Maximal and non-minimal change of state in Salish event structure[*]

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1.   Introduction

This paper presents a novel perspective on the aspectual nature of control and limited control marking in Salish, including non-culminating accomplishments. The language discussed in this paper is Secwepemctsín, also known as Shuswap (ISO: `shs`). It is an Interior Salish language, spoken in the interior of British Columbia, Canada.[1] Secwepemctsín has a four-way control paradigm, given in Table 1, which maps onto a four-way aspectual distinction, given in Table 2 and illustrated in (1)-(4).[2]

	Transitive	**Middle**
Control	*-n-t-*	*-em-*
Limited Control	*-nwén'-t-*	*-nwélln'*

Table 1: Control paradigm in Secwepemctsín

[1]There are at most 166 fluent L1 speakers remaining, most of them elderly (Gessner et al. 2022). As such, the language is in dire need of documentation.

[2]In the Secwepemctsín examples, I use the practical orthography of the language. Material which is underlyingly present but has been deleted by a regular phonological process is marked by square brackets [...] in the gloss line. Clitics are written as separate words. Furthermore, 'vf' stands for volunteered form by the consultant, 'sf' stands for suggested or supplied form by the elicitor. Glossing conventions: ADJV = adjectivizer, CTR = control, D/C = determiner/complementizer, DEM = demonstrative, DIST = distal, EMPH = emphatic, ERG = ergative, EVID = evidential, GDIR = goal-directed, INCH = inchoative, LC = limited control, LOC = locative, MID = middle, NEG = negation, NMLZ = nominalizer, PL = plural, POSS = possessive, PROG = progressive, SBJV = subjunctive, STAT = stativizer, TR = transitive.

	Transitive	**Middle**
Control	*Implicate Culmination*	*Implicate partial Change of State*
Limited Control	*Entail Culmination*	*Entail partial Change of State*

Table 2: Four-Way Contrast of Control in Secwepemctsín

(1)　**Control Transitive** – Implicates culmination
Context: Hannah worked on a new basket but is out of material. So the basket isnt done yet.
Hannah k'úl-**en-[t]**-s　　　re　mim'c, #(k'émell ta7　k　s-wi7-s)
Hannah make-CTR-TR-3ERG D/C basket　however　NEG D/C NMLZ-finish-3POSS
'Hannah made a basket but she hasn't finished.'　　　(vf | DC; LC | 10.15.2021)

(2)　**Limited Control Transitive** – Entails culmination
Bruce sul-**enwén'-[t]**-s　　re　ts'i7, k'émell ta7　k
　Bruce freeze-LC-TR-3ERG D/C deer　however NEG D/C
s-t-sul-s　　　　　ey
NMLZ-STAT-freeze-3POSS still
Intended: 'Bruce froze the meat but it wasn't yet frozen.'　　(sf | GD | 10.27.2021)

(3)　**Control Middle** – Implicates partial change of state
Sander q'wl-**em**　　te　peták, k'émell re　c-k'weltsenélten-s q'uwúp-ekwe.
Sander roast-CTR.MID D/C potato however D/C LOC-stove-3POSS　broken-EVID
Ye-rí7　　wel peták ts-xiw　　ey
DEM-DIST so　potato STAT-raw still
'Sander roasted some potatoes, but his stove was broken. That's why the potatoes are still raw.'　　　(sf | GD | 08.24.2022)

(4)　**Limited Control Middle** – Entails partial change of state
Sander q'wl-**enwélln'** te　peták, k'émell re　c-k'weltsenélten-s q'uwúp-úke7.
　Sander roast-LC.MID　D/C potato however D/C LOC-stove-3POSS　broken-EVID
Ye-rí7　　wel peták ts-xiw　　ey
DEM-DIST so　potato STAT-raw still
Intended: 'Sander managed to roast some potatoes, but his stove was broken. That's why the potatoes are still raw.'　　　(sf | GD | 08.24.2022)

　　　This paper introduces a scalar analysis of the four-way contrast between change of state predicates in Secwepemctín, building on Kennedy and Levin (2008). I propose that change of state is derived from measuring change on a scale, and in which each morpheme restricts the potential degree of change caused by the event.

　　　This paper is structured as follows: in Section 2, I introduce some background on Salish control. Section 3 presents the relevant data that informs the generalizations and analysis, which are presented in Section 4. Section 5 demonstrates that analyses by Bar-el et al.

(2005), Filip (2008), or Krifka (1989) fail to explain the pattern found in Secwepemctsín. Section 6 concludes this paper.

2.   A brief introduction to Secwepemctsín (limited) control

There are at least two areas of the grammar in which Salish control is implicated: (i) agent control over the outcome of the event, and (ii) aspect.[3]

Agent control: Thompson (1985) argues that control marking in Salish is implicated in agent control over the outcome of the event: control expresses that the agent is in 'full control' over the outcome of the event, while limited control expresses a 'lack of control' over the outcome of an event. Kuipers (1992) admits that control implicates agenthood to some extent, but is skeptical about control being fundamentally about agent control over the outcome of an event. For now, I put this issue aside and focus exclusively on aspect.

Aspect: Salish control morphology has been shown to directly affect the aspectual composition of a clause (Bar-el et al. 2005; Jacobs 2011; Kiyota 2008; Huijsmans and Mellesmoen 2021, a.o.): it encodes aspectual distinctions, in particular lexical aspectual distinctions, e.g., in in relation to *non-culminating accomplishments* (NCAs) (Bar-el et al. 2005, Bar-el 2005, Martin 2019). NCAs are verbs with a natural endpoint and that implicate that this natural endpoint is reached, i.e., that the event they denote has culminated. This culmination implicature can be canceled. Control transitive verbs across Salish are typically classified as NCAs. Limited control transitive verbs, on the other hand, *entail* that the natural endpoint is reached – i.e., the event culminates. In addition to the contrast within transitive verbs, Secwepemctsín (together with neighbouring Nłeʔkepmxcín (Thompson River Salish)) exhibits aspectual distinctions within theme-oriented middle verbs, which are formally intransitive, but semantically require a theme argument. The aspectual distinction within middles is such that control middles have a change of state implicature, which is defeasible, whereas limited control middles entail a change of state.[4] The four forms give rise to a four-way aspectual contrast. Transitive verbs come with a culmination inference, with the control form merely implicating culmination and the limited control form entailing it. Middle verbs come with a partial change of state inference, which is implicated by the control form, and entailed by the limited control form.

In the following section, I show data that illustrates how predicates pattern with respect to change of state, depending on which (limited) control morpheme they are marked with, and how the variation in the system is predictable and systematic.

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[3]The (limited) control morpheme and the transitive morpheme are decomposable in Secwepemctsín, and transitivity may also be implicated by Salish control. I leave this for future research.

[4]The use of the term 'middle' in the Salish literature differs from our understanding of middles in Indo-European languages. The middle in Secwepemctsín is an intransitive suffix *-em* (or sometimes null), which has a variety of uses across Salish (see e.g., Gerdts and Hukari 1998, Davis 1996). In the context of this paper, however, the term 'middle' is used specifically to refer to the intransitive, theme-oriented middles in Secwepemctsín.

3.   Aspectual patterns of (limited) control

3.1   Control transitive

Control transitive predicates have a defeasible culmination implicature, which must be explicitly canceled if the implicature fails to hold: contextual cancellation is not sufficient.

(5)   *Context:* Bruce has a very blunt knife for cutting off the fins of the sockeye.
Bruce ník'-**en-[t]**-s   re   te∼tétxmen-s k'émell re   te∼tétxmen-s ta7
Bruce cut-CTR-TR-3ERG D/C PL∼fin-3POSS however D/C PL∼fin-3POSS NEG
k   s-nik'-s
D/C NMLZ-cut-3POSS
'Bruce cut their fins but the fins didn't get cut.'   (vf | GD | 02.07.2022)

(6)   *Context:* Hannah worked on a new basket but is out of material. So the basket isn't
done yet.
Hannah k'úl-**en-[t]**-s   re   mim'c, k'émell ta7   k   s-wi7-s
Hannah make-CTR-TR-3ERG D/C basket however NEG D/C NMLZ-finish-3POSS
'Hannah made a basket but she hasnt finished.'   (vf | DC; LC | 10.15.2021)

    Example (7) has a context identical to (6), yet the lack explicit cancellation of culmination renders (7) infelicitous. This shows that contextual cancellation of the culmination implicature does not suffice.

(7)   *Context:* Hannah worked on a new basket but is out of material. So the basket isn't
done yet.
Hannah k'úl-**en-[t]**-s   re   mim'c
  Hannah make-CTR-TR-3ERG D/C basket
Intended: 'Hannah made a basket.'   (vf | DC; LC | 10.15.2021)

3.2   Limited control transitive

Limited control transitive predicates entail culmination. As such, cancellation of this inference is invariably infelicitous.

(8)   *Context:* Bruce smoked some moose meat, but the fire went out before the meat was
properly smoked.
Bruce k'ec-**enwen'-[t]**-s re   teniye.
  Bruce dry-LC-TR-3ERG D/C moose
Intended: 'Bruce dried the moose meat.'
Consultant's comment: 'He didn't dry it, so you would say *ta7 k sk'écenwén's* [did
not dry (LC.TR)].   (sf | DC; LC | 11.03.2021)

(9)   *Context:* Bruce hunted deer and froze the meat. The freezer broke before it was
        fully frozen.
        # Bruce sul-**enwén'-[t]**-s   re   ts'i7, k'émell ta7   k
          Bruce freeze-LC-TR-3ERG D/C deer however NEG D/C

        s-t-sul-s   ey
        NMLZ-STAT-freeze-3POSS still

        Intended: 'Bruce froze the meat but it wasn't yet frozen.'

                                                                      (sf | GD | 10.27.2021)

3.3   Control middle

Control middle predicates implicate a partial change of state, which is cancelable.

(10)   Sander q'wl-**em**   te   peták, k'émell re   c-k'weltsenélten-s
        Sander roast-CTR.MID D/C potato however D/C LOC-stove-3POSS

        q'uwúp-ekwe. Ye-rí7   wel peták ts-xiw   ey
        broken-EVID DEM-DIST so   potato STAT-raw still

        'Sander roasted some potatoes, but his stove was broken. That's why the potatoes
        are still raw.'   (sf | GD | 08.24.2022)

(11)   re   Julia ník'-**em**   te   lekelét k'émell ts-cets-7úy   re   lekelét es
        D/C Julia cut-CTR.MID D/C bread   but   STAT-scorch-EMPH D/C bread GDIR

        ts-n<7>ik'-s
        STAT-cut<INCH>-3POSS

        'Julia cut the bread but it was too burnt to get cut.'   (sf | MJ | 06.15.2022)

Culmination not encoded by control middle predicates; a lack of culmination is asserted
with *ell* 'and', instead of *k'émell* 'but', which indicates that conjoined assertion does not
contrast with the inference of the prejacent.

(12)   re   Bruce q'7es s-cwik'-**em**-s   te   sqlelten-7úw'i, ell ta7   k
        D/C Bruce long NMLZ-dry-CTR.MID-3POSS D/C salmon-real   and NEG D/C

        s-wi7-s   ey
        NMLZ-finish-3POSS still

        'Bruce dried the sockeye for a long time and he hasn't finished yet'

                                                                      (sf | GD | 12.27.2021)

3.4   Limited control middle

Contrary to control middles, limited control middles entail a partial change of state. Can-
cellation of a change of state is infelicitous.

(13) # Henry mekwmékw re   sek'wmín'-s. Henry nik'-**enwélln'** te   te~tétxmen
       Henry dull   D/C knife-3POSS Henry cut-LC.MID   D/C PL~fin
       k'émell ta7 k   s-ts-<nik>ník'-s   re   te~tétxmen.
       however NEG D/C NMLZ-STAT-<PL>cut-3POSS D/C PL~fin
       Intended: 'Henry's knife is dull. Henry was cutting some but none of the fins got
       cut.'
       Consultant's comment: 'You are contradicting yourself here, because you are say-
       ing that some fins got cut'   (sf | MJ | 02.16.2022)

(14) # Sander q'wl-**enwélln'** te   peták, k'émell re   c-k'weltsenélten-s
       Sander roast-LC.MID   D/C potato however D/C LOC-stove-3POSS
       q'uwúp-úke7. Ye-rí7   wel peták ts-xiw   ey
       broken-EVID DEM-DIST so   potato STAT-raw still
       Intended: 'Sander managed to roast some potatoes, but his stove was broken.
       That's why the potatoes are still raw.'
       Consultant's comment: 'No, they cannot all be raw still'   (sf | GD | 08.24.2022)

Culmination is also not encoded by limited control middle predicates as well: a lack of culmination is asserted with *ell* 'and', instead of *k'émell* 'but', which indicates that conjoined assertion does not contrast with the inference of the prejacent.

(15) re   Bruce q'7es s-cwik'-**enwélln'**-s   te   sqlelten-7úw'i, ell ta7 k
       D/C Bruce long NMLZ-dry-LC.MID-3POSS D/C salmon-real   and NEG D/C
       s-wi7-s   ey
       NMLZ-finish-3POSS still
       'Bruce managed to dry the sockeye for a long time and he hasn't finished yet'
                                                              (sf | GD | 12.27.2021)

In the next section, I present a scalar analysis of change of state, which explains the difference between minimal change of state and culmination, and moreover accounts for how control predicates *implicate* different degrees of change of state.

4.   Gradability in change of state relations

There are two key features that the analysis I present here derives: the first feature is the distinction between transitive and middle verbs, such that transitives come with a culmination inference, whereas middles do not. The second feature is the contrast between an implicature and entailment of culmination or partial change of state.

The component all four forms have in common is their ability to restrict the change of state encoded by the predicate. The analysis I present here captures this similarity between forms, while it also clearly predicts their differences. In what follows, I introduce a scalar analysis of lexical aspect, in which non-minimal and maximal change of state follows from scalarity in the event domain.

I build on work on degree achievements (DAs, Hay et al. 1999, Kennedy and Levin 2008, Kennedy 2012, Piñón 2008, a.o.). Hay et al. (1999) analyze lexical aspect within the framework of degree semantics (see also Kennedy and McNally 2005, Kennedy and Levin 2008, Kennedy 2012, Kearns 2007, Caudal and Nicolas 2005). The central idea behind degree analyses of change of state is that objects of verbs have a 'degree of change' that can be measured on a scale.

The degree analysis of lexical aspect builds on analyses of gradable modification. A gradable adjective *G*, for example, can be modified by words like *very* and *really*, which indicate a degree of *G*-ness. Gradable adjectives are also used for comparison, as in 'A is *G*-er than B', meaning that the degree of *G* is greater for A than it is for B. Degree-semantic analyses of gradable adjectives assume a downward monotonic scale with a total ordering of a set of degrees of some property (e.g., height, for *tall* or *short*) (Bowler and Gluckman 2021). In order to map the individual modified by a gradable predicate to a degree value on a scale, analyses typically use a measure function that measures the degree along the relevant dimension of the gradable predicate. For comparatives, the value is calculated through a difference function $\mathbf{m}_d^{\uparrow}$, which is a type of measure function $\mathbf{m}$. In comparatives, $\mathbf{m}_d^{\uparrow}$ returns a degree for objects in its domain that represents the difference between objects measured on the same scale (Kennedy and McNally 2005, Kennedy and Levin 2008). Kennedy and Levin (2008) argue that comparatives turn a measure function into a difference function:

(16)   *Difference functions*   (Kennedy and Levin 2008: 17)
         For any measure function $\mathbf{m}$ from objects and times to degrees on a scale *S*, and
         for any $d \in S$, $\mathbf{m}_d^{\uparrow}$ is a function just like $\mathbf{m}$ except that:
         i.   its range is $\{d' \in S \mid d \preceq d'\}$, and
         ii. for any *x,t* in the domain of $\mathbf{m}$, if $\mathbf{m}(x)(t) \preceq d$ then $\mathbf{m}_d^{\uparrow}(x)(t) = d$

The definition in (16) states that a difference function $\mathbf{m}_d^{\uparrow}$ is a measure function, with two additional conditions. The condition in (i) states that there is a 'derived zero' – which is the comparative standard. This follows from d' being on the same scale as d, and with d being smaller or equal to d'. The condition in (ii) states that the difference value is zero if the measure of *x* at *t* is smaller than or equal to d. This follows from (i), which makes d a 'derived zero'.

Based on this difference function, Kennedy and Levin (2008) introduce the measure-of-change function ($\mathbf{m}_\Delta$) of verbal predicates, which is a special kind of difference function. The measure-of-change function ($\mathbf{m}_\Delta$) of verbal predicates relies on restrictions similar to the ones explicated in (16); the difference between (16) and the $\mathbf{m}_\Delta$ of verbal predicates follows from *what* is measured: instead of measuring the degree of *x* at *t*, it measures the change undergone by the internal argument as a result of its participation in the event. I adopt Kennedy and Levin's (2008: 18) measure-of-change function $\mathbf{m}_\Delta$, which is a measure function $\mathbf{m}$ from objects and times to degrees on a scale *S*. *Init* returns the initial temporal interval of the event, and *fin* returns the final temporal interval of the event.

(17)   For any measure function $\mathbf{m}$, $\mathbf{m}_\Delta = \lambda x.\lambda e.\mathbf{m}^{\uparrow}_{\mathbf{m}(x)(init(e))}(x)(fin(e))$

$\mathbf{m}_\Delta$ is the degree of difference between the degree of x at the beginning and the degree measured by $\mathbf{m}$ at the end of e.   (Kennedy and Levin 2008: 18)

In prose, (17) says that the measure of change function $\mathbf{m}_\Delta$ takes an object x and an event e and returns the degree that represents the amount that x changes in the property measured by $\mathbf{m}$ as a result of participating in e (Kennedy and Levin 2008). The degree of change is measured by mapping an argument x onto a scale whose minimal value is the degree of x that is measured by $\mathbf{m}$ at the initiation of e. The output is the degree of difference between the degree of x at the beginning and the degree measured by $\mathbf{m}$ at the end of e.

Extending this measure function to account for the aspectual pattern in Secwepemctsín, I propose that limited control predicates restrict the degree of change to a specific maximal or non-minimal point on the scale, giving rise to an entailment. Control predicates come with a scale specification of being top-open or top-closed, which gives rise to the culmination and change of state inferences through *Interpretive Economy* (Hay et al. 1999, Kennedy and McNally 2005, Kennedy 2007, Kennedy and Levin 2008).

The measure function plays a role in both control and limited control predicates, for both middles and transitives. The entailment vs. implicature contrast between limited control and control forms arises from constraints imposed on the scale by each of the morphemes. Limited control forms measure out a specific degree of change relative to maximal and minimal points on the scale of $\mathbf{m}_\Delta$ and pick out either the maximal point on the scale (transitive), or some value that is non-minimal (middle). Maximal and minimal points are defined as follows:

(18) $\mathbf{max(S_{m_\Delta})}$ $=$ $\iota d\ [d \in S_{m_\Delta} \wedge \forall d' \in S_{m_\Delta}\ [d' \leq d]\ ]$

(19) $\mathbf{min(S_{m_\Delta})}$ $=$ $\iota d\ [d \in S_{m_\Delta} \wedge \forall d' \in S_{m_\Delta}\ [d \leq d']\ ]$

(adapted from Morzycki 2016: 128-129)

Limited control transitives entail culmination, which follows from the degree of change being oriented towards and restricted to equal to the maximal value on the scale of $\mathbf{m}_\Delta$:

(20)   *Limited control transitive*
$\mathbf{m}_\Delta(x)(e) = \mathbf{max(S_{m_\Delta})}$
The degree to which x changes as a result of participating in e equals the maximal point on the scale of $\mathbf{m}_\Delta$

For a limited control transitive predicate, such as *k'ulenwén's re mim'c* 's/he managed to make a basket', the derivation is as follows:

(21) $\mathbf{m}_\Delta = \mathbf{m}^{\uparrow}_{\mathbf{m}(basket)(init(make))}(basket)(fin(make)) = \mathbf{max(S_{m\Delta})}$
$\approx$ The degree of change to a basket as a result of participating in a making-event of this basket equals the maximal point of change on the scale of $\mathbf{m}_\Delta$

For the limited control middle, the partial change of state entailment follows from the degree of change being oriented towards and restricted to exceeding the minimal value on the scale of $\mathbf{m}_\Delta$:

(22)   *Limited control middle*
$\mathbf{m}_\Delta(x)(e) > \mathbf{min}(S_{\mathbf{m}_\Delta})$
The degree to which x changes as a result of participating in e exceeds the minimal point on the scale of $\mathbf{m}_\Delta$

For a limited control middle predicate, such as *k'ulenwélln' te mim'c* 's/he managed to make a basket', the derivation is as follows:

(23) $\mathbf{m}_\Delta = \mathbf{m}^{\uparrow}_{\mathbf{m}(basket)(init(make))}(basket)(fin(make)) > \mathbf{min}(S_{\mathbf{m}\Delta})$
$\approx$ The degree of change to a basket as a result of participating in a making-event of this basket exceeds the minimal point of change on the scale of $\mathbf{m}_\Delta$

Thus, limited control marking restricts the points on the scale of degree of change, which results in an entailment of change; this change is maximal for limited control transitive predicates, and non-minimal for limited control middle predicates.

Control predicates lack the particular restriction on the degree of change imposed by limited control. Instead, the measure of change function returns a degree on some scale. Crucially, the scale structure of transitive verbs is different than that of middle verbs. The different scale structures for transitives and middles is implicated by the make-up of limited control predicates but is explicated for control predicates: transitive verbs have the 'derived zero' as their initial point and have a top-closed scale. Middle verbs have the 'derived zero' as their initial point and have a top-open scale. The component that determines the crucial truth conditions for the control forms are given in (24) and (25).

(24)   *Control transitive*
$\mathbf{m}_\Delta(x)(e) \in S_{[0,1]}$
The degree to which x changes as a result of participating in e maps onto a closed scale and is therefore bounded.

(25)   *Control middle*
$\mathbf{m}_\Delta(x)(e) \in S_{[0,\_)}$
The degree to which x changes as a result of participating in e maps onto an open scale and is therefore unbounded.

For a control transitive predicate, such as *k'úlens re mim'c* 's/he made a basket', the derivation is as follows:

(26) $\mathbf{m}_\Delta = \mathbf{m}^{\uparrow}_{\mathbf{m}(basket)(init(make))}(basket)(fin(make)) \in S_{[0,1]}$
      $\approx$ The degree of change to a basket as a result of participating in a making-event of this basket is mapped onto a closed scale.

For a control transitive predicate, such as *k'úlem te mim'c* 's/he made a basket', the derivation is as follows:

(27) $\mathbf{m}_\Delta = \mathbf{m}^{\uparrow}_{\mathbf{m}(basket)(init(make))}(basket)(fin(make)) \in S_{[0,\_)}$
      $\approx$ The degree of change to a basket as a result of participating in a making-event of this basket is mapped onto an open scale.

The formulae in (26)-(27) do not necessarily derive the culmination or partial change of state inferences. In order to derive the default mapping of transitive predicates to culmination interpretations and the default mapping of middle predicates to partial change of state interpretations, I adopt *Interpretive Economy* (Kennedy 2007):

(28) *Interpretive Economy*
      Maximize the contribution of the conventional meanings of the elements of a sentence to the computation of its truth conditions. (Kennedy 2007: 36)

Interpretive Economy was introduced to ensure that closed-scale adjectives receive an absolute interpretation. The (lower) closed-scale adjective *bent*, could receive a relative interpretation in a situation where an object *x* is bent relative to another object *y*. On a minimum standard interpretation, object *x* may not be bent, because it does not correspond to what normally constitutes the lexical minimum. While both interpretations are ultimately possible, Interpretive Economy will by default select the minimum standard interpretation, i.e., the lexical standard, unless the context specifies otherwise (Kennedy 2007).

Under this definition of Interpretive Economy, Kennedy (2007) predicts that closed scale adjectives will default to the absolute interpretation, since the scale structure is part of the conventional meaning of a sentence. The relative interpretation only arises when the conventional meaning is insufficient in the utterance context.

By extending Interpretive Economy to control transitives and middles, we now predict that control transitives default to event culmination. That is, the scale structure is part of the conventional meaning of the sentence, and for control transitives the scale is top-closed. As a result, the a culmination interpretation follows. At the same time, the control transitive allows for a relative interpretation of change. In the case of *k'úlens re mim'c* 's/he made a basket', it is possible that the event has unfolded in such a way that relative to the derived zero, the event description is satisfied without maximizing the degree of change.

For the control middle, the scale lacks a maximum value and the degree of change is always computed relative to the derived zero. As the event unfolds, the degree of change will depart from the derived zero and increase monotonically. Interpretive Economy does not play an obvious role with middles, as there is no scalar maximum. Nevertheless, a partial change of state is a predictable interpretation given the scale structure and a normal

development of an event. Nothing in the denotation of the middle prevents a zero change of state interpretation, as long as the event description is satisfied.

Ultimately, Interpretive Economy ensures that two key features of control predicates are captured. The first feature is that the control transitive defaults to a culmination interpretation. This is achieved through Interpretive Economy by maximizing lexically specified parts of the control transitive, i.e., its top-closed scale. At the same time, it remains possible to cancel the culmination and change of state inferences of control predicates when the effect of Interpretive Economy is negated.

5.   Considering alternatives: Inertia worlds, MAXe, and reference of the object

Inertia worlds (Bar-el et al. 2005)   Earlier accounts of control and limited control in Salish (e.g., Bar-el et al. 2005, Bar-el 2005, Kiyota 2008, Huijsmans and Mellesmoen 2021), highlight the contrast between the culmination implicature and entailment.

Bar-el et al. (2005) account for non-culminating accomplishments in S̲k̲w̲x̲wu7-mesh and St'át'imcets through the use of inertia worlds, drawing on a modalized approach to progressives (see e.g., Dowty 1979, Landman 1992, Portner 1998). Inertia worlds are worlds that have the same history as the utterance world and where 'the normal course of events' take place. For Bar-el et al. (2005), the inertia worlds branch off in different directions from the utterance world at *the beginning of the event time* rather than at the end of the reference time. The denotation enforces that the event culminates in all inertia worlds, but the utterance world need not be an inertia world.

(29) $[\![\text{CTR.TR}]\!] = \lambda f_{\langle v,st \rangle}.\lambda e.\lambda w[e$ is controlled by its agent in $w \land \forall w'[w'$ is an inertia world w.r.t. w at the beginning of $e \rightarrow [\exists e'\ [f(e')(w') \land e$ causes e' in $w']]]]$

(Bar-el et al. 2005: 95)

The control transitivizer in (29) introduces the external argument that controls the event e, and in all inertia worlds, which share the same history as the utterance world but may branch off into different outcomes after the beginning of e, the event e causes e', which is the event expressed by the root. In contrast, the culmination entailment of limited control follows from the fact that the event e' expressed by the root is caused by the event e in the actual utterance world, i.e., limited control does not introduce the inertia worlds:

(30) $[\![\text{LC.TR}]\!] = \lambda f_{\langle v,st \rangle}.\lambda e.\lambda w.\exists e'[f(e)(w) \land e'$ is controlled by its agent in $w \land e'$ causes e in $w]$ (adapted from Huijsmans and Mellesmoen 2021: 89)

The analysis from Bar-el et al. (2005) is transferable to Secwepemctsín control and limited control transitives, since the contrast between the two is similar to the contrast Bar-el et al. (2005) found in S̲k̲w̲x̲wú7mesh, and partially similar to the pattern found in St'át'imcets, which lacks limited control. However, this analysis does not easily extend to middle-marked verbs. That is because the control transitivizer operates on an entire event whose internal argument has been fully saturated. As a result, the verb and the internal argument act like a single unit, which renders the internal argument inaccessible. However, middle-

marked verbs involve a partial change of state measured on the theme argument. Therefore, the analysis by Bar-el et al. (2005) and the ones building on it, fail to be able to derive the full extent of contrasts found in Secwepemctsín.

Maximalization operator MAXe (Filip 2008) Another candidate for analyzing the pattern in Secwepemctsín is the maximalization operator in Filip (2008).

In Filip (2008), the maximalization operator **MAXe** is defined as a monadic operator, such that MAXe(P) $\subset$ P, which maps sets of partially ordered stages of an eventuality type P onto sets of its maximal stage MAXe(P). The maximal stage requirement is satisfied when a P-eventuality ceases to develop in a world at the reference time, and there is no bigger P-eventuality in the world at the reference time of which it is a stage (Filip 2008).

The operator MAXe could capture the Secwepemctsín data through its application in all four (limited) control configurations. That is, in all four cases, MAXe would map sets of partially ordered stages onto sets of its maximal stage. Differences between each result from differences between what counts as the maximal stage. For transitive forms, this maximal stage equals culmination, whereas for middles the maximal stage is smaller (i.e. partial change of state). The implicature/entailment contrast would fall out from control having a 'coarser granularity' (cf. Martin 2019, Martin and Demirdache 2020). That is, control forms come with coarse granularity with respect to the event stages, as a result of which MAXe applied to a control form may give rise to NCAs or a lack of a change of state. Alternatively, the implicature could follow from MAXe applying to a sets of stages of various sizes, and some may even so small that a partial change of state does not take place.

Problems arise, however, with MAXe, as it places strict requirements on event cessation. The maximal stage requirement stipulates that an event cannot develop any further. However, three forms allow event continuation:

(31) re Henry c-tsíqw-**en-[t]**-s   / c-tsíqw-**em**   / c-tsiqw-**enwélln'** re/te
      D/C Henry LOC-dig-CTR-TR-3ERG / LOC-dig-CTR-MID / LOC-dig-LC-MID D/C
      tsípwen,   ell w7ec ey c-tsíq-m-es   te tsípwen-s
      earthen.cellar and PROG still LOC-dig-CTR.MID-3SBJV D/C earthen.cellar-3POSS
      'Henry dug a root cellar and he is still digging his cellar.' (sf | MJ | 02.23.2022)

MAXe appeared to be a very attractive tool for analyzing the Secwepemctsín data, given its potential to yield different interpretation effects through identical underlying semantic operations. However, the maximal stage requirement makes it too restrictive of an operator and it thereby rules out constructions that are attested. Hence, this analysis is unable to account for the phenomenon presented in this paper.

Quantized and cumulative DPs (Krifka 1989) For Krifka (1989, 1998), whether or not a predicate is telic largely depends on whether the theme DP is quantized or cumulative. If a DP is quantized and *x* falls under the DP, then *x* cannot have a proper part *y* that also falls under the DP. This makes the predicate telic. If a DP is cumulative and *x* and *y* fall under

the DP, then the sum of *x* and y also fall under the DP. This makes the predicate atelic. On this logic, the object in a phrase like *Phil ate an apple* has quantized reference and is therefore telic. The object in phrase like *Phil ate apples* has cumulative reference, and is therefore atelic.

In Secwepemctsín, objects of transitive verbs are systematically marked with the core determiner *re*, whereas objects of middle verbs are invariably oblique (*te*). This suggests that the object DP may play a role in the aspectual composition of the predicate.

Despite this suggestion, quantized or cumulative reference does not play a role in aspectual composition in Secwepemctsín. Rather, it seems that determiner selection in Secwepemctsin is syntactically driven (Gardiner 1993: 20): the core determiner *re* appears in argument positions where it is cross-referenced with verbal agreement, e.g., subject, direct object. Oblique determiner *te* appears in positions not cross-referenced with verbal agreement, e.g., indirect object, agent of passive.[5] In terms of quantized and cumulative reference of core and oblique object DPs, we find that core objects under transitive verbs – which implicate or entail culmination – may be cumulative (32). Oblique objects under middle verbs – which entail or implicate partial change of state – can be quantized (33):

(32) re   sgwesgwés xwew-en-t-és   re   s<peq>péq
      D/C sunshine   dry-CTR-TR-3ERG D/C berry<PL>
      'The sun dried berries.'   (vf | GD | 06.2022)

(33) Sander 7íllen-∅   te   nek'ú7 t'ucw te   sxúsem
      Sander eat-CTR.MID D/C one   only   D/C soapberry
      'Sander ate only one soapberry.'   (vf | GD | 12.12.2022)

If it is quantized and cumulative reference of the object that determine the aspectual properties of a predicate, we would predict that (32)-(33) cannot be generated. As a result, under analyses like Krifka's (1989, 1992, 1998), under-generates the possible configurations of the object of transitive and middle verbs.

6.   Conclusion

In this paper, I have claimed that varying degrees of change of state in Secwepemctsín are derived compositionally through an underlying degree semantics that measures the degree of change ($\mathbf{m}_\Delta$) on the internal argument. Whether a verb phrase yields culmination or partial change of state depends on two factors: (i) for limited control, whether the aspectual marking on the predicate restricts the degree of change to be at the maximal point of its scale, or to being non-minimal, or (ii) for control, whether the scale ($\mathbf{m}_\Delta$) maps onto is top-closed or top-open.

The implicature carried by control verbs follows from *Interpretive Economy* (Kennedy 2007), which enforces that under normal circumstances, all components in the denotation of the predicate are maximized. The implicature remains cancelable, however.

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[5]See Assis Navarro and Nederveen 2021 for a discussion of the core determiner *re* in Secwepemctsín.

The entailment that follows from limited control verbs is follows from the explicit mapping of a degree change on the scale of ($\mathbf{m}_\Delta$): for transitive verbs ($\mathbf{m}_\Delta$) is maximal, and for middle verbs ($\mathbf{m}_\Delta$) must be larger than the minimal value on the scale. This gives rise to an absolute interpretation of a partial or complete change of state for limited control verbs.

Questions remain about how the degree variable enters the computation. Degree Achievements inherit their degree semantics from an underlying adjectival root, but in the system presented here, degrees are somehow introduced to the derivation by (limited) control morphology. Moreover, work by Davis (1996, 2022) on Salish verb roots provides evidence that Salish verb roots consist of an event with an internal argument, and lack further internal structure. Ultimately, more research is needed to allow for a full compositional analysis of events in Secwepemctsín.

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