

**Non-Culmination at the Syntax/Semantics Interface - the case for
unifying Modal and Scalar approaches**

Intensional semantics of lexical aspect - as it relates to telicity, and
non-culmination from a crosslinguistic perspective

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Abstract

This thesis offers the basis for a crosslinguistic analysis of the phenomenon of Non-Culminating Accomplishments with a theoretical model that sits at the syntax/semantics interface. Recent literature has brought to light empirical counterexamples to particular foundational views in lexical aspect and much analysis on NCAs themselves are specific accounts of specific empirical cases. My thesis looks at these foundational theoretical points of view and embeds them in a novel theoretical setting to attempt to provide a crosslinguistically motivated theory of the semantics of non-culmination. This has been achieved, in part, through elicitation with native speaker correspondents alongside existing empirical data to inform a theoretical model.

to my friends, old and new.
to my family, enduring.
always for the future.

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References

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1 Setting the stage - Non-Culmination & Telicity

Picture the scene: if I tell you that I solved the Rubik’s Cube, you would naturally assume that I have taken an unsolved Rubik’s Cube and applied a set of algorithms to it that ultimately changes it from an unsolved to a solved state. In English, it would be particularly odd for me to use the sentence “I solved a Rubik’s Cube” if I had just picked it up, twiddle with it for a few minutes, and put it down out of sheer frustration.

“Solve a Rubik’s Cube” is an example of an “accomplishment” predicate. Accomplishments are durative change-of-state predicates, meaning that they refer to changes that extend over a period of time (i.e., “write a book”, “cook dinner”, “build a house”, etc). When used in the perfective aspect or the past tense, it has been widely thought that they entail the endpoint of the event denoted (Vendler (1957), Krifka (1998), Rothstein (2008), Bach (1986), Parsons (1990), Comrie (1976), Verkuyl (1989), amo).

It would therefore be expected, if classical theories of lexical aspect are true, that across the world’s languages, sentences such as the following will be infelicitous and outright contradictory. On the surface, it appears as if you are denying what is entailed:

- (1) John solved a Rubik’s Cube, # but never finished it

However, it has become clear in contemporary studies on lexical aspect that such an entailment of the completion of the event is not always a necessary part of the predicate’s semantics, leading to examples such as the following:

- (2) Aalak gae roobik, dtae gae mai daai
Alex fix Rubik’s, but solve NEG MOD
‘Alex solved the rubik’s cube, but couldn’t’ (own data, **Thai**)
- (3) tû= ò ta =te dà=bème mǎ-tè=bú
3sg=KO kill=REAL this=though NEG-die=NEG
‘I killed him, but he didn’t die’ KATO (2014) - EXAMPLE 5 **Burmese**
- (4) Yǔfēi guānle nà shàn mén, kěshì mén méiyǒu guānshàng
Yufei shut.PFV that CL door, but door not-have.PFV shut
‘Yufei closed the door, but the door didn’t close’. (Martin, 2019) **Mandarin**

Sentences (2)-(4) are an obvious puzzle, because they fundamentally are at odds with an understanding of lexical aspect that believes that accomplishment predicates entail the endpoints of the events that they denote. In all of the above examples, notice that a regular accomplishment predicate asserts that something has happened to something in the world, but that the change denoted by the verb is not fully realised on the theme. For example, the door is not closed

and the Rubik’s cube is not solved.

If endpoints were an entailed part of the predicate’s semantics, it would be impossible to reject the arrival at the event’s endpoint. Because of this, examples (2)-(4) are commonly known as “non-culminating accomplishments” (NCAs) ¹. What sets NCAs apart from regular accomplishments is that the endpoint of the events that they denote is not entailed, but merely implied. This allows for a licit denial of the outcome of the event or an outright rejection of full completion of the change-of-state denoted by the verb.

NCAs are not an empirical novelty. Since the 1980s, linguists have pointed out their presence in many of the world’s languages. One of the earliest revelations comes from Ikegami (1981) who describes the case from Japanese, where it is possible to have sentences such as the following²

- (5) wakashita keredo, wakanakatta.
boiled though, didn’t-boil
'I boiled the water, but it didn’t boil'

Since then, a wellspring of empirical data has emerged that describes similar patterns of non-culmination across a typologically broad sample of languages. Singh (1998) describes that similar properties occur in Hindi, for example:

- (6) mae ne aaj apnaa kek khaaya aur baakii kal
I ERG today mine cake eat-PERF and remaining tomorrow
khaauugaa
eat-FUT
'I ate my cake today and I will eat the remaining part tomorrow'

Bar-El et al. (2005) describes a similar set of facts for St-át-ímcets:

- (7) máys-en-lhkan ti q'láxan-a, t'u7 cw7ay t'u7 kw-s
fix-TR-1SG.SU DET fence-DET but NEG just DET-NOM
tsúkw-s-an
finish-CAU-1SG.ERG
'I fixed a fence, but I didn’t finish.' (Bar-El et al. (2005)p.4

Further to this, NCA behaviour has been demonstrated in Burmese (Kato (2014)), Thai (Koenig and Muansuwan (2000)) Malagasy (Paul et al., 2020); Russian (Tatevosov, 2008); Mandarin (Martin et al., 2021); Korean (Lee (2015)), Beavers and Lee (2020)); Xhosa and Nyakyusa (Persohn, 2022).

¹Other names have been proposed in the literature, such as partitive accomplishment Martin and Demirdache (2020). However, NCA is the term that I will use for the paper for reasons of explanatory ease

²Note that this example includes subject and object omission, common in Japanese idiomatic expressions (Ikegami 1981, p.273)

Explanations of non-culmination seem to include two major schools of thought. The first school of thought is that non-culmination is a feature of *modality* (Nadathur and Filip (2021), Lee (2015), Koenig and Davis (2001)). Modal views of non-culmination propose that the endpoint of an event may be true of a possible world, meaning that you may deny that the outcome has been reached in the evaluation world. The other school of thought is that non-culmination is a feature of language-specific *scalar* properties, which ultimately says that different languages may have differing requirements for how much scalar change is necessary for an accomplishment to be considered true (Martin et al. (2021), Filip (2008), amo).

In this thesis, we will explore the semantics of NCAs by examining these contemporary takes on the phenomenon and outlining several problems that are faced when we start to think about crosslinguistic analysis. The contribution of this thesis lies in a novel approach of non-culmination that unifies these two major approaches. A unification of these two theories will simultaneously build on previous lexical aspect theories, specifically because we will implement our unification using tools from lexical aspect, such as movement relation and maximality. Through unifying scalar and modal approaches to non-culmination, we will be in a better position to understand the fundamental properties of the phenomenon crosslinguistically. Potentially, from this, we will be able to better understand crosslinguistic variation and the types of variation that we see crosslinguistically in the phenomenon.

Overall, it seems to be a well-established fact that in a broad sample of typologically unrelated languages, it is possible to assert that a change-of-state has happened but also assert that the outcome of that event is not entailed. It is very possible in these languages to deny that the outcome of the event as denoted by an accomplishment is fully realised. As will become clear in the next few sections, it is also well established that this takes its shape in many different ways (Martin and Demirdache (2020)).

However, it is not well established what the best form of analysis would be to cover the set of empirical facts in the literature. Specifically, it is not well-established how to understand the crosslinguistic properties of the phenomenon or whether it is theoretically prudent to suggest a unified modal/scalar crosslinguistic mechanism that can account for the data on a comparative level.

This thesis will attempt to answer the following research questions: what would a theoretical model that accounts for a crosslinguistic picture of non-culmination look like? What is the theoretical importance of unifying existing models of non-culmination, and what effects would that have on our understanding of non-culmination?

The ultimate innovation of this thesis is in the contribution of a theory of non-culmination that may be compatible across languages. Getting this goal

means that we will spend time exploring classical notions of telicity, becoming familiar with terms such as “maximality” or “movement relation”. This will be done prior to exploring contemporary theories of non-culmination. It will become clear that my core argument is that the optimal formulation of a crosslinguistic theory will be through unifying *modal* and *scalar* views of non-culmination and that the best way to do this is within a feature-driven syntax (Adger (2003), cf. Borer (2005)).

I ultimately try to demonstrate that non-culmination phenomena, across language, may be reducible to the presence of a specific “**weak inclusion**” functional head, whose semantics and truth conditions vary from a telicity-inducing “**strong inclusion**” functional head. The semantics of these functional heads take their inspiration from both modal concepts of non-culmination like Nadathur and Filip (2021), and scalar notions reflecting Beavers (2012) and Kennedy and McNally (2005).

In this introduction, I have introduced the overall topic of study for the thesis, NCAs. I have introduced a set of empirical examples and demonstrated the importance of studying the phenomenon - that they challenge classical theories of lexical aspect. I further demonstrated the crosslinguistic breadth that the phenomenon seems to demonstrate, which led to a brief introduction to the contemporary schools of thought on the semantics of NCAs. I then state the objectives of the thesis and outline my approach. This approach will critically engage with contemporary notions whilst re-adapting classical ideas of telicity imbued with modern approaches to non-culmination. I also stated that the main contribution of the thesis is an attempt at a solution in the final section.

In the following section, I will explore classical notions of telicity as they relate to two specific schools of thought; Krifkan incrementality and measures of change functions. Specifically, I aim to explore the notions of **movement relation**, **homomorphism**, and **maximality**. A great deal will be said to break this into its constituent parts since they will become foundational to the proposal in the final section. Specifically notions of homomorphism between event and object domains and how this may be implemented within the verbal domain.

In section four, I will then go into depth about two separate contemporary analytical styles of non-culmination, that I have introduced as modal and scalar views. This will then lead to a discussion about the potential problems of crosslinguistic generalisability. This will then lead to section five, where I will outline the core components of my theoretical contribution that attempt to answer some of those questions. My conclusion gives specific pointers for future research, and potential extensions from my own.

It is worth noting that this thesis is limited by some factors. It is limited by its empirical scope and original empirical innovation. I did not manage to undertake the fieldwork necessary to build up a corpus of specific examples that

would have helped pin-point further pressing research questions that have been floated in the likes of Koenig et al. (2017), such as whether specific predicate types allow for NCAs more easily than others crosslinguistically. These open questions involve the limit of variation in the domain of non-culmination, and whether or not specific verbs and specific predicates are more likely, on the whole, to be non-culminating crosslinguistically. The precise nature of what is at the common core to non-culminating accomplishments will continue to remain an open question. However, because the goal of the theory will be to create a crosslinguistically informed theory of non-culmination, I hope that I will contribute to the literature that may lead to more research in this area.

2 The Classical Views

2.1 Incrementality

All verbs will establish some sort of relationship between an object and an event, which is controlled by some sort of subject. In the case of a verb like *eat*, Krifka (1998) gives the form of

$$(8) \quad \text{EAT} = \{\langle y, e \rangle \mid \text{EAT}(x, y, e)\}$$

Under this definition, the semantics of a verb consists of an ordered set of object y relative to an *eat*-event. This denotation sets up a particular relation between the internal argument and the event in question, and therefore maintains that there can be a set of thematic roles to relate the two; this is the focus of Krifka's (1998) paper. His particular focus is on the sorts of telicity/atelicity distinctions that arise with accomplishments predicates. As we can see in examples (9) and (10), depending on the semantic properties of the internal argument that merge into the object position, we can have two different aspectual properties.

- (9) (A) John ate eggs for an hour
(B) John ate an egg in an hour
- (10) (A) John drew pictures for an hour
(B) John drew a picture in an hour

The (A) sentences are atelic, whilst (B) sentences are telic, which superficially seem to stem from the difference in quantificational properties of their respective internal arguments. The atelic (A) sentences include a noun in the bare plural form whilst (B)'s internal arguments are quantified with a determiner, thus resulting in a telic sentence. What semantic mechanisms can be used to explain the seemingly compositional properties of telicity whereby the internal argument can force a particular aspectual property? Also notice how verbs denoting movement can shift in their aspectual qualities:

- (11) (A) John walked for an hour
(B) John walked to school in an hour

As with examples (9) and (10) it is the properties of the internal arguments (or lack thereof) which seem to confer telicity information onto the overall predicate. What causes this? Krifka's paper explains these variations through a subset of relations that exist between verbs (accomplishments) and their internal arguments, through the lens of mereological mappings between different domains of meaning which we will now explore.

2.1.1 Mereological domains

Before going straight into the thematic relationships that ultimately are used to derive the telicity/atelicity distinction, it is necessary to outline what the semantic domains in question are. Krifkan domains build on top of one another.

Firstly, there is a domain of entities. This is structured akin to Link (1983)'s structures, in which nominal elements take their semantic denotations from a partially-ordered join semi-lattice. This initial domain is U_p - and is considered to be a n-tuple set with the following features: $\langle U_p, \oplus_p, \leq_p, <_p, \otimes_p \rangle$

- U_p is the set of entities.
- \oplus_p is the sum operation - *idempotent, commutative and associative*.
- \leq_p refers to a material part relation.
- $<_p$ refers to the proper part relation.
- \otimes_p is the overlap relation, specifying that if $x \otimes y$, there is another argument z that is a proper part of both x and y .

U_p is then used to build up essential *adjacency structures* (U_a). These are part structures with two extra elements in the n-tuple. The first is *adjacency*, marked with the symbol ∞_A , as well as *convex elements* C_a - which is defined as the maximal set of an adjacency structure.

- Adjacency is defined as a two-place relation in U_a , where for all x and y in U_a , if x and y are adjacent then they do not overlap.
- If x , y , and z are in U_a , and if x is adjacent to y and y is a part of z , x is adjacent to z or x overlaps with z (transitivity).
- A convex element is the maximal set within the adjacency structure. Defined as the following: if y and z are parts of x , and y and z are not overlapping or adjacent, then there is another element that *is* a part of x and adjacent to both y and z . This is effectively closure under sum.

From this, Krifka uses adjacency structures to build the domain of *path* structures, U_H , which are ordered sets of adjacent elements. The path structure itself is built through the addition of a relation P_H , which denotes the maximal set of convex elements within the adjacency structure, such that two disjoint non-adjacent parts of a path are always connected by exactly *one* sub-path. This allows for linearity in the path set and excludes overlapping of branching paths.

Path sets are then extended into *directed* path sets, through the addition of the *spatial precedence relation* (marked with the symbol \ll_d). This is represented as the symbol D_d , of directed paths. The precedence relation is ir-reflexive (something cannot precede itself), asymmetric (if x precedes y , then y can't precede x), and transitive (if x precedes y which precedes z , then x naturally precedes z too). Furthermore, the precedence relation makes clear that if something precedes another thing, then those two things do not overlap. If two sub-paths do not overlap, then they must precede each other.

Separate to the above, but still building upon part structures are *temporal structures* U_t and *event structures* U_e , which are intimately related. These are both part-structures but with a few additions. Firstly is τ_e , a function that exists in the *temporal structure*, and maps events onto their associated run-time. ∞_e is a two-place temporal adjacency relation in U_e . \ll_e which is temporal precedence. As well as C_e which denotes the set of temporally contiguous events.

These structures are important to know about since the majority of the subsequent work builds upon thematic relations between the different domains of meaning. However, we should first understand two more particular definitions; *quantization* and *cumulativity* which refers to the internal structure of elements in the domain of entities U_p , which plays a large part in the composition of aspect.

2.1.2 Quantization versus Cumulativity

From the last section, we know that entities/nominals take their semantics from U_p . However, they can be in two contrasting forms depending on their individual properties. The first are *cumulative* nominals such as *water*. In effect, cumulative nouns correspond to plurals and mass nouns (cf. Chierchia (1998)). To illustrate, if we have two measures of water and add one to the other, then we do not have plural “waters” but instead, just “water”. If we have a large amount of water then take a few drops away from it, then similarly we do not have anything else except “water”, and the parts taken from the whole are equally describable as “water”.

Compare this to a *quantized* noun, something like “table”. If we have a space in which there are multiple iterations of some “table” object, then we have “tables”, rather than a mass of “table”. If we remove a part of the table (e.g., its back-right leg), that subpart is not itself “table” rather it is a different object entirely with a separate name “table leg”. A quantized noun’s subparts are not equal to the whole.

“Water” is cumulative. We can refer to any subpart of water as water, and if we accumulate water, we just get more “water”. “Table” is quantized. We can’t refer to any of its subparts as “Table”, and if we accumulate “table-stuff”, then we have plural “tables” rather than “more table”.

Bach (1986) connects these mereological notions that underline this mass/count distinction to that of the atelicity/telicity distinction, which Krifka seems to follow if only vaguely through extending the cumulative/quantized distinction to the entire predicate itself (cf. Verkuyl (1989)). Within the verbal domain, we can see the same sort of quantization/cumulativity dichotomy lining up with the atelicity/telicity distinction. For example, we can illustrate a cumulative predicate such as the following:

(12) LET $\phi =$ John drank water.

If we assume that the ϕ event lasts three hours, and we isolate three separate subevents from ϕ : namely the three separate hours of the drinking event. The full predicate will denote the sum of those three sub-events: $e_1 \oplus e_2 \oplus e_3$. Then if we isolate from ϕ the first e_1 , and disregard $e_2 \oplus e_3$ this hour-long part is still referable to by the predicate “John drank water”. Much like cumulativity in the domain of entities, referring to a part of an event by the name of its contingent whole is perfectly reasonable (cf. Bennet and Partee (1972) for the noted subinterval property).

Compare this to a quantized predicate such as the following:

(13) LET $\gamma =$ John drank a glass of water

We can separate γ into an arbitrary number of subevents, which could correspond to different points in time in which the water in the glass gets consumed. For this predicate, let’s assume that γ represents $e_1 \oplus e_2 \oplus e_3$. First, if we isolate e_1 again which in this case could refer to him sipping the first third of the glass of water, that sub-event is not reliably given the same event description of “John drank a glass of water”. Like “table” in the nominal domain, “drink a glass of water” in the verbal domain is quantized since we cannot refer to a subpart of that event with the same event-description.

The semantic definition of quantization looks like the following:

(14) $\forall X \subseteq U_P [QUA_P(X) \leftrightarrow \forall x, y [X(x) \wedge X(y) \rightarrow \neg y \leq_p x]]$
for any element X in U_P , it is quantized if any of its subparts are disjoint.

Cumulativity, on the other hand has the following semantic definition:

(15) $\forall X \subseteq U_P [CUM_P(X) \leftrightarrow \exists x, y [X(x) \wedge X(y) \wedge \neg x = y] \wedge \forall x, y [X(x) \wedge X(y) \rightarrow X(x \oplus_p y)]]$
For any element X in U_P , it is cumulative if two isolated subparts overlap

For cumulative predicates, we can make them quantized if we apply to them some sort of *extensive measure function*, which will isolate a particular subgroup of elements within the whole and apply to it a particular measurable value. For example “3kg of water” will refer to a part of the “water” $\in U_P$, such that that part is 3kg. This in turn forces cumulative nouns to become quantized nouns.

2.1.3 Incrementality through thematic roles

Ultimately, the distinction between telicity/atelicity on accomplishment predicates derive from how quantized and cumulative information is fed from the noun onto the whole predicate, through a system of relations. The first relation that we can witness are *incremental relations* and *strictly incremental relations*

(INC(θ) and SINC(θ)). Let’s illustrate what this means by restating examples (9) and (10):

- (16) (A) John ate eggs for an hour [**ATELIC**]
 (B) John ate an egg in an hour [**TELIC**]
- (17) (A) John drew pictures for an hour [**ATELIC**]
 (B) John drew a picture in an hour [**TELIC**]

What it means for a verb to be *strictly incremental* is that there is a one-to-one mapping from the parts of the entity structure U_p to parts of the event structure U_e through a structure preserving mapping, or homomorphism. For verbs such as “eat” and “draw”, what seems to be the case is that when the internal argument is quantized, the thematically related event structure will also be so, via homomorphism. Thus, the corresponding predicate is quantized (and by consequence, telic). When the internal argument is cumulative, the whole predicate will be cumulative (thus, atelic). Strict incrementality is the collection four separate thematic relationships that relate the internal argument to its related event:

1. **Mapping to subevents - MSE(θ)** - with the formula:
 $\forall x, y \in U_p, \forall e \in U_e [\theta(x, e) \wedge y <_p x \rightarrow \exists e' [e' <_e e \wedge (y, e')]]$
if x holds at e , any subpart of x holds for its equivalent subpart of e .
2. **Uniqueness of events - UE(θ)** - with the formula:
 $\forall x, y \in U_p, \forall e \in U_e [\theta(x, e) \wedge y \leq_p x \rightarrow \exists! e' [e' \leq_e e \wedge \theta(y, e')]]$
each subevent that a subobject maps to must be a unique subevent.
3. **Mapping to subobjects - MSO(θ)** - with the formula:
 $\forall x \in U_p, \forall e, e' \in U_e [\theta(x, e) \wedge e' <_p e \rightarrow \exists y [y <_p x \wedge (y, e')]]$
if e holds at x , any subpart of e holds for its equivalent subpart of x
4. **Uniqueness of objects - UO(θ)** - with the formula:
 $\forall x \in U_p, \forall e, e' \in U_e [\theta(x, e) \wedge e' \leq_e e \rightarrow \exists! y [y \leq_p x \wedge \theta(y, e')]]$
Each subobject mapped to subevent is unique.

These four thematic roles are enough to distinguish incremental verbs from non-incremental verbs. For example, take a non-incremental activity predicate such as:

- (18) John pushed a cart

It does not make sense to think about an incremental relationship between *parts of a cart*, and *parts of the pushing event*. As a result, we can say that there is not the $MSE(\theta)$ property assigned to the ordered pair $\langle y, e \rangle$ in such a predicate.

Ultimately this leaves us with the idea that each unique element of an internal argument of an incremental verb is mapped directly onto the subparts of the events denoted in the verb. Incremental verbs are endowed with the set

of $SINC(\theta)$ thematic roles. When cumulative nouns merge with verbs of this flavour the resulting predicate is also cumulative. If this occurs, then there is no definite whole within U_p that can be used up entirely over the course of the event or mapped specifically onto a part of the U_e corresponding to the final point of the event. The opposite effect occurs when we have a quantized predicate. There is a whole unit of something that is mapped to a specific part of the event, which would be the point in the event where that entire object is used up, consumed, and the change-of-state (CoS) is wholly reached. Because this mapping from the whole object to a single unit of the event exists, then the predicate is telic.

To conclude this overview of incremental relations - when the nominal merged is cumulative then the overall predicate will be cumulative (atelic), and when the nominal merged is quantized then the overall predicate will be quantized (telic). This is a good foundation which has underlined much subsequent literature on aspectual composition. Furthermore, it is acutely relevant to our future purposes of *non-culmination* in which we will consider cases in which incremental relations, cumulativity, quantization do not naturally lead to specifically telic or atelic predicates, but rather some sort of inferred telicity that can be cancelled without contradiction - going against the overall picture painted by Krifka.

2.2 Movement Relations (MRs)

This subsection lays some of the groundwork for what follows in our future proposal, since the idea of a movement relation is one that is extendable to scalar interpretations whereby changes-of-state are conceived of as change in a property of something, along an ordered set of degrees on a path. Movement relations (hence, MRs) are an extension of adjacency structures and path structures and are specified in two flavours: *strict movement relations* ($SMR(\theta)$) and a subset of strict movement relations, *general movement relations* ($MR(\theta)$).

As we saw for incremental relations in which parts of entities are mapped to parts of events, MRs are generally speaking relations that map parts of the event domain U_e to parts of a path domain U_h . Let's illustrate with an event in which the internal argument and the event are MR-related:

(19) LET ϕ - John walked to the car in two minutes

As we did above to demonstrate cumulativity versus quantization, if we separate the temporal parts of ϕ such that we have sub-parts corresponding to each individual minute (e_1 and e_2); the idea of a thematic MR is that parts of the event structure U_e will map to corresponding parts in the path domain U_h . For example: if $e' \ll_e e$, there will be corresponding parts of the path domain, which have to be adjacent to one another: $x \infty_h y$ - the adjacency property.

- (20) $\forall x, y, z \in P_H, \forall e, e', e'' \in U_E[\theta(x, e) \wedge e', e'' \leq_E e \wedge y, z \leq_H x \wedge \theta(y, e') \wedge \theta(z, e'') \rightarrow [e' \infty_E e'' \leftrightarrow y \infty_H z]]$
If all events and sub-events are θ related to paths and sub-paths, if e' is adjacent to e , then y is adjacent to x

Krifka maintains that the *strict movement relation* must have the adjacency property, as well as the mapping to objects ($MO(\theta)$) property which makes sure that each part of the event is θ -related to some part of the path. Provided is the following semantic derivation of a Strict MR:

- (21) $ADJ(\theta) \wedge MO(\theta) \wedge \forall x \in U_H, \forall e \in U_E[\theta(x, e) \rightarrow x \in P_h]$

Strict MRs make sure that each part of the path mapped to each part of the event is unique, and therefore it disallows any reiteration of a movement along a part of the path. So, for example - if you jump off a cliff, then you cannot necessarily travel back to a point along that path that has already been covered.

The general movement relation (or just movement relation) works similarly but keeps in mind the notion of *tangentiality* - which is defined as parts of paths that are adjacent to each other, or if they share an endpoint.

- (22) $\forall x, y \in U_H, \forall e, e' \in U_E[\theta(x, e) \wedge \theta(y, e') \wedge e \ll_E e' \wedge \forall e'', e''' \in U_E, \forall x', y' \in U_H[FIN_E(e'', e) \wedge INI_E(e''', e') \wedge \theta(e'', x') \wedge \theta(e''', y') \rightarrow TANG_H(x', y')] \rightarrow \theta(x \oplus_H y, e \oplus_E e')]$

Closure under sum of paths that overlap, and their corresponding overlapping temporal counterparts leads to a less strict definition that works more clearly with general predicates that show steady movements and changes-of-state, since with the definition of a strict MR, it is not possible to go back and make amends, or redo something once the path has already crossed, since the homomorphism is between the temporal parts of the event and a specific part of the event. General MRs avoids this issue, and can therefore account for more natural predicates of movement along paths that have reiterable steps such as:

- (23) John listened to the song

If we assume that in this predicate, “music” and “listen” are MR-Related, under the more general MR it is permissible for John to have gone back and repeated a particular part of the song. Under strict MRs, this is not possible.

A consequence of this concept of MR is the ability to overtly define in the semantics of an accomplishment predicate *a source, a goal, and a direction*. These are effectively just specified parts along the path defined in the MR, which therefore allows for specific points in time to be marked as the beginning, the end, and the temporal direction along the path element that leads you from one to the other.

The source element is considered to be the initial temporal part, which through the MR is mapped to the first part of the path:

$$(24) \quad \forall y \in U_H[SOURCE(x, y, e)] \rightarrow \forall e' \in U_E, \forall x' \in U_H[[INI(e', e) \wedge x' \leq_H x \rightarrow x' \infty_{Hy}] \wedge \neg INI(e', e) \wedge x' \leq_H x \rightarrow \neg x' \infty_{Hy}]]$$

Similarly, the goal/maximal point of a path will be mapped to the final part of the event:

$$(25) \quad \forall y \in U_H[GOAL(x, y, e) \rightarrow \forall e' \in U_E, \forall x' \in U_H[[FIN(e', e) \wedge x' \leq_H x \rightarrow x' \infty_{Hy}] \wedge \neg FIN(e', e) \wedge x' \leq_H x \rightarrow \neg x' \infty_{Hy}]]$$

These predicates are telic, because the final part of the event structure must be the final part of the path structure. If there is some other point in time (i.e., if the event continues), then a contradiction holds.

The reason for going through these will become clear as we move into scalar structures. The concept of movement relations is almost analogous to those interpretations of telicity whereby the endpoint is reached through a maximal point of a scale being reached. In the Krifkan case, it is presented via a mereological mapping from parts of an event structure to parts of a path in a straightforward way. For an event to be telic, the path that is undertaken by something must reach a maximal point, as stipulated by the semantic MRs, otherwise it cannot be telic. Note, it may or may not be the case that source, or the goal are lexically specified:

$$(26) \quad \text{John cycled from York to Edinburgh in twenty hours} \\ \lambda e \exists x [CYCLE(J, x, e) \wedge SOURCE(x, York, e) \wedge GOAL(x, Edinburgh, e)] \\ \text{where } x \text{ represents existential closure over a path.}$$

We can also replicate the sort of path-movement relation where the path is somewhat implicit and not lexically specified, such as a change in state of an item over the course of the event. The same logic can apply, such that there is a path that is existentially bound, and two temporal parts (INI and FIN) map onto the path's source and a goal.

$$(27) \quad \text{John cooked the chicken} \\ \lambda e \exists x [COOK(J, C, x, e) \wedge SOURCE(x, RAW, e) \wedge GOAL(x, COOKED, e)] \\ \text{where } x \text{ represents a path of cooking, or something.}$$

This also allows us to account for telic varieties of activity predicates, such as our example in (18) where we can lexically specify a GOAL of the pushing event:

$$(28) \quad \text{John pushed a cart to school in an hour} \\ \lambda e \exists x [PUSH(J, C, x, e) \wedge SOURCE(x, source, e) \wedge GOAL(x, SCHOOL, e)] \\ \text{where } x \text{ represents the path of the cart being pushed.}$$

What we could do with this, too, is replicate those sorts of incremental verbs (like, solve a Rubik’s Cube) whereby the parts of the object do not map necessarily to parts of events but are still telic. Instead, we see another thematic relationship between parts of the events and parts of paths ³.

- (29) John solved a Rubik’s Cube in twenty seconds
 $\lambda e \exists x [SOLVE(J, RK, x, e) \wedge SOURCE(x, UNSOLVED, e)$
 $\wedge GOAL(x, SOLVED, e)$

Under the assumption that we have two event parts that map directly to two abstract path parts then we immediately get the outcome we desire. The predicate “*solve a Rubik’s Cube*” will be telic because there is no extra event part *e*” that precedes or follows the event, and therefore the predicate cannot be true of such a point. This allows us to understand why the following sentence would be contradictory:

- (30) *John solved a Rubik’s Cube, but he gave up halfway.

This is contradictory because for the predicate “*solve a Rubik’s Cube*” to be true, there must be a thematic relationship (an MR) between the final part of that solving event with the final part of the path that underlies *solving*. The truth values would be affected, and thereby making the sentence dubious when we assert a contrary claim in which John’s efforts lead him along half of the *solving* path in the time it takes to reach the end of the event.

Furthermore, with $UO(\theta)$ we could also assert that there is only one part of a path that is true of something being solved. As this maps homomorphically through the MR relation to a part of the event structure if, for instance, the time it takes to get half-way across the path denoted by the predicate does not match that of the event structure, we violate the MR relations and result in contradiction.

One extension to the movement path theories includes that of *minimal MRs*. Proposed by Beavers (2012) the point behind these is to differentiate between those predicates where there is a specified goal in the predicate (“John walked to school”), and one where there is not (“John walked”).

- (31) $\forall x [GOAL(x, p, e) \rightarrow \exists! e' [e' < e \wedge \theta(e', x)]$

This ensures that the goal is MR-related to the smallest final subevent of an event, and that it is only MR-related to one single subevent.

³Note, Rothstein (2004) outlines a particular iteration of this, called mapping to final part relation which does not consider path structures in the same way

2.3 Scalar Approaches - Degree Achievements

A different approach to explaining the telicity of predicates are that of scalar models. Whilst Krifkan approaches interest themselves with mereological principles, and conservation of parthood properties between different semantic domains; scalar models put telicity down to certain types of scalar change. Whilst incremental themes and mereological notions go hand in hand, what seems to be evident with a number of other predicates that denote scalar properties, telicity is determined through a more abstract path or scale (Ramchand et al., 1997), which is conceived of slightly differently to the adjacency properties in Krifkan homomorphism. The key difference between the two ideas is that with scalar models, there is space in the derivation for distinct *scale* and *degree* variables, which is simply just part of the verbal or nominal semantics. This is not produced in the same way as isolating a goal in Krifkan concepts.

Simply put, a predicate will be telic when there is a maximal amount of change⁴ along an underlying scale - often denoted in the verb. Degree Achievements (Hay et al. (1999), Kennedy and Levin (2008)), provide some of the clearest examples that we could see:

- (32) a) The hole in the ground widened by twenty feet in three days
b) Bill widened the hole in the ground in three hours
c) Bill widened the hole in the ground for three hours
- (33) a) John lengthened the rope for three minutes
b) John lengthened the rope in three minutes

If we focus on the B examples first, there are different readings for each of the two adverbials which are used. With the -in adverbial in B, we have a reading that suggests that the widening of the hole was completed to a contextually particular, albeit lexically unspecified, level over the course of the event. This contrasts to C in which the particular reading is that Bill was undertaking an action, the process of widening the hole, but not to a maximal point. C seems to read more like a perfective activity predicate where the endpoint is not relevant for the computation of truth values. For sentence A, where the element that is undergoing the change has been moved to the canonical subject position - a specific amount of change need be specified in order for the same reading that we get from B) to be licit.

Degree achievements are deadjectival verbs, meaning that the root of their meaning is that of an adjective which denotes a property of something in the world. However since they are ultimately verbs, degree achievements denote the process of change in that property their underlying adjective denotes (Piñón (1997), Kennedy (2012)).

• **WIDEN** → **WIDENESS**

⁴this may be contextually provided, but more on this later

- **LENGTHEN** → **LENGTH**
- **SHORTEN** → **SHORTNESS**

Degree achievements are inherently scalar. For our examples in 32, “*widen*” requires there to be a contextually provided amount of change, or a lexically specified amount of change over the course of the event. In the case where there is a non-agentive subject in Spec[TP], the requirement is that the amount of change along the underlying **wideness** scale is given otherwise infelicity will result:

- (34) a) ?The hole in the ground widened by twenty feet for three days.
 b) The hole in the ground widened for three days.
 c) The hole in the ground widened in three days.

When an agent is in control of the event - when an in-adverbial is used, it could be the case that a maximal amount of change for that given event is entailed.

Degree achievements can be viewed as measures of change across the underlying scale given by the adjectival core (Kennedy and Levin, 2008). Verbs that encode scalar properties have a function which map entities onto events, onto degrees of a scale. This gives them a type such as: $\langle e \langle s, d \rangle$ - events, onto scales, onto degrees (Kennedy, 2012). Kennedy provides a clear semantic distinction between underlying properties of the semantics of adjectives and their corresponding verbal counterparts with degree achievements:

$$(35) \quad \llbracket wide_A \rrbracket = \lambda d \lambda x \lambda s. wide(x)(s) \succeq d$$

This is a measure function that takes individuals and maps them onto properties on the adjectival-scale. $wide_{individuals} \rightarrow situation \rightarrow degrees$. However, when they become deadjectival verbs, they are encoded with a particular function that measures that amount of change in that underlying property over the space between the start and the end of an event:

$$(36) \quad \llbracket widen_V \rrbracket = \lambda d \lambda x \lambda s. wide_{\Delta}(x)(s) \succeq d$$

Kennedy uses the Δ symbol on the *measure function* to denote how it is instead a *measure of change function*. Ultimately this makes it an individual of the same type as an adjective, however onto a specific part of a scale, with values specifying the first and last points over the course of the associated event.

What makes an event telic under this analysis is when that *measure of change function* returns a **maximal** value (cf. Filip (2008)). As we can see,

- (37) a) John lengthened the rope in an hour
 b) John lengthened the rope three inches in an hour

Under a scalar analysis both 37a and 37b will have λd set to 1, or to the value specified:

- (38) a) John lengthened the rope in an hour
 $\llbracket \text{lengthen}_V \rrbracket = \lambda d \lambda s. \text{length}_\Delta(\text{rope})(s) \succeq 1$
 b) John lengthened the rope three inches in an hour
 $\llbracket \text{lengthen}_V \rrbracket = \lambda d \lambda s. \text{length}_\Delta(\text{rope})(s) = 3_{\text{inches}}$

However, when the overall event is atelic - this amount of change is not specified to a particular point. It could be partly changed; it could not have been changed at all. The crucial point is that $\lambda d \neq 1$ and unspecified in that range:

- (39) John lengthened the rope for an hour
 $\llbracket \text{lengthen}_V \rrbracket = \lambda d \lambda \text{rope} \lambda s. \text{length}_\Delta(\text{rope})(s) \succ 0$

The same measure of change function can also be specified onto internal arguments to achieve the same result as Krifka's incremental ideas; the measure of change is specified onto the incremental theme argument such that the amount that the argument is used up is measured over the course of the event. This is either by a functional head in the structure which merges with the incremental theme argument (Strensud 2009) or by a particular semantic conversion that takes the *natural unit* (NU - Krifka (1989) measure of some object. In the same way that λd would specify some degree variable onto a degree of change over the course of an event, the idea here is that the same function (Δ) is similarly applied to the NU function applied to a noun, the degree of change in that item:

- (40) $\llbracket \text{teneggs}_{inc} \rrbracket = \lambda x \lambda e. \text{eggs}(x) \wedge \text{NU}_\Delta(\text{dumplings})(x)(e) = 10$
 (41) $\llbracket \text{eggs} \rrbracket = \lambda x \lambda e. \text{eggs}(x) \wedge \text{NU}_\Delta(\text{dumplings})(x)(e) > 0$

Overall, what this leads to is an analysis in which a sentence with a quantized internal argument (i.e., "John ate ten eggs") is true in the case that event denotes the eating of ten eggs. If the amount is not specified, then the event is true when any particular amount is eaten, but there is nothing specific marking the point at which the event becomes completed and is therefore atelic.

2.4 Different Scalar Types

The bounded or unboundedness of a scalar change is also used to form the basis of some sort of classification which may serve to enrich the original Vendler Classifications which generally speaking reveals what occurs systematically at a VP level. Under this idea, it is thought that there is a clear distinction between whether a verb lexicalizes a scale. Split up into a few ways: there are multipoint scales, such as degree achievements, which will denote some sort of complex scale with many points along some sort of *property* axis; non-scalar verbs on the other hand can also be telic, but only when there is some sort of provided

or contextually retrievable bound for some sort of scale, in an example like the following, reminiscent of what we saw above with specification of a GOAL.

(42) John walked to school in three hours

For this predicate, “walk” does not provide a scale itself, however a maximal boundary for a change of state (perhaps one’s not being, then being at school) is provided by the PP-adverbial.

Scales denote some sort of property information. However, Rappaport Hovav (2008) outlines three separate types of scales - all of which denote differing types of properties:

- **Path scales:** these denote some sort of movement along some sort of given path. They have the capacity to be multipoint or two point (binary).
- **Property scales:** Like degree achievements, which simply just denote the amount that something has a particular property.
- **Volume extent scales:** attributable to incremental theme verbs. They denote scales of the extent to which something is affected over the course of an event. These have the property of not being encoded directly onto the verb itself, but rather onto the noun that is merged into the argument position of the verb. The internal argument presumably provides the basis for a scalar measurement.

To briefly sum up, verbs that denote a scalar change encode some sort of function that map events onto some sort of underlying scale. These scales measure out (cf. Tenny 1987) the amount of change undergone by a verb’s internal argument over the course of the event. A predicate will be telic if that scalar shift is maximal Filip (2008) or overtly specified. This may occur through superfluous lexical selection (i.e., with achievements where there are only two options, 1 and 0), through context, or by the internal argument.

Degree achievements will have that scale lexically provided, since it is a deadjectival verb - and thus the amount of change needs to be specified by an adjunct, or through a shared set of propositions (common ground). For motion predicates, then the same concept of scale is akin to that of a path (Kennedy (2012) and references therein). Incremental theme predicates will have the scalar information provided to it compositionally through the nominal, which will provide a unique boundary on the scalar change, as we saw with the Δ operator as a measure of change on the natural units of an internal argument nominal.

2.4.1 Kennedy/Beavers’ Ontology of Scales

A particular ontology of a scale that will become relevant for our purposes of non-culmination in section 3 is Beavers (2012) and Kennedy and McNally (2005), who makes a compelling case that they are abstract linguistic objects

that consist of three parts in an N-tuple: $\langle \delta, S, R \rangle$. δ being a property or a dimension; S being a set of degrees along δ ; R being an ordering on the members of S. The 3-tuple scales can thus be considered as abstract paths, whereby each path represents a specific δ . S denotes atomic subpoints along that path, and a precedence relation \ll_H will order those points.

Under this particular iteration of a scale, all dynamic CoS predicates can be seen under the view of a movement relation (Krifka (1998)): in which events denote patients that undergo a δ -shift along the ordered path S. Maximal shift along this path vary from theory to theory - but for the remainder of this paper we will assume alongside Beavers (2012) and Krifka (1998) the requirement that a telic predicate will denote a *process* sub-event and a *GOAL* subevent - both of which will denote two points along a relevant path.

2.5 Atomicity and Telicity

What may be relevant for cases of apparent non-culmination later on is Rothstein's (2008) re-purposing of the previous held "maximalisation" function (cf. Filip (2004), Filip (2008)) under the name of an operation TELIC, which itself picks out what a single iteration of a given event would be. Telicity in this case works under the following idea:

$$(43) \quad \lambda e.P(e) \wedge \text{MEAS}(e) = \langle 1, U \rangle$$

There is an event e , and a measure on what e is. This is defined as what *one* e would be relative to a sort of measure unit. *TELIC* acts as a function or a maximizer that will maximize to our best knowledge what a single event of $P(e)$ looks like. It is necessary that for an event to be telic, that the maximizer function picks out something from the event that counts as one, and therefore overlapping events are not available to compute with the TELIC function, will not be countable as one, and thus be atelic.

A note here about semelfactives. These are naturally telic since they denote a single moment in time, and thus will compute directly with TELIC and what counts as one relative to the event in question will simply be the event itself. Achievement predicates are different, in that they are naturally quantized; they denote non-extended changes that are homomorphic to adjacent instants in time $\langle i_1, i_2 \rangle$ - achievements then dictate the properties of the change, and the TELIC function will just pick out the whole unit of change as one measure of the event.

Activity predicates denote sets of events that are overlapping, because those events themselves are just collections of other events closed under S-Summation, and thus they do not compute with the TELIC operator, and nothing can be extracted and countable as one relative to the measure function. Accomplishment predicates get their measurement from the thing that is merged into the object position, which is akin to Krifka (1998) whereby the natural unit of what counts

as 1 for that event is determined by how much 1 affected object changes over the event (cf. Beavers 2012). This will become relevant later, when we start to look closer at the empirical data about non-culminating accomplishments, specifically in Mandarin (see 3.3.1).

2.6 *Non-maximal changes* for multipoint scales

One view that may be relevant to a broader crosslinguistic explanation for non-culmination is one that maintains that verbs that lexicalize a multipoint scale entail that there has been some change along the scale's attributes over the course of the events, but the maximal change is not itself an entailment Rappaport Hovav (2008, p.29) (Filip, 2006)

Verbs of *multipoint scales* (section 2), can take their form in several ways - extent scales, path scales, or property scales as mentioned before: and in English, if we want to see a surface level of non-culmination occur, we simply need notice cases where there is a certain amount of change in the direct object over time.

Inc Themes (Extent scales) (Rappaport Hovav, 2008):

- (44) I mowed the lawn, but not all of it
- (45) I ate the apple, but not the whole thing
- (46) I studied the literature, but not all of it
- (47) ?I closed the door, but it couldn't fully shut ⁵

Degree Achievements with gradable property scales (Rappaport Hovav, 2008):

- (48) the acne helped cleared her face, but she still has some pimples
- (49) The street was emptied of its litter, but there was still a lot around

Change of location verbs with multipoint path scale:

- (50) a) "I threw the ball to Mary, but it didn't get there"
b) "I sent John the letter, but it never arrived"

All of the above cases are partitive to some extent. All of them, in the past-tense are associated with some sort of CoS that goes to a certain degree λd , but the outcomes of the events are not themselves entailed since their cancellations are possible (with potential disagreements between speakers). With the exception of the gradable property scales (which we will return to) - what is very clear, is that there is some theoretical mismatch when we assume that predicates that are durative and telic are simply uniformly endpoint-entailing, when this is definitely not the case under the auspices of these sorts of verbs that denote some

⁵Scenario: where subsidence has effected the house so much that the door frame has warped - this is possible, at least to me. Therefore I have added ?

sort of extended gradable change. Whether or not the actual event culminates with respect to the property encoded seems to be somewhat irrelevant for the truth conditions, since one can have “mowed the lawn” but not necessarily to a point where it’s all been mowed. These may all be known by Martin and Demirdache (2020) as *non-maximal* accomplishments and will be explored in 3.2.

2.7 Interim Conclusion

All of these ideas are neatly connected in the following way. We assume that telicity on accomplishment predicates comes from some sort of measurement along a path/scale. How we define what is telic depends on a maximally shifted changed along a scale over the course of an event. If we look upon the previous literature with the same lens, then incremental and scalar ideas neatly wrap up into a single cohesive unit.

What differs between them are certain aspects of the ontology of scales/paths, and which part of the semantics provides which part of the broader schemata. For example, answers which include a separate function that specifies maximality upon a set of quantities, thereby making telicity a sort of scalar implicature (Filip, 2008) differ from those that merely link parts of events onto wholes (Beavers (2012), Krifka (1998)). The argument from the former comes from the empirical fact that there is no outward spell-out of a telicity head, and therefore it is a cover operator picking out maximal shifts; the other is a different ontological take.

What seems to bring the idea of a maximality function to a head is that of entailments, and how we can draw the distinction between what is entailed to be telic and that which is not. For example, in English - it is of course easier to make the case that the sentence:

(51) John mowed the lawn, but not all of it

Allows for an easier non-culminating reading than something like:

(52) ?John built the house, but not all of it

The former seems to allow for a lot more wiggle-room around what it means for a “lawn to be mowed”, whilst the latter is fairly solid in that there is a consistent externalised reality that exists when a “house is built”. Maximality as a contextual matter *is* an answer to this, but what is the specific semantic spell out that we can provide to account for the differences that are noticeable here?

Furthermore, we haven’t even touched crosslinguistic variation yet. What seems to be relegated to a particular number of verbal units in English seems

more widespread in other languages. Therefore, the question immediately comes to mind of - are these particular functions and mechanisms present when we look at other languages; or do we need to provide a more empirically-embracing theory to account for more facts in more languages?

No matter what the case may be for the facts in English - we have a clear enough framework that we can take into analysing these questions. Fundamentally, telicity can be seen as a particular manifestation of the semantics of measures of change; whereby change that reaches a particular point on a scale is that which is telic. We will assume for the rest of the paper, too, that this is spelled out directly through particular sub-units within the verbal denotation, in particular GOAL; and we will take it as read that the underlying mechanism linking events to scales is one of a movement-relation; in which parts of scales are mapped directly onto parts of events.

3 Non-Culminating Accomplishments

3.1 NCAs

Up until now, we have not really paid much attention to non-culminating accomplishments - since important groundwork on the theory of telicity is recognizably challenged when we do. Now we are in a position to look at them. Non-Culminating Accomplishments have come out of the theoretical woodwork as a specific case of accomplishment predicates. First named by Bar-El et al. (2005) from her and colleagues' semantic fieldwork on Salish languages, they noticed that the notion of [+telicity] as an endpoint entailment did not hold in the Salish languages that they examined. The notion of event culmination is not as clear cut, nor as strictly held in Salish perfectives as it is in English.

However, the notion of an NCA pre-exists Bar-El (2005) and have appeared in studies of different languages which demonstrate that classical notions of telicity do not necessarily hold of all languages. This was demonstrated in the ideas of "semi-perfectivity" in Thai (Koenig and Muansuwan, 2000), Hindi "neutral" perfectivity (Singh, 1998), and Japanese accomplishment variation (Ikegami, 1981). These previous studies demonstrated that the strictness of perfective aspect with accomplishment verbs with respect to culmination was unfounded - since there were cases where sentences like the following were licit. This example is from Singh (1998, p.172 & p.191):

- (53) mae ne aaj apnaa kek khaaya aur baakii kal
I ERG today mine cake eat-PERF and remaining tomorrow
khaauugaa
eat-FUT
'I ate my cake today and I will eat the remaining part tomorrow'
- (54) Miiraa ne baraf pighaalii par puurii nahii
Mira ERG ice melt-CAU-PERF but completely NEG
pighaalii
melt-CAU-PERF
'Mira melted the ice but did not melt it completely'.

We will see plenty more examples as we go and we have already explored a few in the introduction of the thesis - but what seems evident from just (53) and (54) is that whilst a perfective accomplishment (i.e., melt and eat) has been used, the culmination of the events are cancellable, in a way that an equivalent phrase in English would not allow. That is to say that there is not a direct entailment from the presence of the perfective marker when merged with an accomplishment.

On the whole, NCAs seem to present in environments where there's already some sort of proposition asserting that an event has reached its endpoint - and thus a culmination is superficially present. However, what seems to be crosslin-

guistically variable is whether this culmination is entailed or simply implied. If the former, we would generally expect to see examples such as the following existing uniformly:

(55) John built the house, (#but the house was not fully built)

Whereby a continuation subordinate clause that negates the outcome of the event is not possible. However, compare this to languages like Burmese, Mandarin, Salish, where endpoints or even whole events can be negated without contradiction. (Example and gloss format from Kato (2014, p.1))

(56) mí ô=de dà=bèmemǎ làun=bú
 fire burn(vi)=REAL this=though NEG-burn(vt.)=NEG
 ‘(I) burnt (it). But (it) didn’t burn.’

(57) Yǔfēi guānle nà shàn mén, kěshì mén méiyǒu guānshàng
 Yufei shut.PFV that CL door, but door not-have.PFV shut
 ‘Yufei closed the door, but the door didn’t close.’

As well as classic examples from Bar-El et al. (2005) - where the following sentence is reportedly possible ⁶

(58) k’ul’-ún’-lhkan ti ts’lá7-a, t’u7 aoy t’u7 kw
 make-TR-1SG.SU DET basket-DET but NEG just DET
 tsukw-s
 finish-3POSS
 ‘I made the basket, but it didn’t get finished.’

Obviously, this is a startling crosslinguistic difference, especially if we take it for granted that telicity is semantically encoded the same way crosslinguistically. Evidently, it’s not. Languages demonstrate variation with what sort of meaning is conferred onto the culmination. There is variation intralinguistically and interlinguistically with respect to whether event endpoints of telic predicates are entailed, or merely implied.

The questions that these sorts of examples raise are manifold, but they include: where does the culmination reading in accomplishment predicates come from? One view is the perfective marker, and if so, is the locus of variation with respect to culmination down to typological differences in the perfective marker (Altshuler, 2014)? Maybe classical theoretical explanations of *accomplishment*, incrementality, and movement relation, are too strong to make crosslinguistic comparison. How do we square up classical approaches to telicity, to these examples that seem to demonstrate that telicity is not fully entailed when a goal is fully reached? Is the notion of culmination and endpoint itself expressed or seen differently between languages? This is what this chapter will try and investigate, then we will move into a proposal based around some particular

⁶Note that the default for unmarked predicates is the perfective

views.

3.2 Types of Partitive Accomplishment - Demirdache and Martin 2020

Perhaps the clearest of typologies relating to non-culminating accomplishments comes from Martin and Demirdache (2020) in which they outline nine types of non-culminating behaviours, or “partitive accomplishment”, which should all be distinguished from one another. In the following list, we summarise the divisions outlined, using the examples that were enumerated in their typological tree.

The first to take note of are “Atelic Partitives” (APs) (previously known as completive atelics in Martin (2019)). APs refer to those predicates that are naturally telic but do however become available for use in non-telic environments and used in an atelic sense. Martin does not believe that these are the same as non-culminating accomplishment *stricto sensu*. Instead, these seem to be different variations of the same predicate.

APs are split along three lines. Firstly, APs *Relative to Manner*, where the event itself has no genuine marked culmination relative to the denoted event. As we can see in the following:

- (59) Jivan lu minut tide seres-əm voz-em.
Ivan ten minute-INESS this letter-ACC write-PST
‘Ivan wrote this letter for ten minutes’ (Tatevosov (2002) p. 355 referenced on p.1218)

In the above example, the “wrote this letter” phrase is considered by Martin and Demirdache to simply be a predicate making a reference to the underlying process, without reference to the goal. Therefore it is not itself telic.

The second and third types of APs differ from *relative to manner* APs in that the goal of the predicate is at least somewhat present but realised to varying degrees. They form a binary pair *partial change APs* and *zero change APs*. These are illustrated below. In both of these cases, they are atelic - because the amount of change that the theme undergoes during the event is not **fully** realised. If we want to use classical scalar theoretical angles such as Hay et al. (1999), we could say that the difference value is unbounded - and are both therefore atelic by nature. Atelicity is the given label because instead of a default completion reading, the reading is atelic.

- (60) *The tank emptied for a few minutes*(PARTIAL)
(61) Kerim eki minut eşik-ne aç-tı.
Kerim two minute door-ACC open-PST
”Kerim spent two minutes trying to open the door” (ZERO CHANGE)

Non-culminating behaviour in telic predicates is where most of the theoretical interest lies because they stand in conceptual discord with the general assumptions of what accomplishment predicates are. In the cases of accomplishments, in the perfective aspect the general assumption (such as those in Rothstein (2004) and Vendler (1957)) is that these verb phrases encode their own endpoints. The event time is included in the reference time. However, these examples demonstrate that this is not the case crosslinguistically. Equivalent translation of accomplishment predicates in other languages don't have the same requirement for the event's endpoint to be included in the denotation of the verb. They are therefore considered as defeasibly implicated parts of the denotation.

The first of these types of accomplishments are known as *non-partitive non-maximal* predicates, as we have seen before. These are generally assumed to be telic, because the event has naturally come to a close and a culmination is read as a default. These are mostly seen with scalar verbs, or degree achievements whereby the completion of the event is determined by the amount of change that is undergone by the theme over the course of the event. For non-partitive non-maximal telic predicates, the amount of change is entailed for some granularity level G , however it is only implied at a finer level of granularity G_p . Non-maximal accomplishments are broadly speaking down to the set of degrees along a particular property. With our definitions of telicity relying on scales, we can make a broad assumption that this sort of non-maximal behavior suggests that the same scenario may have reached a maximal level of scalar change for one particular iteration of a scale; but for another scale, it may not be a maximal level. This leaves us able to potentially say something like the following:

(62) John cleaned the living room in an hour, but it still wasn't clean

Whilst the event culminates and has a telos (i.e., that the point in time at which the cleaning is maximally achieved) - the level of cleanliness is open to interpretation. Whilst John may have cleaned the room in an hour to a degree of "cleanliness" on his iteration of a scale, it is very easy for his husband to come into the living room, then say that the room is not actually clean to a maximal degree on his iteration of a cleanliness scale. This is put down to a shift in granularity. What could be said according to the Beavers (2012) iteration of a telic predicate is that cardinality of points along the scale is increased from one iteration of a scale to another, leaving maximality in one and non-maximality on the other. The definition of a non-maximal accomplishment is given by Martin and Demirdache (2020)

(63) A sentence S built with an accomplishment predicate P_{tel} on a non-maximal reading s entails $CUL(e, P_{tel})$ relative to a coarse granularity level g , but only implicates it relative to a fine granularity level g_p .

Thinking about our cleaning example, the event is telic in some set of circumstances - because the amount of change in the shift of cleanliness of the living

room over the course of the event is entailed relative to John’s cleanliness scale but is only implicated on that of his husband. Therefore, an assertion like “John cleaned the living room” can naturally be interpreted as a telic predicate, but easily denied or refuted if the scale on which the event is measured shifts from one set of circumstances to another. This shift in scalar interpretation can be better exemplified if we provide more information:

- (64) John cleaned the living room in an hour, but it still wasn’t clean (according to his husband).

If we want to have an example of the opposite effect, whereby the CoS denoted by the event is upheld across granularity levels, we can use an adverbial such as “completely”:

- (65) Paul completely cleaned the kitchen

This will be re-explored in section 4.3.2. Different to APs and non-maximal accomplishments are *partitive neutrals*, which are analysed as being regular past progressives. In this case, the evaluation world is simply *neutral* to the question of whether the event has culminated.

- (66) Peter was closing the door

This is as much as we need to mention about these for the purposes of this these.

In the domain of NCAs directly, Martin and Demirdache outline *non-culmination relative to manner* predicates. These are the opposite of the APs relative to manner. For non-culmination relative to manner predicates, the default reading of the proposition without the consequent clause is that the event has terminated relative to the action being denoted by the verb. The event has begun in the evaluation world. However, culmination is an implicature - and can therefore be denied. This is also mirrored by Altshuler (2014) to see the way that -le works in Mandarin - for example

- (67) Wǒ zuótiān xiě-le gěi Zhangsan de xìn kěshì méi
 I yesterday write-PFV to Zhangsan de letter but NEG.PFV
 xiě wán
 write finish
 ‘I wrote a letter to Zhangsan yesterday, but I didn’t finish writing it’
 (Koenig and Muansuwan 2000).

The other type of non-culmination comes in two flavours, known as zero change and partial change. These are non-culminating accomplishments relative to change of state (different to manner properties). These are used to refer to predicates where the action has begun in the evaluation world by some agent, however the outcome of the event can be later described as failed or not started at all. Again, the default reading of the predicate without the consequent denial is culminating. The perfective is still licit, indicating that the result state is not

necessarily part of the denotation of the perfective. This is an example of a partial-change NCA;

- (68) Zhāngsān shāo-le nèi-běn shū kě shū méi quán
 Zhangsan burn-PFV that-CL book but book NEG complete
 shāo-zháo
 burn-reach
 'Zhangsan burnt that book, but the book didn't get burnt completely'

Zero-change NCAs (also known as 'failed attempt' predicates in Tatevosov (2008)) are different from the AP and non-maximal examples, in that there is no need for there to have been any change of state in the theme at all over the course of the event. What is important however is that some part of the event, i.e., some sort of volitional information is somewhat implicit. These are also found in Salish languages:

- (69) chen xewtl'-an ta lhach'ten i na7-xw chen wa
 1.SG break-CTRL-TRZ DET knife CONJ RL-still 1.SG IMP
 xewtl'-an
 break-CTRL-TRZ
 'I broke a knife, and I'm still breaking it' (Bar-El et al. (2005)).

To recap. We have regularly telic predicates used in atelic environments, APs. These verbs denote telicity by default but are coerced into atelic environments. This itself is an interesting question, because evidently there is a distinct difference between which verbs can and can't resist this change - perhaps an adaption of incrementality and scalarity points of view could be considered as options for an explanation.

However, Martin and Demirdache explain why these should crucially be distinguished from non-culminating uses in telic environments, where there three main categories that will be looked at more closely for the rest of the paper. The first is non-culminating accomplishments relative to manner, and non-culminating accomplishments relative to change of state. In the former category, we have seen that the Chinese perfective aspect allows for a reading in which an agent starts an action, but the completion of it doesn't get encoded by the perfective, which immediately calls into question the crosslinguistic generalisability of Krifka (1998)'s point on incrementality and quantization. The latter, we have seen is demonstrated by the Chinese weak perfective, and the other in Salish through what is known as a *control transitivizer* (section 3.3.3).

In the next section, I will discuss some of the theoretical angles that have been employed to analyse some of the latter types. This includes various ideas of modality, crosslinguistic differences in the semantics of the perfective aspect, as well as variations in the way that scales are encoded crosslinguistically.

3.3 Scalar Approaches to NCA Theory

Mandarin accomplishment predicates encode endpoints, but as implicatures which are taken via the strongest meaning in a given context. It is possible in Mandarin to negate the culmination of an event without contradiction - under certain circumstances, such as when: there is a cardinality adverbial, if a non-gradable verb is perfectivized, or if verbal scalar properties are defeasible. We'll have a look at zero-change readings in Mandarin, i.e., predicates which assert that the event occurs, but that it causes no change of state in the thematic object merged in the internal argument position. When it comes to zero-change readings in Mandarin, a recent paper by Martin et al. (2021) outlines a particular idea that assumes that there is a difference in the lexical semantics of simple causative verbs; they are either gradable or ungradable (list from p.2).

[Gradable Causative Verbs]

- (70) shāo 'burn', dòng 'freeze', kāi 'open', guān (mén) 'close (the door)', sī 'tear', fā 'leaven', rǎn (tóufa) 'dye (one's hair)', zhé yíge shùzhī 'break a branch', jiě (lǐngdài) 'unknot a cravat', qiē 'cut'

[Ungradable Causative Verbs]

- (71) Shā 'kill', chú (èbà) 'get rid (of the tyrant)', zhāi (píngguǒ) 'pick (an apple)', guān (shūdiàn) 'close (the bookstore)', suì (diézi) 'break (a plate)', xī 'blow out', jiù 'save'

Zero-change readings in Mandarin are possible for both of these types of verbs, however the gradable type allow them much more simply and with a greater degree of acceptability than the latter, when unmodified. Zero change readings are something like the following

- (72) mòmó shāo le tā-de shū, dàn méi shāo zháo
momo burn PFV 3sg-DE book, but NEG.PFV burn ignite
'Momo burned her book, but it didn't get burnt at all'
- (73) zhāngsān shā le Lìsì liǎng cì, lìsì dōu méi sǐ
Zhangsan kill PFV lisi two time, lisi all not die
'Zhangsan killed lisi twice, but Lisi didn't die' (Tai 1984, 292)

The general idea of the semantic difference is as follows: gradable verbs include in their semantics a scale d_e of "event realisation", which are lacking in non-gradable verbs. There is also a degree of change that is encoded as d_c , which measures the amount of change that the thematic argument undergoes over the course of the event (this is the only scale that is associated with Degree Achievements.) Zero-change sentences, such as the one in (72)-(73) occur when there is a semantic choice between a reading where the d_e value is greater than 0 (i.e., the event has some parts that have been realised in the world) but have

no value on the d_c scale. The scales can be assigned a value by two operators, the “degree maximising operator” (which would set both values to 1), or the “positive binding operator” (which sets it to $1 < d_e < 0$).

If the value of $d_c > 0$, that entails that the d_e is also > 0 . However, this is only an asymmetric entailment, since it could be the case that there have been some events related to the burning of the book (such as, gathering of firewood, lighting a match) - meaning that the d_e value is > 0 , however that doesn’t entail the fact that there is any change in the thematic argument, therefore d_c can remain at zero and thus allow for a zero-change reading even if the event has some evaluation world eventualities. It is said in the paper through data from Lin - that the zero-change reading on gradable causative verbs hover roughly around 50% in acceptability judgement tests, which they claim is because 50% of people have difficulty in discarding the more informative reading that one can take, i.e., that the $d_c > 0$, and therefore a change has been affected over the course of the event. It is argued that some people can have the other reading - where there is an asymmetric entailment between the two degrees of change.

A note on the semantics of -le before we discuss the zero-change readings that can be attributed to the non-gradable forms of the verbs. Soh (2008) (and references therein) makes the argument that there are three distinct -les, one of verbal - which can mark perfectivity and completion of the verb, or sentential -le, which can mark an inchoative reading, a “current relevant state” reading (p.389) . However, the nature of perfectivity of the verbal-le is questionable, particularly under the Neo-Reichenbach account of perfectivity, where it is assumed that the topic time is included in the reference time. Koenig and Muansuwan (2000) further make the case that the perfective operator in Chinese, alongside other languages such as Korean, and Hindi aren’t as clear cut as saying that the culminations are essential parts of the semantics, because it is well observed that culmination entailments in environments with verbal-le are not entailments, because they are cancellable, as we have seen above. They claim that it is in fact best understood as a maximality operator, similar in form to that of Filip (2008), though distinct in the mechanism. This idea is developed further by Altshuler (2014), who embeds it within a broader typological study of the perfective marker, and draws the semantic form as the following

$$(74) \quad [[\text{PFV_m}]] = \lambda P \lambda e [\tau(e) \subseteq t_T \wedge \text{MAX}(e, P)]$$

The Chinese perfective marker, therefore, is selecting out maximal units of event fragments that are included within the denotation of the verb. The event only needs to be headed towards the property of $\text{CUL}(e, P)$, though reaching it is not

entailed. Therefore, the perfective marker obtains a “non-completive perfectised predicate” (Martin et al., 2021) p.10).

For non-gradable verbs that are perfectivised through verbal -le, the zero-

change reading becomes more felicitous when there is combination with the cardinality adverbial, because the perfective marker as non-completive and only maximal does not necessarily designate a singleton set. When extra units such as cardinality adverbials or degree modifiers enter into the derivation, it is said that it is easier to discard readings where the d_e is not set by the degree maximality operator.

It is worth saying, too, that there is a level of conversational implicature that is at work here. The most informative reading for the example (72) would be to assume that there is in fact a change of state in the thematic argument, however it is discardable either through extra lexical information, or resolving some sort of ambiguity. The stronger reading can be ignored in favour of the weaker one.

The conclusions that are reached here are similar in form to those of Filip (2008), particularly when we consider that Chinese as an isolating language lack many morphosyntactic reflexes of semantic properties. Therefore, telicity and non-culmination of telic predicates in Mandarin are likely to simply be a matter left for the semantics and implicature. That being said, when it comes to incrementality in Filip's work - the same sort of thing cannot be said of Mandarin, because it is well known that Mandarin has a distinct mass/count distinction de Vries and Tsoulas (2021), Chierchia (1998). Therefore, the case could be made that maximality and telicity in Mandarin comes from somewhere else than the scales that are denoted by the nominal elements or are induced through other means.

3.3.1 Another potential story - Chinese allows for metonymy

It seems fairly clear that in Mandarin, if someone is “killed multiple times” it need not necessarily encode the change of state. However, it also may not necessarily be a problem of the scale in question, if we assume that “sha-le” can be somewhat polysemous with another action meaning fragment that may lead to death, which in English would be fine. Think “stabbed” or “shot”.

(75) ?John killed him twice, but he didn't die

In English, we know that this is not acceptable, because “killing” entails the death of the other person. However, after speaking to a correspondent, and providing a couple of paraphrases to match to the event - it seems clear to me that the pattern is one of metonymy, whereby “killing” in Mandarin may be a stand-in for any particular event that may cause the death. Such as “stabbing” or “shooting”.

In English, when we have an activity predicate, it's evidently going to be possible for there to be a non-culminating reading. Simply because there is no

natural endpoint to something like an activity. Unlike “kill”, whereby the scale is a binary property shift on a “dead”-scale. This is just atelicity.

- (76) A) John stabbed him twice, but he didn’t die
 B) John stabbed him, but he didn’t die.

And the same sort of thing is acutely possible in Mandarin, unsurprisingly:

- (77) Zhāng sān yòng dāo cì tā liǎng cì, dànshì tā méi
 Zhangsan use knife stab-PFV him two CL, but he not.PFV all
 dōu sǐ
 dead
 ‘Zhangsan stabbed him twice, but he didn’t die’

- (78) Zhāng sān yòng dāo cì tā, dànshì tā méi dōu sǐ
 Zhangsan use knife stab-PFV him, but he not.PFV all dead
 ‘Zhangsan stabbed him, but he didn’t die’

Both of these are acceptable as they are in English. However the interesting point of comparison between English and Mandarin with respect to these predicates is in the verb “killing”.

- (79) Zhāng sān shāle tā liǎng cì, dànshì tā dōu méi sǐ
 Zhangsan kill-PFV him two CL, but he all not.PFV die
 ‘Zhangsan killed Mary three times but she didn’t die’

- (80) ?Zhāng sān shāle tā, dànshì tā dōu méi sǐ
 Zhangsan kill-PFV him, but he all not.PFV die
 ‘Zhangsan killed Mary, but she didn’t die’

Only (A) is possible according to my correspondent. Maybe what is happening is that when the event is made plural, if we think back to Rothstein (2008) the “killing” events are somehow joined into a single union denoting repeated action through some sort of S-summing, which effectively converts the predicate to something more like an activity denoting predicate. As in English, this means it does not have to include any sort of endpoint information simply because it just refers to atomic events with no real specification of the endpoint.

Furthermore, we could argue in this case that what is happening in Mandarin in this example is just a difference in the extension of the meaning to actions in the real world. Obviously in English, “killing” refers to an event that causes the death of another to occur, and it’s not possible to refer to that under an activity reading when placed alongside an event quantifier, notice the dichotomy again:

- (81) *John killed Mary three times, but she didn’t die
 NO ACTIVITY READING

- (82) Zhāng sān shāle tā liǎng cì, dànshì tā dōu méi sǐ
 Zhangsān kill-PFV him two CL, but he all not.PFV die
 'Zhangsan killed Mary three times but she didn't die'
 POSSIBLE ACTIVITY READING

In Mandarin, however, it is possible under an activity reading whereby “killing” is possibly metonymic with some other form of event that is an activity-like paraphrase when translated into English.

Turning to some sort of broader scalar analysis: in English, the lexical specification of KILL is uniformly going to be a binary scale, something which under the past-tense interpretation is naturally bounded, or is at least superficially bound, and thus always telic. This is impervious to any sort of interaction from other things in the general syntactic space. However, in Mandarin - what seems to occur is that the same binary information is encoded in the predicate without any sort of event quantifying adjective, but when one exists - it simply acts out a semantic function to fuse particular atomic events denoted by the predicate and contemporaneously removing any particular scalar information relevant for calculating telicity of the event. Such as removing the GOAL part of a scale.

3.4 Modal Approaches to NCA Theory

To recap, if we follow the lead of Rothstein (2004) who builds upon Vendler (1957), accomplishment predicates as a class can be seen as [+durative] and [+telic], meaning they have temporally connected sub-events and encode a single point in time where the event described by the predicate culminates. Whilst it has been considered that these points in time (teloi) are homogeneously part of the semantics of accomplishment predicates, recent evidence has demonstrated that they crosslinguistically have differing truth conditions with respect to the telos. Accomplishments can be non-culminating.

This section will explore three particular theoretical points of view relating modality to non-culmination. Modality is a necessary theoretical assumption when looking at the semantics behind non-culminating accomplishments, since they assert a proposition about what could be the case in the actual world after an event has ceased. The question is whether the proposition actually holds of the world, and if not, is it possible to state otherwise without a contradiction occurring?

Firstly, we can see cases in languages like Mandarin, where it seems like a separate set of truth conditions exists entirely contrasted to languages like English:

- (83) John closed the door, #but the door didn't close
 (84) Yǔfēi guānle nà shàn mén, kěshì mén méiyǒu guānshàng
 Yufei shut.PFV that CL door, but door not-have.PFV shut

'Yufei closed the door, but the door didn't close'. (Martin, 2019)

Notwithstanding subjecthood agency, which we will return to in 4.3.4, it seems that in order for the predicate “closed the door” to be true in English it must be the case that the door undergoes a full CoS from being open to being closed over the course of the event. The same does not seem to hold for Mandarin, where the sentence can be true of a situation in which the door can be any part along the scale of “closed-ness”, including the point where there is zero-CoS at all, where it remains fully open.

Since modality deals with what is possibly the case (Portner (2009), Kratzer (2012)), this contrast in truth conditions leads to two tentative observations. Firstly, in English it is **necessary** that for the sentence “closed the door” to be true, the direct object “door” **must** undergo a full CoS before utterance time. Whereas the culmination of the equivalent predicate in Mandarin seems to suggest that it is merely a **possibility** that the door undergoes the same CoS. This contrast between Mandarin and English demonstrates that there is a difference in what the requirements are for an event to be encoded as culminated, which affects the truth conditions of equivalent predicates between languages.

However, the pattern of zero-CoS or partial-CoS (Martin, 2019) in accomplishments is not a pattern which is always replicable across verbs of different scalar types, as has been noted by Beavers (2012) *inter alia*. For example, whilst (2) shows that negation of the outcome of the event is possible for some sort of *PATH* scale, the same cannot be said for a predicate such as “solved a Rubik’s Cube”, whose scalar properties are somewhat distinct. Notice:

- (85) John solved a Rubik’s Cube, # but the Rubik’s Cube is not solved
 (86) Yǔfēi huányuánle yīgè mófāng # kěshì mófāng méiyǒu huányuán
 Yufei restore-pfv a-CL RC # but RC not.PFV restore
 ‘Yufei solved a Rubik’s Cube, but the Rubik’s Cube was not solved’⁷

The Mandarin example, *huanyuan-le* is not specific to Rubik’s Cubes. The same contradiction can be seen in examples like (5)⁸

- (87) Yǔfēi huányuánle yī fú huà # kěshì huà méiyǒu
 Yufei restored-PFV on CL painting # but painting have-not.PFV
 huányuán
 restore

⁷Fu, Shiyang p.c.

Something to note, a Thai correspondent reported a sentence with a similar translation to be possible along the lines of “Xā lək kə̄ rŭ bikh tək kə̄ mŭ dŭ” (Alak solved a Rubik’s Cube, but couldn’t) however this will be explored in the next section

⁸With some interspeaker variation between correspondents

’Yufei restored the painting, but the painting wasn’t restored’

In contrast to examples (1) and (2), (4) and (5) show that the thematic object must complete a full CoS relative to some sort of “Solved”/“Restored” scale over the course of the event, otherwise there is a contradiction if one negates that the telos is reached. The dichotomy between (1)/(2) and (4)/(5) is worth noting.

We would be remiss not to say outright what the varying scalar properties *could* be between Solving-VPs and Closing-VPs. Following Beavers and Lee (2020)’s concepts of binary versus gradable scales an “openness” scale is gradable, since there are multiple points along the scale of closed-ness (i.e., a little bit closed, nearly closed, not-closed at all). However, on the surface, this differs from the type of scale that is understood in a verb like “solve” where intuitively the scale is binary. Something is either solved (ϕ) or not-solved ($\neg \phi$). If we consider this line of thinking, then the different scalar properties seem to lead to differences in the availability of non-culminating readings, too. Considering these minimal pairs, we want to consider how modality interacts with particular types of scales. Why is there possible negation of the culmination seen in perfective verbs which denote gradable scales, but seemingly not with binary ones between English and Mandarin?

Altshuler (2014) and Martin and Gyarmathy (2019) make the case for typologically diverse perfective denotations, which means that in languages with *weak* perfectives (Mandarin, Thai, Hindi) there is a *maximality* requirement as opposed to an *absolute maximality* requirement (English, Russian). This opens up an explanation for why Mandarin perfective accomplishments allow for a non-culminating reading on these gradable scales, since only a slice of an event headed towards the telos is necessary for computation with the perfective in AspP. Because this slice need not be fully maximal (i.e., need not include the culmination itself), an endpoint might not have been reached in the real world. This is not the case in languages with a strong perfective, which instead requires the telos be present in the verb for computation with AspP.

However, weak perfectives potentially lead to a prediction that does not hold across different classes of durative verbs and their associated scales. We could assume that “huanyuan-le” (restore) with relation to the Rubik’s Cube example, should allow for a non-culminating reading since it would be possible to extract some part of that event (i.e., the first 10 seconds of the Rubik’s Cube solve) when computing with the weak perfective ‘-le’. It does not seem to hold that in durative verbs with binary scales ⁹ the same conditions are possible. If weak perfectives allow for an explanation for the possible non-culminating behaviours in predicates like “guan-le” (close) with multi-point scales, why not binary ones in Mandarin? What might drive this particular difference? We will see how binary scales in achievement predicates in Salish can allow for non-culmination,

⁹see also; mapping-to-minimal final part (MMFP) relations in Tatevosov and Ivanov (2009) and Rothstein (2004)

too, which adds another layer of required explanation with respect to this question.

This section will outline some background theories on modality as a potential point of explanation for these questions. This will lay the groundwork for section 4, where I will return to the examples laid out in (85-87), expand, and sketch out a particular iteration of a scalar view of telicity such as Hay et al. (1999) and Rappaport Hovav (2008), endowed with intensional semantics following the lead of Beavers and Lee (2020) in an attempt to answer the question of why non-culmination occurs in the first place, and to what extent does it show different syntactic/semantic behaviour crosslinguistically with respect to different scalar types.

The key aim of this section of the thesis is to try and elucidate some of the current literature on the interface between telicity and modality, and why non-culmination in telic predicates is possible in particular languages in particular contexts before moving on to specific generalisations that could be made to answer our research questions.

3.4.1 Sublexical Modals

Let's start with one iteration of modality, that of sublexical modals. Sublexical modals have been demonstrated as a fruitful place to start when considering telicity and culmination entailments, as seen in Martin and Schäfer (2017) based on the premises of Koenig and Davis (2001). Sublexical modality itself has roots in classical Kratzerian semantics of modality (Kratzer, 2012) where modal bases (hence MBs) are seen as being sets of propositions (worlds) that are true of a given situation according to some specific rule.

The Koenig and Davis (2001) approach states that the lexical entry of a verb consists of two elements. The first is a *core situational-component* which determines the relationship between the different arguments in a predicate. For example, a predicate that has an *agent* subject alongside a *recipient* indirect object inherits that specific thematic relation through the verb's situational core. Verbs that share situational cores are grouped together into a superset of relational categories (i.e., agent-undergoer-rel, agent-recipient-rel, agent-theme-rel, etc). The idea here is that verbs themselves are subsets of their relational category supersets. Specific thematic attributes are thus inherited through this hierarchical relation between supersets of classes and verbal subsets.

The second component is the *sublexical modal* that contains the set of possible circumstances in which the event, and its participants, are true. The entailment of a participant's role in a sentence, such as being a *theme*, *undergoer*, *experiencer*, etc. will be determined by the situational-core relativized to the set of possible circumstances hosted by the MB in the verb. These MBs may be bouletic, epistemic, deontic, or null, in which it is simply the set of

worlds in which the event plays out and is true. Whether the actual nominal will carry the thematic role provided by the situational core (whether or not it is “characteristically entailed”) is determined by the verb’s MB. If the argument’s role is true of the worlds within the MB, it will be entailed. Let’s illustrate with an example (from p.101):

(88) Joan promised Bill \$10

“Promise” in this case is analysed as providing a *cause-possessee* relationship to its arguments, which means that the subject of the sentence is a causer of a CoS in which Bill goes from not possessing \$10 to possessing \$10. The sublexical modal attributed to this verb in this context is *deontic*. The sentence is true in all of those worlds in which the conditions satisfying a successful transfer of possession are true, based on the duties from Joan’s promise. The participant roles are entailed here, if the conditions of the deontic modal are true in all worlds of the MB, including the actual world.

What about cases where CoS verbs are defeasible, and therefore non-culminating?

(89) Joan promised Bill \$10, however he never received it

In this case Bill does not undergo any CoS. We can assume that what is true of the actual world does not align with the set of worlds hosted in “promise”’s deontic MB, and Joan does not go through with the promise. What this means is that the participant role held by the indirect object “Bill” is not actually entailed, because his receiving of \$10 does not necessarily hold of this world relative to the MB.

Martin and Schäfer (2017) have a similar idea to that of Koenig and Davis (2001) whereby defeasible causatives are considered bi-eventive predicates. They have a uniform analysis for defeasible causatives such (7), where the MB of *causal-success* is used. This MB can be defined as the set of worlds in which a CoS in a thematic object is achieved. Simply put, if a CoS does not occur in the actual world w , then w is not part of the set of worlds in the sublexical modal. From this, negation of the outcome without contradiction is possible. They illustrate such an idea with a predicate such as the French [VP offrir y à z], shown below (p.101):

(90) $\lambda y \lambda z \lambda e [\text{offer}(e) \wedge \text{theme}(e,y) \wedge \text{recipient}(e,z) \wedge \Box_{\text{causal-success}} \exists e' (\text{cause}(e,e') \wedge \text{have}(e') \wedge \text{possess}(e',y) \wedge (\text{posessor}(e',z)))] =_{\text{def}} \lambda y \lambda z \lambda e [\text{OFFER}(e,z,y)]$

The predicate OFFER(e,z,y) is given a defeasible definition when it’s decomposed with a sublexical modal as part of the semantics. There are two particular arguments, a theme and a recipient. If the recipient thematic role fails to hold of the actual world, because the event of offering is not causally successful, then there is a felicitous negation of the outcome of the event.

Using Koenig and Davis (2001)’s approach, let’s have a look at our examples

again:

- (91) John closed the door, #but the door didn't close
- (92) Yǔfēi guānle nà shàn mén, kěshì mén méiyǒu guānshàng
 Yufei shut.PFV that CL door, but door not-have.PFV shut
 'Yufei closed the door, but the door didn't close'. (Martin, 2019)

We could assume that a separate set of argument-relations hold of verbs crosslinguistically. In Mandarin, it could be the case that “guan” (open) licenses an “agent-participant” relation, whereby the door is simply part of the event of closing. As such, the amount of change that occurs over the course of the event is irrelevant for the truth values of the predicate. In English, however, it could be considered that a “cause-undergoer” argument relation is provided by the core-situational component, whereby the door undergoes a CoS that is triggered by the subject causer.

Under this view, the MB in this case would simply hold the set of worlds in which all the above relations are true, which would reduce the distinction in non-culminating phenomena in Mandarin and English to a difference in thematic relations mediated through a MB, which need not be specifically defined.

However under a Martin & Schäfer analysis with a uniform MB, we could say that both predicates have the same underlying denotation of something like:

- (93) $\lambda y \lambda z \exists e [\text{close}(e) \wedge \text{theme}(e,y) \wedge \text{causer}(z,e) \wedge \Box_{\text{causal-success}} \exists e' (\text{cause}(e,e') \wedge \text{become-closed}(e'))] =_{def} \lambda y \lambda z \lambda e [\text{close}(e,z,y)]$

In Mandarin, the circumstances that lead to a failed CoS could simply be a matter of the actual world not holding of the causal-success worlds, so far so good. However, this leads to a question of typology. This does not seem to be true for English, where “open” is not defeasible in any way. If we consider a causal-success modal as a part of accomplishment predicates, what stops English from taking this form? We will return to this question in the next section, but the takeaway point should be thus: the MBs seem to differ crosslinguistically, *or* the thematic relationship between arguments seem to differ crosslinguistically.

3.4.2 Intention Worlds

In their paper, Beavers and Lee (2020) explore failed-attempt predicates (zero-CoS), under the purview of a MB of *intention*. Whilst the MB is slightly different in ontology to other modal points of view, it has the familiar premise that if a CoS has occurred within the worlds in the MB but not the evaluation world, denial of the telos is possible without contradiction. For example:

- (94) john-i changmwun-ul yel-ess-ta, julena changmwun-i
 john-nom window-acc open-PST-DECL, but window-nom
 yel-li-ci anh-ass-ta
 open-Pass-Comp neg-pst-dec
 'John opened the window, but the window was not opened' (p.1237)

In Korean, the modal information is introduced by active-voice. The MB is the set of “intention worlds” and is modelled as I_x (x = subject variable). The MB is tied to the subject, and their intentions through the agent-voice. Specifically, the failed attempt readings of accomplishment predicates can only occur if the agent of the event has the intention of completing the event, but the CoS does not hold of the actual world. Before we go into an example, a brief note on terminology:

Partial success readings in Korean are possible; they occur in the same way that English degree achievements can have variable telicity. Hay et al. (1999) outline this as a distinction between quantized and non-quantized change along a scale (see 2.1.2).

Quantized scalar changes are quite clear in English degree achievements. For example:

- (95) The council widened the road for a week

This atelic predicate is such that it entails that the road has undergone some sort of change along the scale of “wideness”, however the actual amount of change is not specified, it is non-quantized. This sits in contrast to:

- (96) The council widened the road in a week

This is a quantized change. Since the predicate is telic, and co-occurs with an ‘in-PP’, the interpretation is that the amount of change over the course of the event is fully maximal, or to a specific contextually provided amount.

Within their semantics of accomplishments, a domain U_d is used, which is the domain of scalar points and defines the degree to which “a given state holds along the scale with which it is lexically encoded” (p. 1263). This as part of the semantics of accomplishment predicates allows for a semantics like the following:

- (97) a. $[[\text{yel-}]]^{10} = \lambda y \lambda v \exists s \exists d [\text{cause}'(v,s) \wedge \text{patient}'(y,s) \wedge \text{open}'(s,d)]$
 b. $[[\text{John-i}]] = \lambda P \exists v [\text{effector}'(\text{john}', v \wedge P(v))]$

Breaking this down, λy denotes the the patient argument; λv denotes some variable from a given domain U_v of states or events; $\exists s$ is a variable from the domain U_s of states which is existentially bound; $\exists d$ is a variable from the do-

¹⁰a. yel = open
 b. john-i the agentive subject, active voice

main U_d of degrees.

I_x is introduced by a silent active voice head, and when present creates an entailment that the subject tied to the active voice had the intention to effect change over the event. When implementing the intentional modal unit the following denotation is given to the following sentence:

(98) john-i changmwun-ul yel-ess-ta
 john-nom window-acc open-PST-DECL
 'John opened the window'

(99) a. [[john-i changmwun-ul yel- $\emptyset_{active-modal}$ -ess-ta]]
 b. $\exists v$ [effector'(john',v), $\wedge \square_{I_{john}}$ $\exists s \exists d$ [cause'(v,s), \wedge patient'(window',s)
 \wedge open'(s,d)]]

Broadly speaking, this states that in the worlds according to John's intention he is the effector of an event that causes the patient to undergo some CoS to some degree d . If d remains at θ in the actual world w , the sentence can be true in the set of the worlds within the $\square_{I_{John}}$ MB. Under this circumstance, arrival at the telos can be negated without contradiction deriving the failed-attempt result that we saw in (94). If d is set to a point $>\theta$ and is a non-quantized change, then partial readings are possible. If quantized, the predicate denotes a culminating event.

This intention-world analysis is specific to Korean examples. Though specific, it does reveal an interesting factor about non-culmination; Korean failed-attempt accomplishments must have an intention MB to allow for non-culmination. This is not the case in Mandarin or English, where the same sort of denotation carrying an intention modal does not carry. This raises the question, again, of the crosslinguistic properties of MBs in non-culminating accomplishments, and how they differ.

We have now seen a few proposed examples: one of intention, one of causal success, and one dependent on the verb itself. The question for section 4 will be, how can we make a principled theoretical model that limits the set of MBs that scope over an event to limit culmination possibilities?

3.4.3 Inertia Worlds

The last theoretical angle that we will see comes from one of the first papers on non-culminating accomplishments, Bar-El et al. (2005) who looks at the Salish languages of St-át-íncets and Skwxwú7mesh. As is the case for the other languages, such as Mandarin, the culmination is only an implicature, and it may be cancelled:

- (100) máys-en-lhkan ti q'láxan-a, t'u7 cw7ay t'u7 kw-s
 fix-TR-1SG.SU DET fence-DET but NEG just DET-NOM
 tsúkw-s-an
 finish-CAU-1SG.ERG
 'I fixed a fence, but I didn't finish.' (p.4 - St-át-imecets)

Accomplishment predicates that are analysed in this paper are derived from unaffected root verbs, which on their own entail culminations. They are unaccusative, meaning that they have subjects that are not agents. When verbal roots are used on their own, a contradiction arises when denying the culmination:

- (101) *mays ti q'láxan-a, t'u7 aoy t'u7 kw-s
 get.fixed DET fence-DET but NEG just DET-NOM
 ka-máys-ts-a
 OOC-fix-3POSS-OOC
 'The fence got fixed, but it couldn't get fixed.' (p.7 - St-át-imecets)

This led Bar-El et al. (2005) to provide this denotation for verbal roots: (p.8)

- (102) $[[mays]]^w = \lambda e \lambda x [x \text{ gets fixed in } w (e)]$

Non-culmination comes at the point where an agent is added into the predicate, through a control transitivizer, which in example (18) is the "-en-" infix. As well as allowing a verb to become transitive, it also removes the entailment that the culmination of the event occurs in the actual world. The following semantics is provided on (p.8):

- (103) $[[CONTROL.TRANS]]^w = \lambda f \in D_{\langle l, st \rangle} [\lambda e [e \text{ is controlled by its agent in } w \ \& \ \forall w' [w' \text{ is an inertia world w.r.t. } w \text{ at the beginning of } e \rightarrow [\exists e' [f(e')(w') \ \& \ e \text{ causes } e' \text{ in } w']]]]] \ (l = \text{events}; \text{Intensional Functional Application is used}).$

This states that the CONTROL.TRANS morpheme takes a telic root verb, adds a semantic agent, and introduces inertia worlds. Inertia worlds are those in which the events have a duplicate, a full run time, and a culmination with respect to the normal course of the event following a normal set of circumstances. This theoretical turn follows that of the modalized approaches to the English progressive, such as Dowty (1979).

The idea is that for verbs with agents, inertia worlds are introduced, and in the inertia worlds the culmination holds. It is therefore possible and semantically felicitous to negate that the outcome of the event holds of the actual world, and only holds of the morphologically introduced inertia worlds.

Bar-El et al. (2005) follow Pylkkänen (2008)'s idea of functional head bundling.

For Salish, the argument is that the bare-roots themselves encode a “telicity functional head”. When the control transitivizer is added, then two other functional heads, Root/Inertia Modality and Voice are bundled together. When this is added to the root verb, the bundled CONTROL.TRANS morpheme adds modality information as well as the agent of the verb. Crosslinguistic variation is argued to be down to separate ways in which these functional heads are bundled. Their hierarchy is shown below:

(104) [(IM)perfective [Root/Inertia Modality [Voice [telic [V]]]]. (p.11)

What is interesting about this language is the fact that the type of scale seems to not show the same effect as Mandarin or English. Remember our “Huanyuan-le mofang” (solve the Rubik’s Cube) example, where we saw that in both English and Mandarin, verbs with binary scales don’t allow for a non-culmination - in Skwxwú7mesh it is in fact possible to deny the outcome of a CoS that follows a binary scale. Notice this example with an achievement predicate “break”:

(105) Chen xewtl'-an ta lhach'ten I na7-xw chen wa
 1.sg break-CTRL-TRZ DET knife CNJ rl-still 1.sg IMP
 xewtl'an
 break-CTRL-TRZ
 “I broke a knife, but I’m still breaking it” (Bar-El (2005), cited in
 Martin and Demirdache (2020) p.1197)

This suggests some form of complex crosslinguistic variation in what sort of scales can occur with some sort of modal information. What’s more, if data from Thai is along the right lines (see next section), then it goes somewhat against Beavers and Lee (2020) in suggesting that binary scales are to be considered always telic.

3.4.4 Teleological Modals

Another approach that approaches telicity with a modal angle is that of Naddathur and Filip (2021). Under this approach to telicity, and non-culmination the denotation of a telic predicate P is saturated with a particular culmination condition which is the endpoint for a telic event. The situation, and the context at hand will provide that culmination condition with a set of accessible teleological alternative worlds, in which the event in question proceeds through a causal chain, structured under the Structural Equation Model (SEM) of Pearl et al. (2000) as expressed through propositional chains in a causal premise semantics (Kaufmann, 2013). All the teleological alternatives will realize K , and the outcome of the event is determined by how far along the event goes in comparison to the accessible teleological alternative worlds.

The set of teleological alternatives is outlined as followed given on page 4

(106) “Given a goal G , circumstantial modal base f , stereotypical ordering

source g , and evaluation world w , the set of teleological alternatives for G in w is given by: $\{w':best_g(w)((\cap f(w))\cap G)\}$ "

The set of teleological alternatives for a given telic predicate will be the best ordered set of accessible worlds that intersect with those that have the relevant goal. This is projected from the culmination condition, within the denotation of a predicate P - known as K . The set of teleological alternatives is provided by the modal base, which following Kratzer (2010) is provided by the context, true at reference time for a given world.

Under this iteration of a telic predicate, what makes something telic is not necessarily the predicate, but rather the perfectivity that is marked onto it through the morphology for instance. Following Althsuler (2014), Gyarmathy and Althsuler (2020) depending on the type of the perfective that is used, a maximal portion of the event can be selected - thereby allowing for a non-culminated event (in languages like Hindi), versus an absolute maximizer, which is the requirement that the event denoted by P reaches K .

The modal angle is interesting here, particularly in the iteration outlined by Nadathur and Filip because it allows the semantics of a telic predicate to capture parts of the event, as Nested Temporal Slices along the causal chain, triggered by the situation, towards the culmination condition K . This makes the universal claim, that all telic predicates in language encode culminated events - contra to the claims of Krifka, and others. This is a positive, because as is very evident in the case of non-culminating accomplishments (as we know, accomplishment predicates are broadly seen to be telic). It makes uniform the denotation of accomplishments crosslinguistically and puts the locus of telicity outside of the predicate and onto the aspectual marker. All telic predicates will denote all the stages of their event process in their mereological make-up, and it is up to something else in the semantics to determine what exactly allows for perfectivity, and thus telicity to take shape.

For the most part, the process of making external telicity in this case is interesting. What should be done is to use a similar batch of reasoning to account not just the case of Hindi partial culmination with the weak perfective, but also the broader typological base of non-culminating accomplishment predicates that have become salient in the literature. This includes the ones that we have seen, for example - zero-change accomplishments, non-maximal accomplishments, across a wider set of linguistic examples. Secondly - if the approach of modality is along the right lines, and telicity is just a matter for the perfective marker having a typological distinction in the amount that event has processed, we should be able to make theoretical innovations in the Vendler classes more broadly. What, for instance, is denoted in an activity, state and achievement predicate? The last one is of particular interest - as was noted by Nadathur, because whilst non-culminating achievements are not necessarily all that common in the empirical landscape (so far), we ought to be able to make a prediction as

to how their denotations shape up, and what theoretically would allow them to be non-culminating. In the case of atelics, what in the linguistic domain makes the distinction between predicates that have teleological alternative worlds, and those that do not?

3.5 Interim Summary

In this section, we aimed to outline three previous theoretical angles taken to describe non-culminating accomplishment phenomena through the lens of modality, after introducing some examples which show a crosslinguistic difference in the availability of telos negation and crosslinguistic similarity in resistance of non-culmination with a similar scalar property.

The first theory we witnessed was with English, where we saw the view that a sublexical component of a verb determines the argument structure properties of event participants. From this, we drew a connection between thematic involvement of an event participant with the possibility for defeasible culmination in languages. The crosslinguistic difference between English and Mandarin was said to possibly be down to a distinction in the lexical entries, with different thematic roles assigned to arguments, removing “CoS” as a property of some Chinese accomplishments.

After this we saw the notion of “intention-worlds” in Korean, where in contrast, the modal component was assumed to be part of the active voice instead of the verb itself. We looked how the theory espoused by Beavers and Lee (2020) explains the difference we witness between our examples with multi-point scales versus binary scales, but that the crosslinguistic difference between the availability of non-culmination still remains unclear, particularly as the notion of MBs for determining culmination seem to be distinct between languages as they themselves point out.

We then saw the notion of branching worlds in the case of Salish languages, where the modal is one of inertia worlds where event duplicates exist. We saw how control transitivizers introduce these branching worlds, and the judgement of culmination is argued to be based on truth of the state of the evaluation world compared to these branching worlds. We also outlined the systematic difference between our example with binary scales compared to this language where non-culmination still seems to be possible even for achievement predicates, which naturally have binary scales.

Across languages, and the literature on modality and aspect, what seems to be the case is that the notion and formal explanation of what the MB offers differs depending on the language, and the theoretical angle one takes. However, a key point to take away is the comparison of the truth of possible worlds, in which culminations may hold depending on a particular set of propositions,

and what occurs in the actual world. What these propositions are, how they are introduced, and what scope they have over verbs of different modal types is a question that deserves a deeper look.

We can start to achieve this by developing a motivated pictures of the typology of MBs, which we have begun to do in this section. From here, we can start to make a judgement on what piece of the linguistic architecture is responsible for introducing MBs into the syntax/semantics crosslinguistically. Is there a common core between these MBs that we can base a possible resolution on? One potential answer could be found in Demirdache and Martin (2015)'s Agent Control Hypothesis, which has been reflected in our above examples, where agency of the subject is essential for the availability of non-culmination in accomplishments. Importantly, we need to ask how these MBs can relate to verbs of different scalar types. There seems to be variation there, too. This will be the focus of the next section.

4 Modal Base of Scalar Change

4.1 Taking Stock

Let's sum up the pattern that we can see. Non-culminating accomplishments seem to be a pattern that exist crosslinguistically whereby a CoS verb denoting an action before reference time can have the endpoint information negated in a continuation clause. Fundamentally, the proposition that asserts some set of information is therefore agnostic in some respects to whether the action denoted has entered into a result state.

But there are obviously differences in which verbs can and cannot allow for the continuation clause, denying the outcome of the antecedent proposition. It is relatively clear that in English, a predicate like:

(107) John mowed the lawn, but not all of it

is more acceptable, and is more appropriate to describe a non-culminating scenario than an equivalent scenario using a different predicate such as:

(108) ?John built the house, but not all of it

Or indeed something like the following, which is even more unlikely:

(109) *John solved a Rubik's Cube, but gave up half-way

It almost seems unthinkable to assert that the Rubik's Cube has entered into a solved state, but that the actual state of affairs in the world is one where the Rubik's Cube is not in that state, the same proposition in Mandarin is equally as paradoxical. Whereas another accomplishment predicate like "mow the lawn" might be a bit more lenient for a consequent clause denying the outcome of a CoS.

Crosslinguistically, however, the Rubik's Cube example seems to be acceptable: for example in Thai - with a reading that is more like "try-to", once again:

(110) Aalak gae roobik, dtae gae mai daai
Alex fix Rubik's, but solve NEG MOD
'Alex solved the rubik's cube, but couldn't'¹¹

Furthermore, as is evident from some languages like Burmese and Salish, CoS predicates that denote change with achievement-like predicates can also allow for a similar sort of pattern.

(111) máys-en-lhkan ti q'láxan-a, t'u7 cw7ay t'u7 kw-s
fix-TR-1SG.SU DET fence-DET but NEG just DET-NOM

¹¹p.c Mac Yodmulklee and Ponrawee Prasertsom - both comment that sentence is possible if read with an "intended to" reading, fitting the general pattern from Beavers and Lee (2020)

tsúkw-s-an
 finish-CAU-1SG.ERG

‘I fixed a fence, but I didn’t finish.’ (Bar-El et al. (2005)p.4 - St-át-
 imcets)

- (112) tû= ò ta =te dà=bème mǎ-tè=bú
 3sg=KO kill=REAL this=though NEG-die=NEG
 ‘I killed him, but he didn’t die’ KATO (2014) - EXAMPLE 5

So there are levels of variation that we need to be aware of. There is a sort of continuum of acceptability in English for those predicates that do and don’t allow for a non-culminating consequent clause; crosslinguistically there is another layer of variation.

Furthermore, we have predicates in Mandarin which can have non-culminating consequent when the verbal unit is quantified in some way:

- (113) Zhāng sān shāle tā liǎng cì, dànshì tā dōu méi sǐ
 Zhangsan kill-PFV him two CL, but he all not.PFV die
 ‘Zhangsan killed him three times but he didn’t die’

On a purely pragmatic basis - when one asserts the proposition that includes the concept of culmination, we are in a position to assume that it is the proposition that includes the strongest amount of information, and thereby we should just assume that the culmination of the event is true, and the event itself has terminated. But the actual concept of non-culmination seems to act against this somehow, whereby you can assert the proposition which is the stronger form of a description for a particular scenario, but then go on to say that the entailment of its culmination does not hold, or not at least in the world of evaluation.

Within language, the current empirical landscape suggests that levels of the granularity of the scale involved in the change of state have an effect on the availability of an NCA interpretation. In some languages (as is demonstrated tentatively in our Thai data), MMFP (Rothstein 2008) predicates could allow for some sort of NCA reading. Here, it is the arrival at that final scalar-part which can be negated without contradiction. Otherwise, and what seems more common is that predicates that denote any particular shift along a scale over the course of an event. Secondly, the notions of modality seem to be different, or they are differently described. What the Korean data suggests is that NCAs are possible when evaluation world hold of the worlds in an agent_intentions modal base. However, fundamentally - we could be in a position to make a generalisation about what the modal base could be when building a crosslinguistic semantics of the phenomenon. I would suggest that notions of intention in the Beavers and Lee case could be subsumed under a broader teleological alternative approach such as Nadathur and Filip (2021), which would predict that scope could play a role. For example, if the modal component scopes under the Voice-head, then perhaps something is happening whereby intentional readings

are more or less an entailment.

The next few sections outline the baseline for a semantics of non-culmination that tries to hold to two fundamental axioms:

- The modal base for Non-Culminating Phenomena is a consistent property cross-linguistically
- The modal base for Non-Culminating Phenomena is based around possible worlds of change.

Firstly, I will outline what this could look like.

4.2 Proposal for a unified semantics of non-culmination

Overall, the general pattern for non-culmination can be summarised as the following, not taking into account aspectual or tense information, for now:

$$(114) \quad P_{CoS} \wedge \neg \text{CUL}(P_{CoS})$$

P_{CoS} represents an antecedent proposition. It asserts a situation in the world in which some element shifts along a scalar property. The predicate is built up with a movement relation such that the scalar property maps homomorphically onto the event denoted by a verb. The sort of proposition that enters into this configuration is a proposition with the following sub-units:

- A scalar tuple: $\langle \delta, P, R \rangle$ - consisting of a scalar property (δ), set of scalar points (P), ordering relation of those set of points (R) (adapated from Kennedy (2012))
- Homomorphism between $\langle \delta, S, R \rangle$ and event domain U_e via a movement relation (Krifka (1998), Beavers (2012))
- Open value D, holding of a particular sub-part of the event, namely GOAL(P, e)
- External argument, introduced via Voice (Kratzer, 1996) (Martin and Schäfer, 2012) - specifically, for non-culmination, this must be agentive.

Non-culmination seems to be a pattern whereby the asserted CoS information of an agent-controlled antecedent clause can be negated in a consequent clause. Superficially for a CoS predicate with perfective aspect, then the strongest interpretation is one where GOAL has been reached before utterance time. I propose that, fundamentally, you can achieve non-culmination which denies the strongest reading of a CoS perfective predicate by proposing a higher modal model, specifically one in which the proposition will project a modal base relevant for culmination. The modal base that is involved in non-culmination is projected from P_{CoS^w} , and we will refer to it as the modal base of culmination (Cul_{mb}), or in some terms a teleological modal base (Nadathur and Filip, 2021).

What is included in this modal base are the worlds in which $\text{GOAL}(P,e)$ are true. Seeing that $\text{GOAL}(P,e)$ is simply the event equivalent of a maximal scalar change via the movement relation, this simply reduces the modal base to the set of worlds where a maximal CoS is true.

With this basic apparatus in place, non-culmination of CoS predicates can be explained through a simple pattern. When P_{CoS^w} is included in Cul_{mb} , then the assumption is that $\text{GOAL}(e,P)$ has been reached in all worlds including the evaluation world, and therefore a non-culmination consequent is not possible. Where P_{CoS^w} is not included in modal base, or if its inclusion is not known, then a non-culminating consequent can be possible. This is deliberately broad with respect to the scale in question because we want to account for those instances where predicates with binary-scales allow for non-culmination as well as those which have extended scales.

We can flesh this out a bit more, to understand the distribution of predicates that allow for non-culmination more than others. For scenarios that allow non-culmination, in the evaluation world, it may just be the case that there is no reflexive accessibility relation with a modal base, such that the world of evaluation doesn't need to be hosted. This would therefore allow for a continuation clause to simply deny that GOAL of some predicate P has been reached in relation to the actual world.

4.3 The Semantics of Non-Culmination

Let's flesh out the semantics of the Cul_{mb} a little more. If we follow similar semantics of Kratzer (2012) whereby we can have a function that returns a set of propositions that represent what is true given a certain criterion, then we can propose some function such as f_g (g standing in for goal), which returns the set of propositions that represent what has a goal in the world. From that, let's assume that $\bigcap f_g(w)$ would therefore be the set of worlds compatible with what has a goal in w . From this, we propose that for each predicate that has a GOAL subpart (i.e., a maximal shift along scale δ , any CoS predicate), there will be an associated set of accessible worlds, namely: $\phi \in \bigcap f_g(w)$. This is crosslinguistically consistent across all accomplishment predicates.

With that being said, we can then define non-culmination in the broadest sense based on some sort of relation with the modal base. Let's take some arbitrary CoS denoting proposition ϕ which accords to our criterion listed above. Non-culmination will be determined because of *weak inclusion* (115), whilst strong culmination will be determined by *strong inclusion* (116).

(115) Weak Inclusion (WI):

$$\llbracket \text{CUL}\phi \rrbracket^{w',fg} = 1 \text{ iff } \exists w \in \bigcap f_g(w) : \llbracket \phi \rrbracket^{w',fg} = 1$$

For WI, if we take proposition ϕ to be “John mowed the lawn” and input it into the weak relation then $CUL\phi = 1$ iff there is a world in the modal base which is compatible with the circumstances of the lawn being mowed. However, this need not be the evaluation world. If it is the case that in the evaluation world the lawn has not been mowed fully, but it does hold of some other accessible world within the modal base (as a matter of the normal course of events, etc.) then we may licitly continue the phrase to deny that the outcome has been reached in the actual world.

$$(116) \quad \text{Strong Inclusion (SI):} \\ \llbracket CUL\phi \rrbracket^{w',fg} = 1 \text{ iff } \forall w \in \bigcap f_g(w) : \llbracket \phi \rrbracket^{w',fg} = 1$$

Strong Inclusion is a relation between the predicate P and the modal base. For predicates in English that don’t allow any sort of non-culminating reading like “John solved a Rubik’s Cube” - then the evaluation world necessarily needs to be within the Cul_{mb} . If we let $\phi =$ “John solved a Rubik’s Cube” then we must assume that it works with Strong Inclusion - in so doing, we’re saying that $CUL\phi$ is true iff every world in CUL_{mb} is compatible with the circumstances of the Rubik’s Cube becoming solved. This must occur in every possible world, and therefore $GOAL(e,P)$ must be true in the evaluation world. There will be no opportunity for it to be cancelled with a continuation phrase.

4.3.1 Why Strong and Weak?

My use of the term Strong and Weak are not a mirror to those of Strong and Weak Perfective (Altshuler, 2014). My reasoning for using these specific terms are based around notions of strongest readings. On the strongest of interpretations (cf. De Carvalho et al. (2016) in the domain of quantifiers), in any given scenario for both WI and SI predicates, then the maximal amount of worlds in which the GOAL is true is considered. This naturally includes the evaluation world. This predicts that interpretation of an antecedent PCoS clause in the perfective, in any case, is that GOAL is true.

SI predicates outright demand that culmination is true. Rejecting the strongest reading is not possible, as there is no alternative. The semantics does not make accessible a possible world for consideration when computing truth conditions.

On the other hand, non-culmination comes into the picture if GOAL may hold of any one accessible world. Effectively, what this is saying is that the semantics is offering an accessible alternative on which to build truth conditions, a weaker reading. Therefore, if you negate the outcome of an event relative to the evaluation world then you can reject the strongest reading in favour of a weaker reading without contradiction.

4.3.2 NCA vs Non-Maximal Accomplishment

Whilst similar, it should be made clear that the above theory is not trying to collapse the notion of NCA into a Non-Maximal Accomplishment (Martin and Demirdache, 2020). In this instance, the notion of non-maximality can be modelled in a separate manner. In cases of non-maximality, the difference seems to sit in the sort of scale on which an event is measured, not necessarily whether a full culmination has occurred over the course of an event. To me, this seems to represent some sort of difference in belief states - for instance, if we take a sentence like:

(117) John dried the clothes, but his husband didn't think they were fully dry

Then the measure of change (i.e., the dryness of the clothes) over the course of the event will be measured differently depending on one person's belief-state of what "dryness" is, for instance. This directly follows from the example we saw before, in (63), but we can rephrase it based on our ontology of a CoS predicate by saying that from one belief-state to another, then the set of points (R) within the $\langle \delta, P, R \rangle$ tuple will differ:

(118) Relative Culmination:
 $\exists x \llbracket \text{CUL} \phi \rrbracket^{w',fg} = 1$ iff $\exists w \in \bigcap f_g(w) : \llbracket \phi \rrbracket^{w',fg} = 1$
 $\wedge w \in \text{BELIEF_WORLD}(x)$

This makes the case that the predicate can be considered culminated with respect to particular belief world. This makes the notion of culmination relative, since it may be the case that $\llbracket \text{CUL} \phi \rrbracket^{w',fg} = 0$ according to $\text{BELIEF_WORLD}(\neg x)$.

4.3.3 Maximality Requirement

Persohn (2022) indicates that in some cases (Mandarin, Xhosa, and others) you can't negate the outcome of an antecedent clause by asserting that the event is still ongoing. This means that in order for the event to be non-culminating, for the most part it needs to be fully perfectivized. The action needs to have *temporally* ceased before UT and RT. For our purposes, where we've not thought too much directly about the aspectual properties of P_{CoS} - we could follow the argumentation of others, such as Filip (2008) by implementing the requirement that composition with both Weak and Strong inclusion requires that $UT \subseteq RT$. However, saying that - the data from Salish also suggests that this is not necessarily a universal requirement for non-culmination to occur (105). This could therefore suggest that the presence of precise perfective information is somewhat optional when composing an NCA.

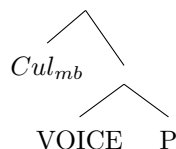
These semantics are good enough to explain the pattern as they exist for English, however evidently - there seems to be something going on crosslinguis-

tically that means that different types of predicate and different types of scalar information can allow for distinct non-culmination effects. For this, we need to turn to how the composition of this would go together, and how we can translate these categories into functional elements within the syntax which will allow for clearer explanation of the variation that we see.

A question may be asked here: what ultimately stops “John solved a Rubik’s Cube” from inputting into the Weak flavour of relation? On the face of it, we should not stipulate anything since it could be seen to be non-culminating, in a language like Thai, for instance. The question would be, what stops it from happening in English? This is where we will need to introduce some syntactic elements. Namely, specific feature requirements that are hosted by the verb, and are checked by specific functional units that carry the WEAK and STRONG relations, respectively.

4.3.4 Agent-Control

Before spelling this out in more detail, we can’t ignore the Agent Control Hypothesis (ACH) (Martin and Schäfer, 2012). Briefly, the ACH is a condition on non-culminating clauses that require that the event in question be controlled by an agentive subject. What the proposal above allows us to do is include the ACH as a cornerstone of the logical system that can lead to non-culmination. Fundamentally we want a system that builds up compositionally like the following:

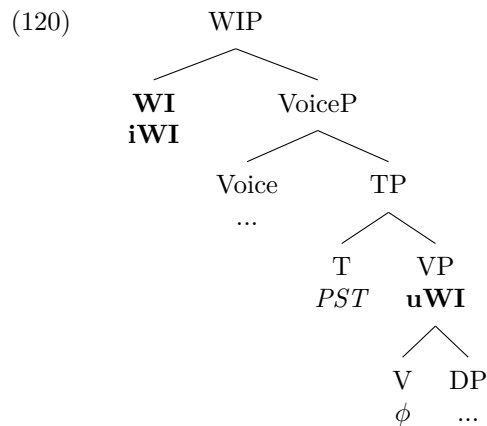
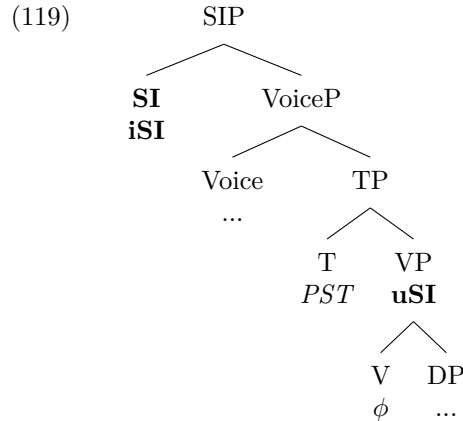


The most compelling of arguments in the domain of non-culmination is that in order to achieve a non-culminating reading, it must be the case that there is an agentive subject. If we assume that this is introduced via a Voice functional head (Kratzer, 1996). This will make the stipulation that only those predicates with an agentive subject can have some sort of weak inclusive relationship to the modal base.

4.4 Composition

Overall, the proposed system works by assuming that the modal information that is relevant for non-culmination comes from a modal source that is imposed above the composition of the predicate itself. What I suggest is that there is particular set of functional elements. These two units correspond to the

strong inclusion and **weak inclusion** criterion, and will be spelled out with the particular relation criterion:



Working with regular feature checking/agreement mechanisms (Zeijlstra (2020), cf. Borer (2005)), for specific predicate types there will be some functional element spelled out onto it. The proposal puts it that strong-culmination/non-culmination arises if there is an agree relation between a VP and its associated higher functional category. If the SI feature is present, then the evaluation world is required to be part of the Cul_{mb} . As a result, the predicate must culminate, and the CoS must hold in all possible worlds. Conversely, when WI is present on the TP, then the presence of the evaluation world in that modal base is not a requirement. When composing [WIP[TP[...]]], then simply by a matter of availability of the possible alternative, one may assert a following proposition denying that $CUL(e, P)$ is true of the actual world.

Crucially, the putative WI feature is not spelled out onto the verb itself. Ultimately, if we go with the concepts of incrementality as a fundamental in the

calculation of telicity, then adding a feature at the level of VP allows for regular aspectual composition. This decouples telicity and non-culmination. This is a positive step, because what seems to be the case is that the default reading, without any consequent clause denying the outcome, is that a culmination has been reached. Seeing that non-culmination broadly comes into the picture when the extra information is possible, we are allowing the semantics the option to take the weaker reading, by specifying that the culmination *may* hold of a possible world, and not of the evaluation world.

Furthermore, this allows us to have a broad take on the gamut of different GOAL loci. For example, we know that for motion + goal verbs - “*walk to school*”, as well as non-culminating predicates relative to a manner property - “*write a letter*”, then the convincing view (Rappaport Hovav (2008), Beavers (2012), Kennedy (2012)) is that the GOAL of the event is not an inherent part of the verb’s semantics but provided by some sort of measure from the internal argument. If these predicates allow for non-culmination, then the feature that allows for the denial consequent clause must not be part of the semantics of the verb itself. Ultimately, this predicts that telicity should be able to compose naturally, and therefore separate from the possibility of allowing non-culmination.

We should think, too, about the status of SIP and WIP? One could assume as a matter of course that these are part of an extended TP structure, otherwise and possibly more explanatorily adequate - they are part of a broader left periphery (Rizzi, 1997). I propose that both of these functional heads are in complementary distribution, and both of them would take the same syntactic location, thus avoiding possible issues that would arise with scope.

4.5 Further Points and Summary

I realise that what the above seems to do is group partial and zero change predicates into the same thing. However, I want to justify this slightly. On the face of it, this proposal is making the case that there is a distinct difference between those predicates which allow and disallow consequent clauses that deny the outcome of GOAL(e,P) in an antecedent clause. The precise amount the degrees to which this effective non-maximality can take raises pertinent and further questions. However, what remains the same between both zero-change and partial-change NCAs is that the shift along the δ property on the underlying scale is effectively < 1 (cf. Martin et al. (2021), Koenig and Chief (2008)). This is admittedly neglected if we assume that only maximal shift in δ is the foundation on which you build a unified crosslinguistic modal base. Because of this, for now, I will propose that the surface difference that we see between these two predicate types collapse into a fundamentally identical semantic cause. However, this does raise further questions.

The first is the question regarding how much shift along δ is required before an endpoint-rejecting consequent clause becomes licit/illicit. The second

question that this proposal raises relates to the notion of the syntactic features that drive the weak and strong inclusive properties. It is possibly the case that predicates that are endowed with a weak-inclusive feature (i.e., NCA-Capable) are specific to a general type of predicate, or semantic description. Could a crosslinguistically informed model of NCA-phenomena help achieve uncovering this? The third question relates to possible situations in which for the same predicate; zero-change NCAs are possible but partial change is banned, or vice-versa. Obviously, if it appears that this pattern does exist, then an endowment of this theoretical angle is required. However, I'm not able to make a convincing case for this as it stands.

These specific questions are currently peripheral, since the empirical background across the literature is too weak to arrive at a definitive answer, and beyond the scope of this thesis and the obvious financial-limit. However, I do believe that it is possible through crosslinguistic, and experimental semantic fieldwork to start answering these questions, to uncover the source of NCA construals. Perhaps following in the recent fieldwork innovations from Persohn (2022), whereby one tests particular classes of predicate alongside a set of questions that targets the amount to which something shifts before A) it can receive a perfective marker, and B) stop being licit for NCA construal.

Alternative considerations could be paid to accounts of grammatical aspect that espouse a modal-base style semantics (Arche (2014), Dowty (1979)). A valid concern of the sketched proposal here is the lack of clear extension to alternate forms of non-culmination (see section 3.2), such as atelic partitivity, which is demonstrated in Arche (2014) who does use an alternative analysis. Therefore, I will make clear that there is a specific limitation for this proposal, specifically that it may be restricted to certain sub-types of NCA-phenomena, and more work can be done in consideration of alternate approaches to grammatical aspect which espouse modal bases, to extend this unified framework to alternate NCA types (Martin and Demirdache, 2020).

To conclude in a brief summary: the purpose of this theoretical proposal is to provide the foundation of a crosslinguistically informed model of non-culmination. I have attempted to do this by unifying modal and scalar approaches to NCA phenomena. This was done through the proposal that a universal modal base exists for accomplishment predicates, which consists of the set of worlds where a maximal amount of change along a δ -property on a scale is true. Accomplishment predicates are predicted to have default culminating readings, but due to a specific WI-feature have a semantically accessible possible-world to base the truth values, which is not available for those with an SI-feature.

5 Conclusion

Accomplishments are a type of predicate that comprises an event in which something’s properties change, such as “mow the lawn” or “solve a Rubik’s Cube”. While past-tense accomplishments have traditionally been analysed as entailing the event’s culmination in the actual world (Parsons (1990)), recent research has shown that such an entailment is not always present crosslinguistically. Accomplishments that have this property are known as non-culminating accomplishments (NCAs). Thus, while sentences such as “John burned the book, but the book didn’t get burned” are contradictory in English, there are other languages such as St’át’imcets, Mandarin, or Thai where no such contradiction arises (Martin et al. 2020).

There are two contemporary types of analysis for NCAs. The first claims that NCAs are a product of language-specific modal mechanisms (Beavers & Lee 2020 – Korean; Nadathur & Filip 2022 - Hindi) which work by offsetting the culminating moment of an event into a hypothetical set of parallel situations. This explains why denial of the outcome of the event is possible without contradiction. When explaining specific empirical fragments of the phenomenon, modal analyses work well. They are problematic, however, when broadened to crosslinguistic analysis. To what extent is the proposed Korean mechanism different to that of Hindi for example? Is there a commonality between these languages such that we can propose a unified crosslinguistic mechanism? I hypothesised that we can.

Others claim NCAs are the product of a scalar mechanism (Koenig & Chief 2008, Martin et al. 2021). Under this view, accomplishments denote a scale that comprises a gradable property (how mowed the lawn is) along which something (the lawn) shifts over the course of a (mowing) event. Different languages may have different requirements on how much something must shift along the scale over the course of an event to be considered as culminated. This view predicts that there are specific types of predicates more amenable to NCA construals since nothing blocks the same mechanism acting on predicates not available for NCA construal. This is a typological prediction yet to be tested, however in this thesis I have attempted to lay the groundwork using a feature-based system to perhaps start moving into deriving a possible answer.

In this MRes thesis, I have attempted to derive a system for NCAs that unifies both a modal and a scalar view. I did this by attempting to isolate the specific set of situations that could be seen as consistent across NCA phenomena, which allow there to be a rejection that a full change-of-state is required of a predicate to be true. I have turned to previous studies on telicity, especially that of movement relations to suggest that the fundamental modal base that acts over accomplishment predicates is one where the final part of the scalar-change is reached.

For future study into NCAs, I believe that unifying theoretical angles in the way attempted in this thesis would allow us more power to describe NCA patterns across languages, and particularly allow us to achieve two key goals: firstly, understand what the core properties are of NC-capable predicates across languages, and secondly what are the absolute limits of variation of non-culmination within language.

However, going further to achieve this would necessitate a crosslinguistic empirical modelling of non-culmination through detailed and fine-grained empirical data to help us track what is consistent between languages, how different expressions of non-culmination is. Because this thesis does not have the space for explicit large-scale data collection, these are two questions left open for future research.

- To what extent can we find consistent patterns in NCA phenomena across languages?
- How can we account for consistencies/differences within a unified theoretical, and crosslinguistic model?

Lastly, due to language contact, I hypothesise the number of languages with NCAs is higher than the literature suggests. Indo-Aryan languages like Pahari-Pothwari; Niger-Congo languages like Igbo and Kiitharaka, and Austroasiatic languages like Khmer are all possible sources of NCAs. However, they are yet to be documented, which could offer a novel empirical sources for any future endeavour mapping the phenomenon across languages and building up a system of crosslinguistic comparison.

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