ON THE (NON-)FUTURE ORIENTATION OF MODALS

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1 Introduction[1]

Some modals appear to impart future semantics; the phenomenon is illustrated in (1). In (1a), the described event (your push-ups) will occur after the time at which the deontically accessible worlds are calculated (the utterance time). Similarly in (1b), Sally's possible going to the party follows the utterance time.

(1) a. You **must** do fifty push-ups. (Enç 1996:349)
   b. Sally **may** go to the party if she finishes her work. (Enç 1996:349)

The source of future orientation in modals is a matter of some debate; see Enç (1996), Condoravdi (2002), Laca (2008), among many others. In this paper I bring data from Gitksan (Tsimshianic) to bear on the correct analysis of future orientation. I propose that future orientation on both epistemic and circumstantial modals comes from a separate prospective aspect morpheme. This prospective aspect is overtly spelled out in Gitksan, and is in this language obligatory on circumstantial modals (correlating with the cross-linguistic tendency for circumstantial modals to be future-oriented).[2] The analysis to be proposed has consequences for the analysis of actuality entailments; it leads to an account of AEs which relies not on the addition of perfective aspect (as in Hacquard 2006, 2009), but on the absence of prospective aspect (as in Kratzer 2011). The analysis predicts the following possible and attested systems:

Language	Actuality entailments are:	Because PROSPECTIVE is:	PROSPECTIVE is also:
English	optional	optional	covert
Blackfoot	optional	optional	overt
Gitksan	absent	obligatory	overt
St'át'imcets	absent	obligatory	covert

Table 1: Types of modal systems

Before proceeding, I review some terminology from Condoravdi (2002). The *temporal perspective* of a modal is the time at which the worlds in the modal base are calculated. For an epistemic modal, this is the time at which the knowledge of the relevant agent is evaluated; for a circumstantial modal, it is the time at which the relevant facts hold. The *temporal orientation* of a modal is the relation between the temporal perspective and the time of the described event. These two notions are illustrated in (2) for unembedded epistemic modals.

(2) a. He might have been sick yesterday.   PRESENT TP   PAST TO
    b. He might be sick now.   PRESENT TP   PRESENT TO
    c. He might be sick soon.   PRESENT TP   FUTURE TO

Various factors affect TO in English, including the perfect auxiliary *have,* the stative vs. eventive nature of the embedded predicate, the perfective vs. imperfective status of the embedded predicate, whether the modal is a possibility or a necessity modal, and the type of modality (whether epistemic or circumstantial); see the references above for discussion. There is also a tendency, both within English and cross-linguistically, for circumstantial modals to be more likely to be future-oriented than epistemic ones. See Enç (1996), Condoravdi (2002), Stowell (2004:624), Copley (2006), Werner (2006:235), Borgonovo and Cummins (2007), Kratzer (2010:29), Van de Vate (2011), among others.

2 Prior analyses of future orientation

One common approach to the future orientation of modals is to assign an inherently future semantics to the lexical entry of the modal itself. For example, Enç (1996:349) writes that 'shifting to the future is a property common to a number of intensional expressions, derived from the lexical meaning of those expressions.' See Condoravdi (2002), Butler (2006), Hacquard (2006), Arregui (2007), Abusch (2008), Demirdache and Uribe-Etxebarria (2008), Kaufmann (2011), Van de Vate (2011), among others, for similar claims and/or for lexical entries of individual modals which contain future semantics. One of the most worked-out analyses along these lines (indeed, of the temporal interpretation of modals generally) is that of Condoravdi (2002). I will now outline the basics of Condoravdi's analysis of English possibility modals, as I will be adopting many of her main ideas in my own analysis.

Condoravdi proposes that the temporal perspective for possibility modals is given by (a) the present tense, when the modal is unembedded, and (b) the perfect operator (introduced by *have*) when it scopes over the modal (so, PERF > MOD gives a past TP). Temporal orientation is affected by (a) a forward-shifting semantics in the lexical entry of the modal, (b) Aktionsart (such that eventives are obligatorily future-oriented in some contexts where statives may be either present or future-oriented), and (c) the perfect, when it scopes under the modal (so, MOD > PERF gives a

past TO). Condoravdi's lexical entries are given in (3-4). In (3), [t,_] gives futurity: it denotes the interval beginning at t and extending to the end of time (cf. Abusch 1998).

(3) MAY/MIGHT$_{MB}$ = λP λw λt ∃w' [w' ∈ MB(w,t) & AT(**[t,_)**, w', P)]   (Condoravdi 2002:13)

(4) AT (t,w,P) =   ∃e [P(w,e) & τ(e,w) ⊆ t]   if P is eventive

∃e [P(w,e) & τ(e,w) o t]   if P is stative

P(w),(t)   if P is temporal   (Condoravdi 2002:12)

According to (4), eventive predicates require the event to be included within a relevant time interval, while stative predicates only require overlap. Condoravdi's analysis is applied to an eventive and a stative predicate in (5) and (6) respectively.

(5) a. He might run.

b. PRES(MIGHT$_{MB}$(he run)) = λw ∃w' [w' ∈ MB(w,now) & ∃e [[he run](w',e) & **τ(e,w')**
⊆ **[now,_)**]]   (Condoravdi 2002:15)

(6) a. He might be sick.

b. PRES(MIGHT$_{MB}$(he be sick)) = λw ∃w' [w' ∈ MB(w,now) & ∃e [[he be sick](w',e) &
τ(e,w') o [now,_)]]   (adapted from Condoravdi 2002:14)

(5b) says that in at least one world compatible with the speaker's knowledge at the utterance time (PRESENT TP), he runs at a time which is included within the interval between now and the end of time (FUTURE TO). (6b) says that in at least one world compatible with the speaker's knowledge at the utterance time (PRESENT TP), he is sick at a time which overlaps the interval between now and the end of time (PRESENT or FUTURE TO). We see that the temporal properties of epistemic *might* are affected by the future orientation embedded inside its lexical entry, as well as the Aktionsart of the embedded predicate. See also Zagona (1990), Laca (2008), among others, for proposals which derive the temporal properties of modals at least in part from Aktionsart.

With regard to the extra tendency for circumstantial modals to be unambiguously future-oriented (even with stative predicates), several authors propose that this derives from general mechanisms. For example, something about the structure of branching worlds combined with the type of modal reasoning involved is claimed to derive at least some subset of circumstantial future orientations. See Condoravdi (2002), Werner (2003, 2006), Copley (2006), among others, for suggestions along these lines.

The final class of approach to future orientation is to postulate that viewpoint aspect is responsible. Kratzer (2011) suggests that certain modals are themselves not future-oriented, but optionally co-occur with silent prospective aspect. In the next section we will see evidence, independently gathered from Gitksan, which supports this approach.

3 Evidence for a prospective aspect analysis: Gitksan

Gitksan is a Tsimshianic language spoken in north-western British Columbia, Canada. It has fewer than 200 remaining speakers. For discussion of the grammatical properties of Gitksan, see Rigsby (1986). Peterson (2010) presents an analysis of Gitksan epistemic modals, and Matthewson (in press) gives description and preliminary analysis of the entire modal system. Data presented here come from original fieldwork unless otherwise noted.

First, some background about temporal reference in Gitksan. The language does not overtly distinguish past vs. present tense (Jóhannsdóttir and Matthewson 2007). This is shown in (7).

(7) a. ba<u>x</u>=t   Yoko
        run=DM   Yoko
        'Yoko ran' / 'Yoko is running.'   (Jóhannsdóttir and Matthewson 2007)

    b. siipxw=t   James (k'yoots)
        sick=DM   James (yesterday)
        'James was sick (yesterday)' / 'James is sick.'

For future time reference, the marker *dim* is necessary and sufficient, with both eventive and stative predicates. (See also Rigsby 1986:279.) This is shown in (8).

(8) a. *(**dim**)   limx=t   James t'aahlakw
        *(**FUT**)   sing=DM   James tomorrow
        'James will sing tomorrow.'

    b. *(**dim**)   siipxw=t   James t'aahlakw
        *(**FUT**)   sick=DM   James tomorrow
        'James will be sick tomorrow.'

I assume a phonologically null non-future tense morpheme, as in (9):

(9) $[[$ NON-FUT$_i$ $]]^{g,c}$ is only defined if no part of g(i) is after t_c.
    If defined, $[[$ NON-FUT$_i$ $]]^{g,c}$ = g(i).   (Jóhannsdóttir and Matthewson 2007)

The NON-FUT tense is present in sentences like (7a,b), restricting the temporal reference to non-future. This null tense optionally co-occurs with *dim,* exactly as proposed by Abusch (1985) for English WOLL. Note that this means that *dim* is actually a marker of prospective aspect: it places the event time after the reference time.[3]

The Gitksan modal system is presented in Table 2. The language lexically and grammatically distinguishes circumstantial from epistemic modality; distinctions of modal strength are made only in the circumstantial domain.

Table 2: The Gitksan modal system (Matthewson in press)			POSSIBILITY	(WEAK) NECESSITY
CIRCUMSTANTIAL	VERBS / PREDICATIVE PARTICLES	PLAIN	*da'a<u>kh</u>lxw*	*sgi*
		DEONTIC	*anoo<u>k</u>*	
EPISTEMIC	SECOND-POSITION CLITICS	PLAIN	*ima('a)*	
		REPORTATIVE	*gat*	

Let us now consider the predictions for the temporal perspective of Gitksan modals, dealing first with the general epistemic modal *ima('a)*. Condoravdi's (2002) proposal that the TP of an

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[3] This analysis predicts that 'future-in-the-past' interpretations can arise with *dim* – cases where the event-time is placed after some past reference time. This is correct; see Jóhannsdóttir and Matthewson (2007).

unembedded modal is given by the tense, combined with my assumption that Gitksan possesses a null non-future tense, predicts that *ima('a)* should allow both present and past TPs. That is, *ima('a)* should be felicitous either when the evidence for the claim holds at the utterance time, or when it held prior to the utterance time. This prediction is upheld, as shown in (10-11).

(10) *Context: You hear pattering, and you're not entirely sure what it is.*
    yugw=**imaa**=hl   wis
    IMPF=**EPIS**=CN   rain
    'It might be raining.'   PRESENT TP

(11) *Context: The Canucks were playing last night. You weren't watching the game but you heard your son sounding excited and happy from the living room where he was watching the game, so you thought they were winning. You found out after the game that the Canucks lost 20-0, and your son was happy about something else that his friend had told him on his cellphone.*
    yugw=**imaa**=hl   xsdaa-diit
    IMPF=**EPIS**=CN   win-3PL.II   PAST TP
    'They might have been winning.' [according to my evidence last night]

The possibility of a past TP for epistemics in Gitksan is significant, given that many researchers propose that epistemic modals scope over tense and receive their TP only from the evaluation time (Cinque 1999, Stowell 2004, Hacquard 2006, 2009, Borgonovo and Cummins 2007, Demirdache and Uribe-Etxebarria 2008, Zagona 2008, Van de Vate 2011, among others). Gitksan on the contrary supports Condoravdi's view that tense provides the TP.[4]

    What about temporal orientation? Condoravdi's analysis predicts that epistemic possibility modals always allow future orientation, due to the inherent future semantics of the modal. Stative predicates should in addition allow a present TO (see 5-6 above). Here, Gitksan diverges from Condoravdi's predictions. In Gitksan, epistemic modals show no evidence for an inherent future semantics. On the contrary, the overt prospective aspect *dim* is both necessary and sufficient for a future orientation of the modal. This is shown for an eventive in (12-13). Exactly the same temporal facts hold for stative predicates; there is no Aktionsart effect.[5]

(12) yugw=**ima'**=hl   wis
    IMPF=**EPIS**=CN   rain
    'It might have rained.' / 'It might be raining.' / ≠ 'It might rain (in the future).'
  √ *Context: You see the flowers looking fresh and damp and puddles.*   √ PAST TO
  √ *Context: You hear pattering on the roof.*   √ PRES TO
  # *Context: You hear thunder, so you think it might rain soon.*   # FUT TO

(13) yugw=**ima'**=hl   **dim**   wis
    IMPF=**EPIS**=CN   **PROSP** rain

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[4] If no extra stipulations are added, this predicts that even in English, past TPs should be possible for epistemic modals. This runs counter to the majority view in the literature, but see section 6 below.

[5] The reportative epistemic modal *gat* similarly requires *dim* for a future orientation (i.e., when the time of the described event follows the time of the report the speaker heard). See Matthewson (in press).

≠ 'It might have rained.' / ≠ 'It might be raining.' / 'It might rain (in the future).'
  # *Context: You see the flowers looking fresh and damp and puddles.*   # PAST TO
  # *Context: You hear pattering on the roof.*   # PRES TO
  √ *Context: You hear thunder, so you think it might rain soon.*   √ FUT TO

I turn now to circumstantial modals, illustrating with the possibility modal *da'akhlxw*. (14-16) show that *da'akhlxw* has pure circumstantial, ability, and counterfactual readings.

(14) nee=dii   wan=hl   maa'y   go'osun   ii   ap   **da'akhlxw** dim   wan-t
     NEG=CNTR sit.PL=CN berries LOC.here and EMPH **CIRC.POSS**   PROSP sit-3SG.II
     'There are no berries around here, but they could grow here.'

(15) **da'akhlxw**-i-s   Henry dim   jam-t
     CIRC.POSS-TRA-PN   Henry PROSP cook-3SG.II
     'Henry is able to cook.' / 'Henry was able to cook.'

(16) *Context: You were watching the Canucks and at one point in the first period they were up 2-1. At that point, they might have still won (but they didn't).*
     k'ay **da'akxw**-diit   dim   xsdaa-diit, ii   ap   nee=dii   xsdaa-diit
     still **CIRC.POSS**-3PL.II PROSP win-3PL.II and EMPH NEG=CNTR win-3PL.II
     'They still could have won, but they didn't win.'   (adapted from Condoravdi 2002)

Just like with the epistemics, we predict that *da'akhlxw* will allow both past and present TPs in aspectually unmarked sentences. This is because the TP is given by the tense, which in Gitksan is non-future. We thus predict that the relevant circumstances or ability should be able to hold at any non-future time.

    This prediction is upheld. (14) has a present TP, (16) has a past T.P., and (15) is accepted in contexts corresponding to either present or past TPs. A further past TP case is given in (17).

(17) *Context: You are talking about some land you used to have. I ask you 'What was the soil like? Could berries have grown there?'*
     da'akhlxw-i=hl   maa'y=hl   dim   limxs-t
     CIRC.POSS-TRA=CN berries=CN   PROSP grow.PL-3SG.II
     'Berries could have grown.'

What about temporal orientation for the Gitksan circumstantials? I briefly mentioned above that both Condoravdi (2002) and Werner (2003, 2006) propose general mechanisms which derive an obligatory future TO for (at least some) circumstantial modals. Condoravdi's analysis predicts that the counterfactual interpretation of *da'akhlxw* (as in (16)) allows only a future TO; Werner's analysis would predict only a future TO for all readings of *da'akhlxw*.

    It turns out that *da'akhlxw* does allow only a future TO, in all its readings – but it encodes this overtly via *dim,* which is always obligatorily present with *da'akhlxw* (whether the TP is present or past). The future TO of *da'akhlxw* is illustrated in (18): an ability claim with a present temporal perspective entails that it is possible for the event to happen after the utterance time.

(18) **da'akxw**[-i]-'y   dim   ayee=hl   bax-'y
     CIRC.POSS[-TRA]-1SG.II   PROSP go.fast=CN   run-1SG.II

'I can run fast.'
Rejected in context: You were a fast runner, but you've become permanently paralyzed.

The Gitksan facts provide preliminary evidence against a Werner/Condoravdi-style general-mechanism analysis. If future orientation followed for free from general conditions on interpretation, why would we need to spell out that future orientation with an overt morpheme?

  I have not yet discussed the potential for future temporal perspective with *da'akhlxw*.[6] Can *da'akhlxw* have a future TP, where the claim is about a possibility which does not yet hold at the utterance time, but will hold in the future? If tense provides the TP for modals, we actually predict that a future TP with *da'akhlxw* will require <u>two</u> *dim*s: the lower *dim* which gives a future TO, and a higher *dim* which gives a future TP. This prediction is upheld, as shown in (19).

(19) *Context: He can't cook now, but he will be able to cook (after taking a cooking course).* □

dim	**da'akxw**-i-t	**dim**	jam-t
PROSP	**CIRC.POSS**-TRA-3SG.II	**PROSP**	cook-3SG.II

'He will be able to cook.'

  In sum, we have seen that the circumstantial possibility modal *da'akhlxw* obligatorily co-occurs with *dim,* which gives a future temporal orientation. It allows either past or present temporal perspective, and future TP just in case another *dim* precedes the modal. The same temporal facts hold for the other circumstantial modals in Gitksan (the deontic possibility modal *anook* and the general circumstantial necessity *sgi).* See Matthewson (in press) for those data.

4 Analysis

Based on the data given above, I argue that Gitksan modals have no inherent future orientation. The prospective aspect marker *dim* can freely attach below any modal (this correlates with the surface word order). When *dim* appears under a modal, it gives future orientation by placing the described event time after the temporal perspective (which is provided by tense).

  Since the modals are restricted to certain types of modality, I assume that the individual modals are lexically restricted with respect to the modal bases they allow (Rullmann et al. 2008, Peterson 2010, among others). Lexical entries for *ima('a)* and *da'akhlxw* are given in (20-21).

(20) [[*ima('a)*$_{MB}$]] is defined only if MB is epistemic. If defined,
      [[*ima('a)*$_{MB}$]] = $\lambda P \in D_{<i,st>} \lambda t \lambda w . \exists w'$ [w' $\in$ MB(w,t) & P(t)(w') = 1]

(21) [[*da'akhlxw*$_{MB}$]] is defined only if MB is circumstantial. If defined,
      [[*da'akhlxw*$_{MB}$]] = $\lambda P \in D_{<i,st>} \lambda t \lambda w . \exists w'$ [w' $\in$ MB(w,t) & P(t)(w') = 1]

I have removed Condoravdi's future temporal extension [t,_) from the modal denotations, since any futurity is contributed by *dim.* Condoravdi's AT predicate is also unnecessary, since Gitksan displays no difference between stative and eventive predicates with respect to temporal

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[6] Nor did I discuss it for the epistemic modals. A future TP for an epistemic modal gives a pragmatically odd interpretation whereby the speaker is predicting that something will be compatible with/follow from their knowledge at some future time. I have found these readings very difficult to elicit in Gitksan.

orientation under modals.

We also need denotations for the various aspectual operators. Gitksan stacks aspectual operators (e.g., prospective overtly co-occurs with imperfective). In order to keep a uniform lexical entry for the aspectual morphemes (whether they are attaching directly to the VP, or to a phrase which already contains an aspectual operator), I separate out the existential closure over events which is usually part of aspectual heads (e.g., Kratzer 1998). Every clause will contain a bleached ASP head, as in (22a), which is merely a type-shifter. Contentful aspectual operators appear above ASP, and the modals appear higher still.[7]

(22) a. $[[\text{ASP}]] = \quad \lambda P_{<ev,st>} \, \lambda t \, \lambda w \, . \, \exists e \, [P(e)(w) \, \& \, \boldsymbol{\tau}(e) = t]$

b. $[[\textit{dim}]] = \quad \lambda P \in D_{<i,st>} \, \lambda t \, \lambda w \, . \, \exists t' \, [t < t' \, \& \, P(t')(w) = 1]$

c. $[[\textit{yukw}]] = \quad \lambda P \in D_{<i,st>} \, \lambda t \, \lambda w \, . \, \exists t' \, [t' \quad t \, \& \, P(t')(w) = 1]$

Let us now apply the analysis to some examples. (23) involves a present or a past TP, and a present TO.

(23) yugw=**imaa**=hl   wis
    IMPF=**EPIS**=CN   rain
    'It might be raining.' / 'It might have been raining [based on my evidence at that time].'

$[[\textit{ima('a)}_{MB} \; \textit{yukw} \; \text{ASP} \; \textit{wis}]] = \lambda t \, \lambda w \, . \, \exists w' \, [w' \in \text{MB}(w,t) \, \& \, \exists t' \, [t' \quad t \, \& \, [\exists e \, [[\text{it rains}](w')(e) \, \& \, \boldsymbol{\tau}(e) = t']]]]$

If the NON-FUTURE tense gives a present Reference Time, (23) will assert that there is a world w' which is epistemically accessible at the Utterance Time, such that it rains in w' at a time which includes UT. If NON-FUTURE gives a past RT, (23) will assert that there is a world w' which is epistemically accessible at that past RT, such that it rained in w' at a time which includes RT.

(24) applies the analysis to a sentence with a present or past TP and a future TO.

(24) yugw=**imaa**=hl   **dim**   wis
    IMPF=**EPIS**=CN   **PROSP** rain
    'It might rain.'

$[[\textit{ima('a)}_{MB} \; \textit{yukw} \; \textit{dim} \; \text{asp} \; \textit{wis}]] = \lambda t \, \lambda w \, . \, \exists w' \, [w' \in \text{MB}(w,t) \, \& \, \exists t' \, [t' \quad t \, \& \, \exists t'' \, [t' < t'' \, \& \, \exists e \, [[\text{it rains}](w')(e) \, \& \, \boldsymbol{\tau}(e) = t'']]]]$

If the NON-FUTURE tense gives a present RT, (24) will assert that there is a world w' which is epistemically accessible at UT, such that there is a time t'' which follows a time t' which includes UT, such that it rains in w' at t''. The analysis works similarly for a past RT.[8]

Now we turn to cases with a past temporal orientation. Like future TO, past TO crucially requires a precedence relation between two times: the time at which the modal base is calculated, and the time of the potential event. To achieve past TO, I therefore postulate a null perfect

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[7] All circumstantial modals syntactically take scope over clauses containing aspectual heads (they are either higher verbs, or predicate operators which introduce dependent clauses). I assume that the epistemic modals, which are second-position clitics, also take scope over everything except tense.

[8] This analysis of the interaction between the imperfective and the prospective is reminiscent of Copley's (2002) analysis of *be going to.*

operator, as in (25) (cf. Van de Vate 2011). The sentence in (23), if interpreted with a null PERF, receives the denotation in (26).

(25) $[[\text{PERF}]] = \lambda P \in D_{<i,st>} \lambda t \lambda w . \exists t' [t' < t \& P(t')(w) = 1]$

(26) $[[\textit{ima('a)}_{MB} \text{ PERF } \textit{yukw} \text{ ASP } \textit{wis}]] = \lambda t \lambda w . \exists w' [w' \in \text{EPIS}(w,t) \& \exists t' [t' < t \& \exists t'' [t''$

$t' \& \exists e [[\text{it rains}](w')(e) \& \boldsymbol{\tau}(e) = t'']]]]]$

With a present RT, (26) asserts that there is a world w' which is epistemically accessible at UT, such that there is a time t' which precedes UT, and it rains in w' at a time which includes t'. With a past RT, we will get a doubly back-shifted reading, such that at some past RT, it was epistemically possible that it rained before that RT.[9]

For circumstantial modals, the temporal facts are the same as for the epistemics, and the analysis works in a parallel fashion. The only difference is that with circumstantials, *dim* is obligatory, so only future-oriented interpretations arise. A double *dim* case is analyzed in (27).

(27) **dim   da'a<u>k</u>xw**-i-t   **dim**   jam-t
     PROSPCIRC.POSS-TRA-3SG.II **PROSP** cook-3SG.II
     'He will be able to cook.'

$[[\textit{dim da'a}\underline{\textit{k}}\textit{hlxw}_{MB} \textit{ dim } \text{ASP } \textit{jamt}]] = \lambda t \lambda w . \exists t' [t < t' \& \exists w' [w' \in \text{ MB}(w,t') \& \exists t''$

$[t' < t'' \& \exists e [[\text{he cooks}](w')(e) \& \boldsymbol{\tau}(e) = t'']]]]]$

If NON-FUTURE gives a present RT, (27) asserts that there is a future time t' and a world w' which is circumstantially accessible at t', such that there is a time t'' which follows t', and he cooks in w' at t''. Similar results obtain if NON-FUTURE gives a past RT.

The analysis of *dim* as prospective aspect correctly accounts for the Gitksan data. In particular, it captures the facts that (a) *dim* allows 'future in the past' readings (see footnote 3); (b) *dim* is necessary and sufficient for a modal to be future-oriented; (c) circumstantial modals with future temporal perspective have double *dim;* and (d) *dim* takes away actuality entailments. I turn to actuality entailments in the next section.

5 Actuality entailments

Actuality entailments are when a perfective/past tense circumstantial modal gives rise to an entailment that the relevant event took place (Bhatt 1999/2006, Hacquard 2006, 2009, Mari and Martin 2007, among others). A French example is given in (28). Hacquard (2006:13) notes that '[f]or [28] to be true, Jane must have taken the train *in the actual world.'*

(28) Pour aller au zoo,   Jane   a **pu**   prendre le train.
     to go to the zoo   Jane   can-**PAST-PFV** take the train   (Hacquard 2006:13)

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[9] The reader might be wondering whether the null perfect operator incorrectly over-generates perfect readings in unmarked sentences. Preliminary results suggest that although there are ways to facilitate perfect meanings (elements roughly corresponding to 'already', 'ever', 'yet', etc.), aspectually unmarked sentences can be used in contexts in which English would use either the simple past or the perfect.

Gitksan *da'aḵhlxw* lacks actuality entailments, as shown in (29-30).

(29) **da'aḵhlxw**-'y   **dim**   hahla'alsd-'y k'yoots, ii   ap   nee=dii   wil-'y
      CIRC.POSS-1SG.II **PROSP** work-1SG.II   yesterday and EMPH   NEG=CONTR   be-1SG.II
      'I was able to work yesterday, but I didn't.'

(30) **da'aḵxw**-i-s   Jane   **dim**-t   yuxw=hl   *train* ji   yee-t
      CIRC.POSS-TRA-PN   Jane   **PROSP**-3SG.II follow=CN   train   IRR   go-3SG.II
        goo=hl   Vancouver,   ii   ap   nee   dii-t   yuxw=hl   *train*
        LOC=CN   Vancouver   and   EMPH NEG   CONTR-3SG.II follow=CN   train
      'Jane was able to take the train to get to Vancouver, but she didn't take it.'

Hacquard's (2006, 2009) analysis of AEs relies on the idea that perfective aspect comes with a world argument.[10] When perfective scopes over a modal in a matrix clause, the world argument picks out the actual world, forcing the event to actually take place. Hacquard's analysis accounts for the fact that only some modals give rise to AEs, in terms of independently-motivated syntactic differences. Epistemic modals and 'true' (addressee-oriented) deontics are located above viewpoint aspect (and therefore don't give rise to AEs), while ability modals, goal-oriented modals, and subject-oriented deontics scope under aspect (and can give rise to AEs).

In Gitksan, there are no obvious relevant height differences between different types of modals, and all the modals take complements which contain their own viewpoint aspect (see footnote 7). So an analysis relying on differing heights of perfective aspect seems unlikely for this language. What Gitksan suggests instead is that there is a correlation between prospective aspect and the absence of AEs. Observe that AEs are the only case where a circumstantial modal is *not* future-oriented (cf. Mari and Martin 2007). In (28) above, Jane's ability/opportunity and the actual taking of the train happen at the same time. And recall that the circumstantial modals in Gitksan, which lack AEs, always co-occur with prospective aspect. These facts are accounted for if prospective aspect removes actuality entailments. Or to put it more broadly, perhaps any form of future orientation removes actuality entailments. This future orientation comes from prospective aspect in Gitksan, and perhaps from the imperfective in languages like French.[11]

This idea requires us to assume that without prospective aspect, a circumstantial modal gives rise to AEs. Interestingly, Kratzer (2011) has independently proposed exactly this for English. She argues that circumstantial possibility modals use counterpart relations (cf. Lewis 1968). They can co-occur with complements containing either perfective or prospective aspect (both of which are phonologically null):[12]

(31) a. $[[can]] = \lambda R \ \lambda x \ \lambda t \ \exists x' \ \exists t' \ [<x', t'> \in f(<x,t>) \ \& \ R(x')(t')]$ (Kratzer 2011)

   b. $[[\text{[perfective]}]] = \lambda P \ \lambda t \ \exists e \ [P(e) \ \& \ e \leq t]$

   c. $[[\text{[prospective]}]] = \lambda P \ \lambda t \ \exists e \ [P(e) \ \& \ e \leq future_t]$

Suppose for example that the sentence in (32) contains a perfective aspect. Kratzer's analysis

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[10] See Bhatt (1999/2006) for an alternative non-modal analysis.

[11] Thanks to Valentine Hacquard (p.c.) for discussion.

[12] Modal alternatives are pairs of individuals and time-slices of worlds. 'f(<x,t>)' is short for the set of individual-time-slice pairs that are counterparts of <x,t>.

gives rise to the meaning paraphrased below:

(32) Mary could climb those stairs yesterday.
'There is a counterpart of Mary who lives in a world very much like ours, whose circumstances yesterday exactly matched those of Mary yesterday, and who climbed a counterpart of those stairs yesterday' (Kratzer 2011).

Kratzer then observes that 'Any counterpart of Mary whose circumstances exactly match those of Mary at t does exactly what Mary does at t!' Thus, we derive actuality entailments for perfective circumstantial modals in the presence of perfective aspect.

 Prospective aspect is predicted under this analysis to take AEs away. This is because when prospective aspect is present, Mary's counterpart is only asserted to have (had) the potential to do something after the RT. This does not entail that she does it. We thus arrive at the four-way set of possibilities in (33), with (33a,b) giving rise to AEs, and (33c,d) not giving rise to AEs.

(33) a. [Present [Mary can$_{\lambda n}$ [Perf [x$_n$ climb Everest]]]]
 b. [Past$_n$ [Mary can$_{\lambda n}$ [Perf [x$_n$ climb Everest]]]]
 c. [Present [Mary can$_{\lambda n}$ [Prosp [x$_n$ climb Everest]]]]
 d. [Past$_n$ [Mary can$_{\lambda n}$ [Prosp [x$_n$ climb Everest]]]]   (Kratzer 2011)

The reader has probably already worked out the punch line to this comparison with Kratzer's analysis of English: Kratzer's covert prospective aspect is overtly spelled out in Gitksan as *dim.* The languages thus receive the same analysis, with Gitksan providing cross-linguistic support for the idea that AEs are present unless removed by prospective aspect. In the next sub-section I turn to some further cross-linguistic predictions.[13]

5.1 Cross-linguistic predictions of the analysis

I have argued so far that circumstantial modals inherently give rise to actuality entailments, and that AEs are removed by prospective aspect. This analysis was independently developed on the basis of Gitksan, where the prospective aspect is overt, and of English, where it is covert (Kratzer 2011). There is however another difference between the two languages. Recall that in Gitksan, prospective aspect is obligatory on all circumstantial modals; hence we never have AEs. In English, prospective aspect is optional, according to Kratzer. This predicts that AEs may or may not be present, depending on which covert aspect is chosen.

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[13] AEs arise with necessity modals, too; see for example Hacquard (2006:14). As we expect, the Gitskan necessity modal *sgi* does not give rise to AEs, because it obligatorily co-occurs with *dim*:

(i) **sgi**   **dim**   t'ee'l-t   dim   ha'w-'y,   ii   ap   nee=dii   wil-'y
   CIRC.NECESS PROSP fast-3SG.II PROSP go.home-1SG.II and EMPH NEG=CONTR do-1SG.II
   'I was supposed to leave early, but I didn't.'

If we adopt the counterpart analysis also for necessity modals, the three-way distinction between possibility, necessity, and a non-modalized claim is semi-neutralized in the perfective aspect. In the perfective, a possibility modal, a necessity modal, and a non-modal claim all entail that the event happened in the actual world. They differ in whether the relevant agent was able to and did, had to and did, or simply did, perform the event (cf. discussion in Hacquard 2006:67).

This proposal makes a cross-linguistic prediction: whenever prospective aspect can be removed, we will have actuality entailments. In particular, we should find that languages which have *overt, optional* prospective aspect on circumstantial modals should display AEs just in case the prospective aspect is not there. This prediction is supported by data from Blackfoot (Algonquian).

In Blackfoot, the circumstantial possibility modal *ohkott* always gives rise to AEs in the absence of prospective aspect (Davis et al. 2010, Reis Silva 2009a). This is true whether we have perfective aspect, or imperfective:

(34) a.# omá   isttoan **iihkott / á-ohkott**-ooht-yistsini-'p   om-istsi sitokihkiitaan-ists
        DEM   knife   **CIRC.PFV / IMPF-CIRC**-means-cut-UNSPEC DEM-PL pie-PL
        kiwa   máát-ooht-yistsini-'p   om-istsi sitokihkiitaan-ists
        even.though NEG-means-cut-UNSPEC DEM-PL   pie-PL   (Davis et al. 2010)
        'That knife can cut those pies, even though it wasn't used to cut those pies.'

    b. *Context: Joe was climbing The Chief. He was almost at the top when he got a phone*
       call from his wife, who told him that she was going into labor. He rushed back down
       the mountain to go to the hospital. He didn't reach the top, but he could have.
   # **iihkott / á-ohkott**-waamis-áát-oo-m   omi miistaki
     CIRC.PFV / IMPF-CIRC-ascend-move-go.VAI-3>in DEM mountain
      máát-waamis-áát-oo-m-aatsiks   annisk ot-óhkíímaan
      NEG-ascend-move-go.VAI-3>INAN-3:NONAFFF.SG DEM   3-wife
        ááwattamohsi-yíni-ayi
        go.into.labour.VAI-3'-DTP   (Davis et al. 2010)
     'He was/is able to climb that mountain. He didn't climb it; his wife was in labour.'

The presence of AEs even with imperfective aspect in Blackfoot is a puzzle for a Hacquard-style analysis. However, AEs are removed in Blackfoot by the future morpheme *áak* (which is actually a prospective aspect, parallel to Gitksan *dim;* see analysis in Reis Silva 2009b). This is just as predicted by the current analysis.

(35) omá   isttoan **áák-ohkott**-ooht-yistsini-'p   om-istsi   sitokihkiitaan-ists
    dem   knife **PROSP-CIRC**-means-cut-UNSPEC   DEM-PL   pie-PL
      kiwa   máát-ooht-yistsini-'p   om-istsi   sitokihkiitaan-ists
      even.though NEG-means-cut.UNSPEC DEM-PL   pie-PL
    'That knife can/will be able to cut those pies, even though it wasn't used to cut those
    pies.'   (Davis et al. 2010)

The analysis proposed here enables us to resolve the apparent paradox between the fact that *ohkott* appears to be a modal (having a range of modal readings; Reis Silva 2009a), yet gives rise to AEs in all cases which lack prospective aspect. It also brings to light a cross-linguistic parallelism, because Blackfoot, with its optional overt prospective aspect, is an overt version of Kratzer's analysis of English. This is shown in Table 3. Table 3 also shows that there is a fourth logically possible type of language, one which has obligatory, covert prospective aspect.

Language	Actuality entailments are:	Because PROSPECTIVE is:	PROSPECTIVE is also:
English	optional	optional	covert
Blackfoot	optional	optional	overt
Gitksan	absent	obligatory	overt
?	absent	obligatory	covert

Table 3: Cross-linguistic typology for AEs

I would like to argue that St'át'imcets (Lillooet Salish) is an example of the fourth predicted language type. Davis et al. (2009) show that the St'át'imcets circumstantial modal *ka…a* lacks AEs, even when there is no overt prospective aspect:

(36) **ka-**q'ém-s=kan**-a**   aylh   n-kál'wat=a,   t'u7 cw7áoz=t'u7
     CIRC-swallow-CAUS=1SG.SUBJ**-CIRC** then   1SG.POSS-medicine=EXIS but   NEG=ADD
        múta7 kw=en=s=xát'-min',   nilh   s=7ús-ts-an   (Davis et al. 2009:218)
        again   DET=1SG.POSS=NOM=want-RED FOC   NOM=throw.out–CAUS-1SG.ERG
    'I was able to swallow my medicine, but I didn't want it any more, so I threw it out.'

St'át'imcets can thus be viewed as a null version of Gitksan – a language with obligatory prospective aspect, albeit null. This means that all four expected possibilities are attested.

6 Consequences and remaining issues

The Gitksan modal data have implications for a range of theoretical issues; for space reasons I do not have time to address these in depth. The first implication is actually the take-home message of the paper, namely that in at least some languages, the future orientation of modals comes neither from the lexical entry of the modal itself, nor from general mechanisms, but rather from a separate prospective aspect which appears under the modal. This accords with Kratzer's (2011) independently-developed analysis of English.[14]

A second consequence of the Gitksan data concerns the possibility for epistemic modals to have past temporal perspectives. The majority opinion in the literature is that epistemic modals cannot scope under tense, and a large part of the motivation for this claim is the absence of past-TP readings for unembedded epistemics (Cinque 1999, Abraham 2001, Drubig 2001, Fagan 2001, Condoravdi 2002, Stowell 2004, Hacquard 2006, Borgonovo and Cummins 2007, Demirdache and Uribe-Etxebarria 2008, Laca 2008, among others). However, Gitksan *does* allow past TPs with epistemics, as shown in (11) above. The analysis I have proposed involves the epistemic modal scoping under tense; we achieve this simply by removing the stipulation that such scopal configurations are impossible. This may suggest that it is worth re-looking at the minority of literature which argues that such readings are possible (e.g., Eide 2001, Boogaart 2007, von Fintel and Gillies 2010).

A third issue is the cross-linguistically stable preference or requirement for circumstantial modals to be future-oriented. As noted above, Condoravdi (2002) and Werner (2003, 2006) derive this result from universal general mechanisms. The discussion above suggests that there are reasons to doubt this approach. First, we have seen that Gitksan overtly spells out the future orientation in a separate morpheme; why would a language do this, if it followed for free?

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[14] It also accords with comments in Stowell (2006), who writes that 'the future-shifting interpretation commonly associated with modals is actually a covert FUTURE tense within the complement of the modal.'

Second, some languages allow prospective aspect to be absent from circumstantial modals, with a corresponding absence of future orientation (and presence of AEs); see the discussion of Blackfoot above.[15]

Within the analysis advanced here, the question can be rephrased as why it is that circumstantial modals prefer to co-occur with prospective aspect, rather than perfective. Kratzer (2011) addresses this question. She observes that of the four possible combinations listed in (33) above, the two with perfective aspect are both pragmatically odd. The present + perfective case in (33a) is odd because it requires a very long present time stretch which can completely include the event. And the past + perfective case in (33b) is odd because it gives rise to an AE, and the meaning is very close to having no modal at all. What's the point of having the modal, then? Based on Gitksan, I propose that languages can elevate this pragmatic oddity into a grammaticalized requirement for prospective aspect with circumstantial modals.

Finally, something which deserves further investigation is the possible connection between Gitksan *dim* and a covert counterfactual modal proposed by Hacquard (2006). Haquard's covert CF introduces quantification over metaphysically accessible worlds, and a time interval that expands into the future (Hacquard 2006:111). Hacquard proposes that the futurity contributed by CF is overtly marked by the 'conditionnel' morphology usually associated with it.[16] Interestingly, Hacquard's CF is like Gitksan *dim* in being a separate element which imparts future orientation to certain overt modals. Hacquard also proposes that the covert CF is present even in cases like (37a,b), which are *not* obviously counterfactual; this derives the desired future orientation:

(37) a.   Elisabeth   doit   prendre le train   (pour aller à Londres)
           Elisabeth   must-PRES   take the train   (to go to London)

     b.   Cette voiture   peut   faire du 200 km/h
           this car   can-PRES   go 200 kph   (Hacquard 2006:109)

Hacquard raises the issue of whether the presence of CF in cases like (37) is an ad hoc feature of her analysis. However, it is supported by Gitksan, which as shown above has an overt *dim* in sentences corresponding to (37).[17]

My overall conclusion is that modals are not inherently future-oriented, in at least some languages. Future research might reveal that the Gitksan pattern is valid in a wider range of languages.

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[15] And third, as argued by Abusch (2008), the modal bases required by circumstantial modals are not totally realistic (see also Portner 2009:235). This casts doubt on Werner's and Condoravdi's accounts, both of which rely on the totally realistic nature of (some or all) circumstantial/metaphysical modal bases.

[16] If CF were also reflected in French imperfective morphology, my analysis of AEs above might go through for French.

[17] One difference between CF and *dim* is that Hacquard places CF above root modals, while *dim* scopes below them.

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