing causative derivation*

a. Túun péek le=che'-o'b=o'.
PROG:A.3 move(INC) DEF=tree-PL=D2
'The trees are moving.'

b. Le=ìik'=o' túun péek-s-ik le=che-o'b=o'.
DEF-wind=D2 PROG:A.3 move-CAUS-INC(B.3.SG) DEF=tree-PL=D2
'The wind, it's moving the trees.'

Conversely, *hàan* 'eat' has an inactive status pattern, but undergoes applicative rather than causative derivation:

(9) *Inactive* hàan *'eat' undergoing applicative derivation*

a. Túun hàan-al Pedro.
PROG:A.3 eat-INC Pedro.
'Pedro is eating.'

b. Pedro=e' túun hàan-t-ik wáah.
Pedro=TOP PROG:A.3 eat-APP-INC(B.3.SG) tortilla
'Pedro, he's eating tortillas.'

Finally, non-agentive manner-of-motion verbs like *balak'* 'roll' and *háarax* 'slide' and some emission verbs like *tsíirin* 'buzz' take applicative *-t* with causative semantics (if they transitivize at all):

(10) *Active* balak' *'roll' undergoing applicative derivation with causative semantics*

a. Túun balak' le=bòola=o'.
PROG:A.3 roll(INC) DEF=ball=D2
'The ball is rolling.'

b. Pedro=e' túun balak'-t-ik le=bòola=o'.
Pedro=TOP PROG:A.3 roll-APP-INC(B.3.SG) DEF=ball=D2
'Pedro, he's rolling the ball.'

(11) *Active* tsíirin *'buzz' undergoing applicative derivation with causative semantics*

a. Túun tsíirin le=tìimbre=o'.
PROG:A.3 buzz(INC) DEF=bell=D2
'The bell is buzzing.'

b. Pedro=e' túun tsíirin-t-ik le=tìimbre=o'.
Pedro=TOP PROG:A.3 buzz-APP-INC(B.3.SG) DEF=bell=D2
'Pedro, he's buzzing the bell.'

These apparent mismatches ((8)-(11)) play a crucial role below in pinpointing the decisive semantic determinant of verb class membership.

Finally, detransitivizing operations are also sensitive to the intransitive classification. Antipassivized stems inflect like active intransitives, whereas passivized and anticausativized stems inflect like inactive intransitives:

(12) *Argument-structure/voice alternations of* p'eh *'chip'*

a. *Active transitive*
k-in=p'eh-ik
IMPF-A.1.SG=chip-INC(B.3.SG)
'I chip it'

b. *Antipassive*
k-in=p'èeh
IMPF-A.1.SG=chip\ATP(INC)
'I chip'

c. *Passive*
k-u=p'e'h-el tumèen tèen
IMPF-A.3=chip\PASS-INC CAUSE me

d. *Anticausative ('Middle')*
k-u=p'éeh-el
IMPF-A.3=chip\ACAUS-INC

‘it’s chipped by me’ ‘it gets chipped’ (Bricker et al. 1998: 333)

The following section lays out the theoretical framework for the discussion of the relationship between aspectual semantics and participant structure in the remainder of the study.

3. Theoretical background

The main aim of this section is to recapitulate some recent proposals concerning the relationship between lexical aspect and thematic or participant structure. As is widely customary in contemporary research on lexical aspect, Vendler’s (1957, 1967) ‘time schemata of verbs’ are taken as a starting point here. Vendler’s classification has been subject to diverging interpretations concerning the information that can be derived from determining that a verb stem or construction belongs to one Vendlerian class rather than another. In particular, to what extent does class membership of a verb stem determine that verb stem’s participant structure properties? Two (types of) proposals are of particular interest for the present purposes. One consists of a reconstruction of the four Vendlerian ‘time schemata’ in terms of three purely aspectual parameters: ‘dynamicity’, i.e. the dynamic-stative distinction; ‘telicity’, i.e. the telic-atelic distinction; and ‘durativity’, i.e. the durative-punctual distinction. This approach originates in Mourelatos’s (1981) synthesis of Vendler’s (1957, 1967) and Kenny’s (1963) works on lexical aspect. It has been explicitly proposed in ways equivalent to Table 2 e.g. by Andersen (1990), Smith (1991: 30), and Van Valin & LaPolla 1997: 91-102):

Event type / Aspectual parameter	States	Activities	Accomplishments	Achievements
Dynamicity	-dynamic	+dynamic	+dynamic	+dynamic
Telicity	-telic	-telic	+telic	+telic
Durativity	+durative	+durative	+durative	-durative

Table 2. *A reconstruction of Vendler’s 'time schemata’*

The second proposal to be considered here is a decomposition of Vendler’s ‘time schemata’ based on von Wright’s (1963) ‘Logic of Change’. This was argued for influentially by Dowty (1979). The basic formulas of Dowty’s calculus are given in (13):[7]

(13) *Basic formulas for the representation of Vendler’s ‘time schemata’ in Dowty’s (1979) calculus*

States: $B_n (\forall_1, ..., \forall_n)$

Activities: $DO(\forall_1, [B_n (\forall_1, ..., \forall_n)])$

Achievements: $BECOME[B_n (\forall_1, ..., \forall_n)]$

Accomplishments: $[[DO(\forall_1, [B_n (\forall_1, ..., \forall_n)])] CAUSE [BECOME[\Delta_n (\exists_1, ..., \exists_n)]]]$

Achievements are on this account simple uncaused state changes; accomplishments are (in the most simple case) state changes caused by activities; and activity predicates differ from state predicates in that they entail ‘unmediated control’ of an agent. Thus, each class has a unique participant structure. For simplicity’s sake, the first argument of the DO predicate in (13) is

[7] $\forall_i$, $\exists_i$ denote individuals; B_n, Δ_n denote n-place predicates.

henceforth termed **agent**, and the participants of states and state changes are referred to as **patients** (with physical state change) or **themes** (in all other cases).

The reconstruction in terms of aspectual parameters and Dowty's decompositional approach obviously characterize the Vendler classes in very different terms intensionally. But do they happen to characterize co-extensive sets of event descriptions in natural languages? Even just looking at English, the answer appears to be negative (cf. also Abusch 1985; L&RH; Van Valin & LaPolla 1997: chapter 3). There are two groups of principled mismatches between the two approaches. The first concerns the achievement-accomplishment distinction, which is based on durativity in the aspectual-parameter framework, but on causativity on Dowty's lexical-decomposition account. However, durativity of state-change descriptions is independent of causativity and/or agentivity. Thus, there are non-agentive/non-causative durative state-change verbs, such as *grow up* and *recover* - these denote accomplishments on the classification in Table 2, but achievements on the classification in (13). Conversely, there are causative and/or agentive punctual verbs of state change (e.g. *puncture; smash*) or contact (e.g. *hit; touch*) – these denote achievements on the classification in Table 2 but accomplishments on the classification in (13).

More important for the present purposes is the second group of mismatches. These originate from disalignements between telicity and state change. To begin with, the telicity of state-change descriptions in many cases depends on specific quantification of the patient argument (Verkuyl 1972, 1993). Similarly, the telicity of motion descriptions may depend on the specification of path boundaries. Therefore, on the aspectual-parameter approach, achievement descriptions may be turned into activity descriptions and vice versa, merely by changing quantificational properties or path specifications. This is inconsistent with (13). For example, the telic (14a) denotes an achievement on Dowty's (1979) decompositional account and an accomplishment on the aspectual-parameter approach (see above). In contrast, the atelic (14b) denotes an activity on the aspectual-parameter account. However, it is clearly not the case that (14b) entails an added feature of 'unmediated control'; (14b) still instantiates the achievement formula in (13).

(14) a. The ice cubes melted in the sun (in five minutes).
b. Ice cubes melted in the sun (for five minutes).

An explanation of the dependence of telicity on quantification in examples like (5) that is in line with the lexical decompositions in (13) is Dowty's (1991) 'incremental theme role' analysis based on Krifka's (1989, 1992, 1998) homomorphic mapping of objects into event structures and time intervals.

There are also verbs of state change or location change that are atelic independently of the quantification of patient arguments or the specification of path boundaries. These are 'degree achievement' verbs such as *grow, darken, widen*, *harden*, *dim*, and *cool* (cf. Abusch 1985; Bertinetto & Squartini 1995; Dowty 1979: 88-91) and 'atelic verbs of inherently directed motion' (L&RH) such as *descend*, *rise*, and *fall*. These notional predicate classes are taken up below. Moreover, there are some 'manner-of-motion' verbs which are atelic, but nevertheless have non-agentive and non-causative readings, including *bounce, roll*, *slide,* and *spin* (cf. Levin & Rappaport Hovav 1992); these will be classified as denoting activities in the schema of Table 2, but they do not seem to satisfy the activity formula in (13). Conversely, there are also telic verbs which are (predominantly) agentive and/or causative, including 'agentive assume-position verbs' like *stand up* and *sit down* (RH&L) and 'semelfactives' (Smith 1991: 55-58) with 'point'-meanings (Moens 1987) under non-iterative readings, like *jump* and *cough*.[8]

[8] These would be telic on an account such as outlined in F4, simply because *all* punctual

It should be mentioned that there are alternative decompositional approaches to lexical aspect which like Dowty (1979) (at least implicitly) implement von Wright's state-change calculus but which unlike Dowty (1979) do not stipulate participant structures for aspectual classes. Such approaches have been proposed for example by Klein (1994) and Moens (1987). However, these approaches perform clearly worse than Dowty's in capturing the relationship between state change and telicity. Thus, degree achievements, atelic directed motion events, and gradual changes with indefinitely quantized incremental themes, are treated on a par with activities in these approaches (i.e. as simple 'processes' (Moens 1987) and '1-state-contents' (Klein 1994), respectively).

To the extent that Dowty's (1979) approach remains committed to the telicity tests of Vendler's (1957, 1967) classification, it faces a fundamental problem in the discrepancy between telicity and state change semantics with degree achievement predicates and predicates of 'atelic directed motion'. Kennedy & Levin (2001) offer a treatment of gradual change that promises a solution to this problem (see also Hay, Kennedy & Levin 1999). On their account, any predicate of gradual change ($V_{\spadesuit}$ in (15) below) involves a syntactically optional 'degree of change' argument which specifies the degree (*d* in (5)) to which the theme or patient (*x* in (15)) has changed in the relevant state or 'associated property' (P_V in (15)) at the terminal boundary of the event. Thus:

(15) *Kennedy & Levin's (2001) semantics for verbs of gradual change*

a. $V_{\spadesuit}' = \lambda x \lambda d \lambda e.\mathrm{CHANGE}(P_V)(x)(d)(e)$

b. $[\![\mathrm{CHANGE}(P)(x)(d)(e)]\!] = 1$ iff $P(x)(\mathrm{BEG}(e)) + d = P(x)(\mathrm{END}(e))$

BEG and END are functions from events to times that denote the event's beginning and endpoint, respectively. Thus, 'B $V_{\spadesuit}$s' is true iff B changes during the run time of the event in P_V-ness by *d*-much. This is straightforwardly extended to causative predicates ('A $V_{\spadesuit}$s B' is true iff A causes B to change during the run time of the event in P_V-ness by *d*-much).

The predicate $V_{\spadesuit}$ will be telic if it entails a 'set terminal point' (Krifka 1992) to the event according to the Krifka-Dowty homomorphism. However, computation of the object-event-time homomorphism now operates on predicates with a semantic degree-of-change argument as in (15a). With verbs of creation and verbs of destruction, the degree of change specifies the part of the patient affected by the change at the termination of the event:

(16) *Degree of change with verbs of creation/destruction*

[write (d-much of) x] = $\lambda e.\mathrm{CHANGE}(\mathrm{WRITTEN})(x)(d)(e)$

[eat (d-much of) x] = $\lambda e.\mathrm{CHANGE}(\mathrm{EATEN})(x)(d)(e)$

Thus if no degree is specified, the patient is entailed to be affected completely. If the theme/patient is specifically quantified, the Krifka-Dowty calculus will now deliver a 'set terminal point' to the event, and thus the predicate will behave telically. Hence, (17a-b) are telic, while (17c-d) are atelic:

(17) a. James wrote the letter (in two hours).

b. James wrote half of the letter (in two hours).

c. James wrote letters (for two hours).

d. James wrote letters half-way (for two hours) (but finished none).

In contrast, according to (15b), degree achievement predicates and atelic directed motion predicates cannot entail a set terminal point *unless* a degree of change is specified:

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verbs are telic on such an account.

(18) *Degree of change with degree achievements predicates*
[lengthen x (by d-much)] = 8*e*.CHANGE(LONG)(*x*)(*d*)(*e*)
[shorten x (by d-much)] = 8*e*.CHANGE(SHORT)(*x*)(*d*)(*e*)

(19) *Degree of change with atelic predicates of directed motion:*
[x ascend (d-much)] = 8*e*.CHANGE(UP)(*x*)(*d*)(*e*)
[x descend (d-much)] = 8*e*.CHANGE(DOWN)(*x*)(*d*)(*e*)

Hence, (20a) behaves atelically, while (20b) is telic:

(20) a. The plane ascended (for five minutes).
b. The plane ascended 500 meters (in five minutes).

Kennedy & Levin's approach permits a unified treatment of all predicates of gradual change, whether they are telic or atelic, that preserves the intuition that they denote an element of change. In the following, it is assumed that this treatment can in fact be extended to *all* state change predicates. Discrete changes such as denoted by *die* or *burst* which generally affect an animal or object only as whole, not in parts, can be accommodated to the treatment in (15) under the following set of assumptions: all parts of the object are affected by the change simultaneously; the beginning and endpoint of the event are adjacent (regardless of the duration of a 'preparatory process' in the sense of Moens (1987)); and specification of the degree argument is blocked, so the object is always construed as affected completely, just as in the case of (16). Under these assumptions, then, all state change predicates entail a model-theoretic CHANGE predicate with the semantics stated under (15), in the same way that achievements and accomplishments entail a BECOME predicate in Dowty's (1979) approach. Just like the BECOME predicate (cf. (21)), the CHANGE predicate may be said to entail a thematic relation of theme or patient (cf. (22)):

(21) *Theme/patient as entailed by BECOME (Dowty (1979), Jackendoff (1983), Hale & Keyser (1993), Parson (1990), etc.)*
theme = 8x□P[x BE/BECOME P] (or 8x□y□P[y CAUSE [x BE/BECOME P]])
patient = 8x□P[x BECOME P] (or 8x□y□P[y CAUSE [x BECOME P]])

(22) *Theme/patient as entailed by CHANGE under a Kennedy & Levin (2001) analysis*
theme = 8x□P[x BE/CHANGE P] (or 8x□y□P[y CAUSE [x BE/CHANGE P]])
patient = 8x□P[x CHANGE P] (or 8x□y□P[y CAUSE [x CHANGE P]])

Note that (21) and (22) follow the convention introduced above according to which 'patient' is used for the participant undergoing physical state change and 'theme' for the participant undergoing any other kind of state change (in particular, location change) or described as being in a state or location.

The discussion in this section has shown that there is principled disalingment between a predicate's aspectual properties and its thematic structure. Of particular interest for the remainder of this study are mismatches between telicity, state change semantics, and agentivity or causativity. These mismatches are instrumentalized in the study of Yukatek verb semantics below. They provide litmus tests of the semantic determinants of verb class membership. Consider degree achievement predicates: these combine state change semantics with atelicity (unless a degree of change is specified). If the language treats them on a par with activities, this classification will be based on telicity. But if degree achievements are grouped with state change verbs, then the entailment of state change and the theme or patient role it encompasses will be the crucial determinant. Or take non-agentive manner of motion verbs like *bounce* and *roll*. If these are classified as activities, then either telicity or the presence of absence of state change are key. But if these predicates are treated together with uncaused state-change predicates, then agentivity or causativity must be the controlling parameter.

The next two sections take up the role of telicity, agentivity, and causativity in determining verb class membership in Yukatek. After that, the expected mismatches are addressed again.

4. Telicity in Yukatek verb classes

Before the role of telicity as a possible determinant of verb class membership is addressed, a brief digression to consider how telicity is tested in Yukatek seems in order. There is no formal distinction between duration adverbials such as *for X time* in English and time-span adverbials such as *in X time* in this language. Thus the time adverbials in (23a), which describes discrete state change, and in (23b), which describes an activity, are both headed by the complex preposition *ichil ti'*:

(23) a. T-u=xot-ah=xan hun-kúul che' Pedro
PRV-A.3=cut-CMP(B.3.SG)=also one-CL.PLANT tree Pedro
ich-il ti' ka'-p'éel òora.
in-REL LOC two-CL.IN hour
'Pedro also cut a tree in two hours.' <Quant MD SBM>

b. (...) Maria=e' t-u=pax-ah piyàano
Maria=TOP PRV-A.3=play-CMP(B.3.SG) piano
ich-il ti' ka'-p'éel òora.
in-REL LOC two-CL.IN hour
'(...) Maria, she played the piano for two hours.' <Quant MD SBM>

There is likewise no formal distinction between duration verb phrases such as *spend X time* in English and time-span verb phrases like *take X time*. Thus, (24a), describing a discrete state change, and (24b), describing an activity, feature the same idiom headed by *ch'a'* 'take' expressing lapse of time:

(24) a. (...) káa t-u=ch'a'-ah tres dìiyas u=ti'a'l
káa PRV-A.3=take-CMP(B.3.SG) three days A.3=for
uy=èem-s-ik u=pìits'-il le=taman-o'b=o', (...)
A.3=descend-CAUS-INC(B.3.SG) A.3=cotton-REL DEF=sheep-PL=D2
'(...) (and then) / it took him / he spent / three days in order to shear (lit. pluck) the wool of the sheep, (...)'

b. (...) káa t-u=ch'a'-ah hun-p'éel k'ìin u=ti'a'l
káa PRV-A.3=take-CMP(B.3.SG) one-CL.IN sun A.3=for
u=hi'+nòok' túun (...)
A.3=smooth+cloth CON
'(...) (and then) / it took her / she spent / one day in order to iron cloth (...)' (Bohnemeyer 1998: 441)

There is a distinction between egressive/terminative phase verbs that entail completion (like *complete*, *end*, and *finish*) and those that don't (like *cease*, *quit*, and *stop*). Consider the contrast in (25) between *ts'o'k* 'end' which entails completion when combined with verbs of discrete state change and *ch'en* 'stop' which does not:

(25) Le=meyah ko'n mèet=o',
DEF=work SR.IRR:B.1.PL do(B.3.SG)=D2
las sìinko k-ak=ch'en-ik,
five.o'clock IMPF-A.1.PL=stop-INC(B.3.SG)
pero ma' k=ts'o'k-s-ik túun=e'; (...)
but NEG.PROG A.1.PL=end-CAUS-INC(B.3.SG) CON=D3

'The work we are going to do, we will quit at five, but we won't finish it (tomorrow), ...' (Bohnemeyer 1998: 248-249)

However, unlike English *complete*, *end*, and *finish* (cf. Dowty 1979), *ts'o'k* 'end' also combines with activity expressions:

(26) Táan u=ts'o'k-ol u=bàax-t-ik le=bòola=o',
PROG A.3=end-INC A.3=play-APP-INC(B.3.SG) DEF=ball=D2
káa=h=ts'o'k u=pàax.
káa=PRV=end(B.3.SG) A.3=play.music\ATP
'She was about to quit (lit. finish) playing the ball, (when) (the other woman) quit (lit. finished) playing (guitar).' (Bohnemeyer 1998: 249)

This means that there is no direct formal reflex of telicity in Yukatek; i.e. there is no co-occurrence restriction sensitive to the telic-atelic distinction (similarly Baker 1995: 290 for Mohawk and Smith 1996 for Navajo). There are, however, semantic tests that allow to assess the telicity of a predicate. One such criterion consists in scope ambiguity with *almost*-type operators. Consider the following two test frames:

(27) *Test frame for prospective readings with* ta'itak *'almost'*
Ta'itak u=VERB Pedro, chéen+ba'l=e'h=p'áat
PROX A.3=VERB Pedro only+thing=TOP PRV=leave\ACAUS(B.3.SG)
mix t-u=chúun-s-ah u=VERB=i'.
EMPH.NEG PRV-A.3=start-CAUS-CMP(B.3.SG) A.3=VERB=D4
'Pedro almost VERB-ed, but he ended up not even starting to VERB.'

(28) *Test frame for progressive readings with* ta'itak *'almost'*
Táan u=VERB Pedro ka'ch-il,
PROG A.3=VERB Pedro formerly-REL
hach ta'itak u=VERB, chéen+ba'l=e'h=p'áat
really PROX A.3=VERB only+thing=TOP PRV=leave\ACAUS(B.3.SG)
ma' t-u=ts'o'k-s-ah u=VERB=i'.
NEG PRV-A.3=end-CAUS-CMP(B.3.SG) A.3=VERB=D4
'Pedro was VERB-ing, he almost VERB-ed, but he ended up not finishing VERB-ing.'

The 'proximate future' AM marker *ta'itak* encompasses both a 'prospective' reading in which it has scope over the entire event and a 'progressive' reading in which it has scope only over the the event's 'culmination' (in Moens's (1987) sense). The two frames serve to disambiguate between these two readings: (27) excludes the reading under which the event is already in progress and *ta'itak* has scope over the culmination only, while (28) excludes the reading under which the event has not yet begun and *ta'itak* has scope over the entire event. The latter reading should be possible only with telic predicates (see Dowty 1979: 58).[9] Indeed, the putative unaccusative verbs of Yukatek are generally possible in (27) and (28) (if they're durative!) whereas active intransitives are only possible in (27). This has not been tested for degree achievement predicates and atelic directed motion predicates; the prediction is they behave like

[9] Alternatively, one could argue that the two readings are indistinguishable with atelic predicates, since any part of the event denoted by an atelic predicate could be considered a 'culmination'.

active intransitives.

A second test concerns event realization under cessation. Events denoted by atelic predicates are realized at any time after their beginning, even if they are interrupted. In contrast, telic predicates denote events that are only realized once their culmination is reached. Therefore, the test frame under (29) produces affirmative answers with atelic predicates but negative responses with telic predicates.

(29) *Test frame for realization under cessation*
Pedro=e' ts'-u=chúun-ul u=VERB,
Pedro=TOP TERM-A.3=start\ACAUS-INC A.3=VERB
káa=h=t'a'n-ih,
káa=PRV=call\PASS-B.3.SG
káa t-u=p'at-ah. Ts'-u=VERB Pedro?
káa PRV-A.3=leave-CMP(B.3.SG) TERM-A.3=VERB Pedro
'Pedro, he had started to VERB, (when/and then) he was called (and) quit. Had Pedro VERB-ed?'

214 verbs of all classes have been tested in this frame, eliciting responses from five adult native speakers. This test shows verbs of gradual change to be telic if they entail a discrete endstate and the theme is definitely quantized. However, degree achievement verbs and atelic verbs of directed motion prove to be atelic, even though they pattern with the inactive and inchoate classes, i.e. the putative unaccusatives of Yukatek:[10]

(30) *Degree achievements: realization under cessation*
Pedro=e' táan u=ka'n-al, káa=h=ts'a'b
Pedro=TOP PROG A.3=get.tired-INC káa=PRV=give\PASS(B.3.SG)
kàafe ti', káa=h=p'íil y=ich.
coffee LOC(B.3.SG) káa=PRV=open(B.3.SG) A.3=eye
Ts'-u=ka'n-al Pedro? - Ts'-u=ka'n-al.
TERM-A.3=get.tired-INC Pedro TERM-A.3=tire-INC
'Pedro, he was getting tired, (when/and then) coffee was given to him (and) he refreshened (lit. his eyes opened). Had Pedro become tired? - He had become tired.'

(31)-(32) list some of the verb stems encoding degree achievements and atelic directed motion events, respectively, attested to behave atelically in (29):

(31) *Some degree achievement verbs that behave atelically in (29)*
bòox-tal 'blacken'
chichan-tal 'shrink'
káal-tal 'get intoxicated'
ka'n 'get tired'
la'b 'deteriorate'
t'íil 'last, drag on'
ts'úum 'deflate'
ts'u'k 'rot'
úuchben-tal 'age'
wi'h-tal 'get hungry'

[10] See L&RH (172-173) for similar properties of the corresponding verb classes in English and Italian.

(32) *Some atelic directed motion verbs that behave atelically in (29)*[11]
kàabal-tal 'lower, sink'
lúub 'fall'
na'k 'ascend'

The test in (29) shows some active intransitive verbs to be atelic (like *che'h* 'laugh', *meyah* 'work', *ts'íikil* 'be angry', *wayáak'* 'dream' and *léembal*, *lemléem* 'lighten, flicker, flash'). However, surprisingly, many active intransitives in fact behave telically in (29), like *k'àa*y 'sing' in (33):

(33) *Activities: no realization under cessation*
Pedro=e' **táan** **u=k'àay,** káa t-u=k'at-ah
Pedro=TOP **PROG** **A.3=sing\ATP** káa PRV-A.3=cross-CMP(B.3.SG)
u=báah Pablo. Pedro=e' t-u=p'at-ah u=k'àay.
A.3=self Pablo Pedro=TOP PRV-A.3=leave-CMP(B.3.SG) A.3=sing\ATP
Be'òora=a' **ts'o'k=wáah** **u=k'àay** Pedro? -
now=D2 **TERM=ALT** **A.3=sing\ATP** Pedro
Ma'=h=bèey-chah u=k'àay=i'.
NEG=PRV=thus-PROC.CMP(B.3.SG) A.3=sing\ATP=D4
'Pedro, **he was singing,** (when/and then) Pablo interfered. As for Pedro, he quit singing. Right now, **has Pedro sung?** - It wasn't possible for him to sing.'

The reason for this behavior is that active intransitive stems produce inflected nouns as well as inflected verbs, without overt derivation (some Mayanists consider them to *be* nouns). Examples:

(34) *Verbal and nominal uses of active intransitive stems*
bàaxal 'to play, playing, game/joke'
kàanbal 'to study, studying, study'
k'àay 'to sing, singing, song, singer'
meyah ' to work, working, work, worker'
náay 'to dream, dreaming, dream'
pàax 'to play music, playing music, music, musician'
óok'ot 'to dance, dancing, dance, dancer'
se'n 'to cough, coughing, catarrh'
tsikbal 'to chat, chatting, story'
tùukul 'to think, thinking, thought'
tùus 'to lie, lying, lie'
t'àan 'to speak, talking, speech/word'

Due to this morphological indeterminacy, active stems are prone in certain environments to invoke 'performance object' readings, which their English counterparts only receive in transitive clauses with cognate objects, like *to sing a song*, *to dance a dance*, etc. (cf. Dowty 1979: 69-70). These interpretations result in telic behaviour.

Thus, semantic evidence regarding telicity is conflicting - active intransitives are atelic on account of their scopal properties, but many of them show telic behaviour under cessation, depending on the construction. However, on all accounts, degree achievement verbs and atelic verbs of directed motion are atelic, even though they are all in the unaccusative classes.

Recollect now that membership of degree achievement verbs and atelic verbs of directed

[11] Note that verbs like *lúub* 'fall' and *na'k* 'ascend' behave telically when combined with goal phrases.

motion in the unaccusative classes can still be motivated under an aspectual analysis, if that analysis assumes Kennedy & Levin's (2000) CHANGE predicate, rather than telicity, as the determining factor!Several sources of evidence support the assumption that the verbs in question lexicalize state change. First of all, degree achievement stems and stems of atelic directed motion include inchoative stems, which are overtly derived from stative roots by a suffix *–tal* (cf. (31)-(32)). Moreover, like all unaccusatives, degree achievement stems and stems of atelic directed motion verbs produce derived stative resultative forms in *-a'n*; cf. (35):

(35) *Degree achievement root* ka'n *'get tired' with resultative* -a'n
Hach ka'n-a'n-en.
really get.tired-RES-B.1.SG
'I'm very tired.'

Active intransitives only exceptionally produce this form, and only in combination with completive status inflection. Finally, like all unaccusatives, degree achievement verbs and atelic verbs of directed motion may incorporate the universal quantifier *láah*, which active intransitives never do):

(36) *Atelic directed motion verb* lúub *'fall' incorporating universal quantifier* láah
Yàan nukuch óox=o': h=lúub-láah-ih.
EXIST(B.3.SG) big breadnut.tree=D2 PRV=fall-ALL-B.3.SG
'There were huge breadnut trees: they fell completely [in a hurricane].'

Incorporation of the universal quantifier directly reflects the incremental theme role. The quantifyer has scope either over a set of referents or over the degree of change. Under the latter reading, the quantifier signals 'total affectedness'.

To summarize, telicity is a bad predictor of verb class membership in Yukatek. In contrast, state change semantics proves to be an excellent predictor. If a single-argument verb incorporates a CHANGE predicate, it is assigned to an unaccusative class; otherwise, it is assigned to the unergative class.

5. Causativity and agentivity in Yukatek verb classes

Evidence regarding agentivity and control as determinants of verb class membership in Yukatek is inconclusive. Lehmann (1993) tests 450 stems of all classes for control, using the frame in (37):

(37) *Control test frame in Lehmann (1993)*
T-u=pat-ah u=báah u=VERB.
PRV-A.3=dare-CMP(B.3.SG) A.3=self A.3=VERB
'(S)he dared/tried to VERB.' (Lehmann 1993: 217)

If the distinction of intransitive verb classes was motivated in terms of control, then all or most active intransitives should be possible in (37), whereas all or most members of the other intransitive classes should be excluded. However, Lehmann (1993) finds that the active stems listed in (38) are not acceptable in (37), while the unaccusative stems in (39) are in fact acceptable:

(38) *Some non-agentive active stems in Lehmann (1993)*
òok'ol 'cry, weep',
kíilbal 'thunder',
húum 'roar',
léembal 'shine',
he'síin 'sneeze'

(39) *Some agentive unaccusative stems in Lehmann (1993)*
wa'l-tal 'stand up',
kul-tal 'sit down',
chil-tal 'lie down',
xol-tal 'kneel'

These mismatches are not coincidental. Cross-linguistically, verbs of 'emission' like English *cry*, *sneeze*, and *shine* are often found realized as non-controlled unergatives, because their single argument is neither active (it does not necessarily – in some cases not possibly - cause or initiate the emission and may not be able to stop it) nor does it undergo a state change. In contrast, 'assume position' verbs like *sit down*, *stand up*, and *lie down* in English are often found realized as controllable unaccusatives, as their argument undergoes a state change, but may also cause and control that state change (if animate) (cf. L&RH; RH&L).

It turns out, then, that control – and to this extent agentivity – is not an optimal predictor of verb class membership. However, causativity may be better predictor. L&RH suggest that verbs undergoing the causative-inchoative alternation in English and/or occuring in intransitive resultative constructions express 'externally caused' events, while verbs that do not undergo causative-inchoative alternation and do not occur in intransitive resultative constructions express 'internally caused' events.

L&RH's proposal might be adapted to Yukatek along the following lines: verbs that causativize express 'externally caused' (or uncaused) events, whereas verbs that don't causativize express 'internally caused events'. Internally caused events may be construed as directly causing other events. On this account, the semantics of the detransitivizing operations may be characterized as follows: [12]

(40) *Antipassive rule: the antipassive stem denotes an activity causing a state change such that the activity is entailed by the corresponding transitive stem*
$\exists = [_{via} [\forall]_{vt} \backslash ATP]$
& $\forall$' = 8x8y$\square$e$_1\square$e$_2$[DO(e$_1$) & agent(e$_1$,x) & CHANGE(e$_2$) & theme(e$_2$,y)
& CAUSE(e$_1$,e$_2$)]
-> $\exists$' = 8x$\square$e$_1$[DO(e$_1$) & agent(e$_1$,x)]

(41) *Anticausative rule*: *the anticausative stem denotes the state change entailed by the corresponding transitive stem*
$\exists = [_{vii} [\forall]_{vt} \backslash ACAUS]$
& $\forall$'= 8x8y$\square$e$_1\square$e$_2$[DO(e$_1$) & agent(e$_1$,x) & CHANGE(e$_2$) & theme(e$_2$,y)
& CAUSE(e$_1$,e$_2$)]
-> $\exists$' = 8y$\square$e$_2$[CHANGE(e$_2$) & theme(e$_2$,y)]

(42) *Passive rule: the passive stem denotes the state change entailed by the corresponding transitive stem; unlike in (40) entailment of the cause is retained*
$\exists = [_{vii} [\forall]_{vt} \backslash PASS]$

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[12] The formalism is based on Parsons 1990. *P* and *Q* denote generic event predicates and *arg* a generic thematic relation. Krämer & Wunderlich (1999) give a similar account of the valence-changing operations, but crucially neglect the causal relation between subevents, presumably because they wish to maintain that causativity plays no desicive role in the system of predicate classes. On their proposal, the subevents are merely aspectual phases of the verb meaning.

& ∀'= 8x8y□e$_1$□e$_2$[DO(e$_1$) & agent(e$_1$,x) & CHANGE(e$_2$) & theme(e$_2$,y)
& CAUSE(e$_1$,e$_2$)]
-> ∃' = 8y□e$_1$□e$_2$[CHANGE(e$_2$) & theme(e$_2$,y) & CAUSE(e$_1$,e$_2$)]

DO in (40)-(42) is not characterized by 'unmediated control', as in Dowty 1979 (see (13) above), but by 'internal causation'; 'agent' and 'theme' are thematic relations entailed by DO and CHANGE, respectively.

The transitivization rules in (43) and (44) below predict "applicative semantics" just in case the single argument is an agent and causative semantics otherwise, regardless of the class membership of the base. Selection of *-s* vs. *-t* as the morphological expression of transitivization is under this assumption independent of the semantics of the process.[13] This takes care of the mismatches discussed in (8)-(11) above.

(43) *Applicative rule: the transitivization of a verb denoting an internally caused event has applicative semantics*
∃ = [$_{vt}$ [∀]$_{vi}$] & ∀' = 8x□e$_1$[DO(e$_1$) & agent(e$_1$,x)]
-> ∃' = 8x8y□e$_1$□e$_2$[DO(e$_1$) & agent(e$_1$,x) & Q(e$_2$) & arg(e$_2$,y) & CAUSE(e$_1$,e$_2$)]

(44) *Causative rule: the transitivization of a verb denoting an uncaused event has causative semantics*
∃ = [$_{vt}$ [∀]$_{vi}$] & ∀' = 8y□e$_2$[Q(e$_2$) & arg(e$_2$,y) & ¬DO(e$_2$)]
-> ∃' = 8y8x□e$_1$□e$_2$[DO(e$_1$) & agent(e$_1$,x) & Q(e$_2$) & arg(e$_2$,y) & CAUSE(e$_1$,e$_2$)]

The presence or absence of internal causation, rather than that of state change, is the decisive factor determining whether (43) or (44) apply. This has been chosen on account of the fact that verbs of emission and non-agentive manner of motion do not have state change semantics, so their transitive counterparts should have applicative semantics if state change were the determining factor.

Note that it is not assumed in (43)-(44) that transitivized verbs by necessity entail state change. A possible argument against the analysis in (43)-(44) is that controllable assume-position verbs causativize, as shown in (45):

(45) *Positional* wa'l-tal *'stand up' undergoing causativization*
K-a=wa'l-kunt-ik u=tisèera-il-o'b.
IMPF-A.2=stand-CAUS-INC(B.3.SG) A.3=cross.tie-REL-PL
'You erect the cross ties.' <K'axbil 27>

This might be contrued as a conflict with (43) which predicts that verbs encoding internally caused events applicativize. However, it seems debatable whether internal causation really constitutes a lexical entailment of verbs like *wa'l* 'stand up'. Internal causation could be a mere inference from the animacy of the theme argument required with these verbs. The large majority of verbs in this class take inanimate themes and thus do not give rise to the inference.[14] This,

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[13] Evidence for the semantics of transitization depending neither on class membership as per status pattern nor on the *–s/-t* distinction comes from K'iche' Maya: in K'iche', there's only a single transitization process which may have causative or applicative semantics depending on base root or stem (Cliff Pye, p.c.).

[14] The argument may be extended to verbs of 'directed motion' (L&RH) such as *bin* 'go', *hóok'* 'exit', and *tàal* 'come'. These are all in the inactive class, and as shown in Bohnemeyer (submitted), they lexicalize pure location change, unlike their English counterparts. Yet, like the assume-position verbs they frequently combine with animate S-arguments (although not as exclusively as is the case with e.g. *kul* 'sit' which only takes a human argument) and in that case

however, only points to a more fundamental problem with the 'internal causation' analysis: this analysis remains circular as long as there is no criterion to test 'internal causation' other than applicative semantics under transitivization. Pending a resolution of this problem, it may by hypothesized, in accordance with (40)-(44), that the members of the inactive, inchoative, and positional verb classes – the predicates that causativize, i.e. the putative unaccusatives – express uncaused state changes, whereas members of the active intransitive class – the predicates that applicativize, i.e. the putative unergatives - encode internally caused events. The key determinant of whether a transitivized verb has applicative or causative semantics is internal causation. Mismatches such as the emission and manner-of-motion verbs that applicativize, but with causative semantics, even though they belong to the inactive class, originate in a disalingment of the two motivating parameters of verb class membership, internal causation and state change semantics. It appears to be the latter that takes precedence in such cases of conflict. These mismatches will be reconsidered in the following section.

6. Misfits revisited

In this section, some apparent mismatches between participant structure features and/or aspectual features and verb class membership are examined, with the aim of establishing in each case which semantic property (if any) seems to be the key determinant of the particular verb's class membership.

Hàan 'eat' denotes an agentive event, even though it morphologically patterns with the inactive intransitives. Now, in the realization-under-cessation test frame (29), *hàan* actually behaves telically:

(46) Hàan *'eat': no realization under cessation*
Pedro=e', táan u=hàan-al, káa t-u=k'at-ah
Pedro=TOP PROG A.3=eat-INC káa PRV-A.3=cross-CMP(B.3.SG)
u=báah Pablo. Pedro=e' t-u=p'at-ah u=hàan-al.
A.3=selfPablo Pedro=TOP PRV-A.3=leave-CMP(B.3.SG) A.3=eat-INC
Be'òora=a', ts'o'k=wáah u=hàan-al Pedro? - Ma'=h=hàan=i'.
now=D2 TERM=ALT A.3-eat-INC Pedro NEG=PRV=eat(B.3.SG)=D4
'Pedro, he was eating, (when/and then) Pablo interferred. Pedro, he quit eating. As of now, has Pedro eaten?' – 'He didn't eat.'

This suggests that *hàan* may indeed have state change semantics. It is perhaps better glossed 'become satisfied through ingestion', rather than 'eat'. However, as shown in (9) above, *hàan* applicativizes rather than to causativize. Perhaps this has to be considered a genuine case of lexical ambiguity – a verb that encompasses both a state change and an activity reading.

In constrast, verbs of emission like *tsíirin* 'buzz' and verbs of uncaused manner of motion like *balak'* 'roll' are non-agentive (as shown in the previous section), even though they are members of the active intransitive class. These verbs behave atelically in (29) and thus may be assumed to indeed express activities rather than state changes:[15]

(47) Balak' *'roll': realization under cessation*

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are controllable. Yet, they all causativize. Thus, it is assumed here that controllability is to some extent independent of internal causation.

[15] Examples (47) and (48) were verified with native speakers by Barbara Pfeiler, which is gratefully acknowledged here.

Le=bòola=o' ts'-u=chúun-ul u=balak',
DEF=ball=D2 TERM-A.3=start\ACAUS-INC A.3=roll
káa=h=he'l-s-a'b-ih.
káa=PRV=rest-CAUS-CMP.PASS-B.3.SG
Ts'-u=balak' le=bòola=o'? - Ts'o'k-ih.
TERM-A.3=roll DEF=ball=D2 TERM-B.3.SG
'The ball had started rolling, (when/and then) it was stopped. Had the ball rolled?' – 'It had.'

The same holds for *péek* 'move', 'wiggle' (which causativizes; see the appendix):

(48) Péek *'move': realization under cessation*
Le=bòola=o' ts'-u=chúun-ul u=péek,
DEF=ball=D2 TERM-A.3=start\ACAUS-INC A.3=move
káa=h=he'l-s-a'b-ih.
káa=PRV=rest-CAUS-CMP.PASS-B.3.SG
Ts'-u=péek le=bòola=o'? - Ts'o'k-ih.
TERM-A.3=move-INC(B.3.SG) DEF=ball=D2 TERM-B.3.SG
'The ball had started moving, (when/and then) it was stopped. Had the ball moved?' – 'It had.'

In contrast, all assume-position verbs, including the agentive ones, again entail state change: they behave telically in (29).

(49) Kul-tal *'sit down': no realization under cessation*
Pedro=e' táan u=kul-tal, káa=h=máan
Pedro=TOP PROG A.3=sit-INC.PROC káa=PRV=pass(B.3.SG)
tul-bil le=k'an+che'=o', káa=h=lúub Pedro.
push-GIV(B.3.SG) DEF=four+tree=D2 káa=PRV=fall(B.3.SG) Pedro
Ts'-u=kul-tal te=k'an-che' Pedro=o'?
TERM-A.3=sit-INC.PROC LOC:DEF=four+tree Pedro=D2
- Ma'=h=kul-lah-i'.
NEG=PRV=sit-CMP.PROC(B.3.SG)-D4
'Pedro, he was sitting down on the chair, (when/and then) the chair was pushed away (and) Pedro fell down. Did Pedro sit down on the chair?' – 'He didn't sit down.'

Thus, in cases of a clash between agentivity (as attested by control) and state change semantics, the latter always takes precedence. The aspectual distinction between presence and absence of state change in the semantics of a verb determines the verb's status pattern. To the extent that state change semantics entails a theme role (cf. section 3), it is therefore appropriate to consider the inactive, inchoative, and positional verbs of Yukatek counterparts of unaccusatives in other languages.

7. Conclusions

Neither the participant structure features agentivity and control nor the aspectual features telicity and dynamicity are good predictors of verb class membership in Yukatek. Telicity in particular has no formal reflex in this language, and semantic evidence for telicity in unergative verbs is conflicting, in that due to noun-verb indeterminacy, unergatives, although morphosyntactically intransitive, frequently assume telic 'performance object' readings. These findings reinforce earlier suggestions (Abusch 1985; L&RH; Van Valin & LaPolla 1997) to the effect that there is no one-to-one mapping from participant configurations into event structures.

The best predictor of a verb's pattern of status inflection proves to be the entailment of state change. Degree achievement verbs and 'atelic verbs of directed motion' pattern with the verbs of discrete state change in this respect, providing evidence in support of a unified state change analysis as proposed by Kennedy & Levin (2001). A verb's transitivization properties may be motivated by a feature of 'internal causation' as proposed by L&RH for English (see appendix). However, an independent criterion that would allow to test verbs for this feature is lacking. Principled mismatches between a verb classification based on state change semantics and a verb classification based on 'internal causation' are certain verbs of emission and uncaused manner of motion which entail neither state-change nor internal causation.

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