

## Past possibility cross-linguistically: Evidence from 12 languages

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### 12.1 Introduction

The goal of this paper is to subject Condoravdi's (2002) groundbreaking analysis of English modal-temporal interactions to cross-linguistic testing, a task which has not so far been attempted in the literature. We test a generalized version of Condoravdi's proposals on 12 languages from seven families. We show that a core architecture can be retained, while allowing language-specific differences in tense and aspect to influence the available interpretations in predictable ways.

#### 12.1.1 Background

Condoravdi (2002) observes that the English sentence in (1) has two distinct readings.

(1) He might have won the game.

On an epistemic reading, (1) asserts that it is compatible with the speaker's utterance-time knowledge that he won the game in the past. The modal *might* has a present temporal perspective and a past temporal orientation. A continuation asserting that the prejacent is false is infelicitous, as shown in (2).

(2) He might have (already) won the game (# but he didn't).

On the second reading, which Condoravdi calls metaphysical, (1) asserts that it was compatible with the facts at some past time that he would win the game after that time. The modal has a past temporal perspective, and a future temporal orientation. Under this reading, it is possible for the speaker to know at the utterance time that the prejacent is false.

(3) At that point he might (still) have won the game, but he didn't in the end.

Condoravdi proposes an analysis whereby the perfect auxiliary *have* optionally raises to scope over the modal. The scope ordering *might* > *have* gives rise to the first reading, and the scope ordering *have* > *might* gives rise to the second reading. This information is summarized in Table 12.1.

Following Abusch (2012), we will henceforth assume that the ‘metaphysical’ reading is a type of circumstantial reading (relying on a realistic modal base representing relevant facts about the evaluation world, but not requiring the entire history of all the worlds in the modal base to be identical).

Table 12.1: Readings of *might have*

reading	conversational background	temporal perspective (TP)	TP given by	temporal orientation (TO)	TO given by
A	epistemic	present	present tense	past	low <i>have</i>
B	circumstantial	past	raised <i>have</i>	future	<i>might</i>

(Condoravdi 2002)

Subsequent literature has debated various aspects of Condoravdi’s analysis; see e.g., Arregui (2005), Hacquard (2006), Laca (2008), among others. Analytical issues include the question of how the readings are compositionally derived – is the *have*-raising operation justified? There are also empirical questions, including whether (1) has readings other than the two identified by Condoravdi. This question is important because Condoravdi’s framework does not actually rule out

an additional set of readings for *might have* sentences, namely those with an epistemic conversational background and a past temporal perspective. These potential readings are listed in Table 12.2.

Table 12.2: Extra potential readings for *might have* sentences

reading	conversational background	temporal perspective	temporal orientation
C-past	epistemic	past	past
C-present	epistemic	past	present
C-future	epistemic	past	future

(4) is an example of Reading C-present: it was epistemically possible at some past time *t* that there was ice-cream in the freezer at *t*.

(4) **Context:** *Sophie is looking for some ice cream and checks the freezer. There is none in there. Asked why she opened the freezer, she replies:*

There might have been ice cream in the freezer. (von Fintel and Gillies 2008:87)

Although many authors have claimed that epistemic modals do not allow past temporal perspectives (see Groenendijk and Stokhof 1975; Cinque 1999; Drubig 2001; Condoravdi 2002; Stowell 2004; Hacquard 2006; Borgonovo and Cummins 2007; Demirdache and Uribe-Etxebarria 2008; Laca 2008; among others), other researchers have argued that C-readings exist in various languages (Eide 2003; Boogaart 2007; Martin 2011; Homer 2010; von Fintel and Gillies 2008; Matthewson and Rullmann 2012; Rullmann and Matthewson 2012, 2015; and see Iatridou 1990, Portner 2009:222-236 for discussion).

### 12.1.2 Preview of proposals

In this study we bring a cross-linguistic perspective to the issue of possibility modals with some kind of ‘pastness’. We present and discuss data on Readings A, B and C from 12 languages.

Table 12.3: Languages discussed

<b>language</b>	<b>family</b>
English	Germanic (Indo-European)
Dutch	Germanic (Indo-European)
German	Germanic (Indo-European)
Mandarin	Sino-Tibetan
St'át'imcets	Northern Interior Salish
Northern Straits Salish	Central Salish
Halkomelem	Central Salish
Gitksan	Tsimshianic
Blackfoot	Algonquian
Ktunaxa	Isolate
Atayal	Austronesian (Formosan area)
Javanese	Western Malayo-Polynesian (Austronesian)

Our general null hypothesis, inspired by Condoravdi, is that modal-temporal interactions are restricted only by independent language-internal properties of the tense and aspect systems. We thus pursue a fully decompositional approach to modal-temporal interactions, whereby neither the temporal perspective nor the orientation is contributed by the lexical entry of the modal itself. More precisely, our null expectations are as in (5):

- (5) The Null Hypothesis:
- (i) Temporal perspective is provided by tense.
  - (ii) Temporal orientation is provided by viewpoint and lexical aspect.

There are two important things to note about (5). First, it is a corollary of (5i) that there should be no special constraints on the temporal perspective of epistemic modals. We therefore expect epistemic modals to be able to have past temporal perspectives; C-readings will exist. With respect to (5ii), there is one systematic exception to the expectation that temporal orientation is provided by

aspect. This has to do with the cross-linguistically stable observation that circumstantial modals have a special affinity with future temporal orientation (see Enç 1996; Condoravdi 2002; Stowell 2004; Laca 2008; among others). Condoravdi captures this correlation with her *Diversity Condition*, which states that metaphysical modal claims are only possible when the modal base contains both worlds where the prejacent is true, and worlds where it is false. Assuming a branching-futures model, the past is settled but the future is not. Events that occurred in the past, occurred in all metaphysically accessible worlds. A modal claim asserting the circumstantial possibility of an event prior to the temporal perspective is thus ruled out.<sup>1</sup> Given this, circumstantial modals are an exception to the null hypothesis that temporal orientation is given by aspect; they can only occur with non-past temporal orientations. We will see various ways in which this restriction plays out in different languages.

The final thing to note about our null hypothesis is that it leaves room for variation based on language-internal features of the tense and aspect systems. For example, we expect that languages will vary in whether the distinction between present and past temporal perspective is overtly marked. Languages which do not distinguish past from present tense will be expected to display systematic ambiguity with respect to the temporal perspective of modals. We also expect the expression of future temporal orientation to be influenced by how each language independently marks future time reference.

This paper is organized as follows. In the remainder of the introduction, we provide background information on the languages discussed and describe our methodology. Section 12.2 presents data from seven languages which exemplify our null hypotheses: Dutch, German, Gitksan, St'át'imcets, Javanese, Mandarin and Ktunaxa. Section 12.3 presents data from four additional

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<sup>1</sup> Thomas (2014) argues that Diversity Condition effects extend to non-priority circumstantial modals more generally.

languages which at least partially diverge from the predictions of our null hypothesis: Blackfoot, SENĆOŦEN, Hul'q'umi'num' and Atayal, and section 12.4 discusses how these divergences can be accounted for. Section 12.5 concludes.

### 12.1.3 Languages and methodology

Although much work has been done on modal-temporal interactions, almost all formal research in this area has concentrated on a handful of Indo-European languages, primarily in Germanic and Romance. The languages investigated in the current study come from seven language families, as outlined in Table 12.3 above. Seven of the languages are endangered, and almost all have modal-temporal systems which are understudied from a formal perspective. Here we provide a brief introduction to the less-familiar languages we discuss.

*St'át'imcets* (a.k.a. Lillooet) is a Northern Interior Salish language spoken in the southwest interior of British Columbia, with fewer than 100 speakers. Data and generalizations come from fieldwork with speakers of both the Upper *St'át'imcets* dialect (Carl Alexander, the late Beverley Frank, the late Gertrude Ned, and the late Rose Agnes Whitley) and the Lower *St'át'imcets* dialect (Laura Thevarge).

*Gitksan* is the term conventionally used to cover that part of the Nass-Gitksan dialect continuum spoken along the upper drainage of the Skeena River in northwestern interior British Columbia. It has fewer than 400 speakers. The data presented here come from speakers of the dialects spoken in Ansbayaxw/Kispiox (Barbara Sennott), Gitanyaw/Kitwancool (Vincent Gogag) and Gitsegukla (Hector Hill).

*Ktunaxa* is a language isolate spoken in southeastern British Columbia, northern Idaho and northwestern Montana. Fewer than 50 native speakers are estimated to be remaining from the two known dialects, Lower and Upper Kootenay. The data presented here are from a speaker of Upper

Kootenay.

*Javanese* is an Austronesian language of the Western Malayo-Polynesian branch spoken in Indonesia by over 90 million people. There are three main dialectal groups: West, Central, and East Javanese (Hatley 1984). The data presented here are from speakers of East Javanese, as spoken in the village of Paciran, East Java (Dhifa Ariffudin, Fina Aksanah, Titis Subekti, Bahrul Ulum, Nashrulloh Khoyrun Nashr).

*Blackfoot* is a Plains Algonquian language spoken on three reserves in southern Alberta (the Siksika, Blood/Kainaa, and Piegan reserves), and the Blackfeet reservation in Montana. The data presented here are from a speaker of the Blood dialect (Beatrice Bullshields).

*SENĆOFEN* and *Hul'q'umi'num'* are dialects of two closely related languages of the Central branch of the Salish language family. The two dialects are spoken adjacent to each other on Southeastern Vancouver Island, British Columbia, Canada. *SENĆOFEN* is the Saanich dialect of Northern Straits Salish. Examples come from fieldwork with Ivan Morris Sr., Raymond Sam, Mary Jack and Anne Jimmy. *Hul'q'umi'num'* is the Vancouver Island dialect of Halkomelem. Examples come from fieldwork with Ruby Peter from Quamichan.

*Atayal* is an Austronesian language spoken in northern Taiwan. There are two major dialects, Squliq Atayal and C'uli' Atayal. The data presented here come from speakers of Squliq Atayal spoken in Hsinchu County of Taiwan (Heitay Payan, Tintin Payan, Buya' Bawnay).

Information on the orthographies used for each language, and on abbreviations used in glosses, is given in the Appendix.

Our data were gathered by means of semantic fieldwork, as well as by introspection in the cases of languages spoken natively by an author. Our semantic fieldwork methodology includes (i) elicited production tasks, in which speakers produce object-language utterances in contexts provided by the researcher; (ii) acceptability judgment tasks, in which speakers judge the felicity of

utterances in discourse contexts provided by the researcher; and (iii) targeted construction storyboard tasks, in which speakers tell stories in their language based on pictorial representations, which are designed to elicit particular constructions or elements ([www.totemfieldstoryboards.org](http://www.totemfieldstoryboards.org); Burton and Matthewson in press). See Matthewson (2004) and Krifka (2011) for further discussion of methodologies used and the rationale behind them.

## 12.2 Results compatible with the null hypothesis

In this section, we show that various languages have modals that satisfy our null hypothesis. We show that Dutch, German, Gitksan, St'át'imcets, Javanese, Mandarin and Ktunaxa all have modals whose temporal perspective behaves as if determined by tense (and thus, epistemic possibility modals can have past temporal perspectives) and whose temporal orientation behaves as if determined by aspect, except where this is tempered by Diversity Condition effects.

### 12.2.1 Dutch and German

#### 12.2.1.1 Tense and aspect

German and Dutch are closely related (their non-standard dialects form a geographic continuum) and their tense/aspect systems are very similar (and similar to English).<sup>2</sup> As far as tense is concerned, there is a basic opposition between non-past and past, which semantically we will assume correspond to the non-past operator N in (6) and the past operator P in (7):

$$(6) \quad \llbracket N \rrbracket = \lambda t_{\langle i \rangle}. \lambda p_{\langle i, t \rangle}. \exists t' [\neg (t' < t) \ \& \ p(t')] = \lambda t_{\langle i \rangle}. \lambda p_{\langle i, t \rangle}. \exists t' [t' \geq t \ \& \ p(t')]$$

$$(7) \quad \llbracket P \rrbracket = \lambda t_{\langle i \rangle}. \lambda p_{\langle i, t \rangle}. \exists t' [t' < t \ \& \ p(t')]$$

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<sup>2</sup> For a basic introduction to tense and aspect in German and a comparison with English, we refer the reader to e.g., Beck and Gergel (2014:214-291) or von Stechow (2009).



There is some variation in the way these operators are expressed in the morpho-syntax. In both languages, N is realized as a morphological present tense, but whereas P is realized in Dutch and some (western) dialects of German as a morphological past tense, in other (southern) varieties of German, P is realized as a periphrastic perfect form with *haben* ('to have') or *sein* ('to be') plus a past participle. (German examples below do not take this variation into consideration and are from High German.) In Dutch and varieties of German that use a morphological past tense for P, periphrastic perfect forms express some kind of perfect aspect (although there are differences in the meaning and use of the perfect, both compared to English and between Dutch and the German varieties). The perfect forms may either share the semantics of (7) or be the realization of an extended-now temporal operator,<sup>3</sup> but a real analysis of the semantics and pragmatics of the perfect in German and Dutch is beyond the scope of this paper.

Future can be expressed by means of a modal auxiliary (*zullen* in Dutch, *werden* in German), but this is often optional. The languages do not have an overt perfective/imperfective contrast, and eventive verbs can get an "in-progress" interpretation without any overt aspectual marking. We assume the two phonologically null aspectual operators from Kratzer (1998) in (8-9):

$$(8) \quad \llbracket \text{IPFV} \rrbracket = \lambda t_{\langle i \rangle}. \lambda p_{\langle v, t \rangle}. \exists e [p(e) \ \& \ \tau(e) \subseteq t]$$

$$(9) \quad \llbracket \text{PFV} \rrbracket = \lambda t_{\langle i \rangle}. \lambda p_{\langle v, t \rangle}. \exists e [p(e) \ \& \ \tau(e) \supseteq t]$$

Both languages have various progressive-like constructions, but these are much less commonly used than the English progressive and are never obligatory.

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<sup>3</sup> See Kratzer (1998); von Stechow (1999, 2009); Klein (2000); Musan (2002); and Alexiadou et al. (2003).

### 12.2.1.2 Temporal perspective given by tense, and availability of Reading C

In our examples we will mostly focus on the epistemic interpretation of the Dutch modal *kunnen* and its German cognate *können* ('can, could, may, might'), but these can have non-epistemic readings as well. (See e.g., Kratzer (1991:649-650) for further discussion.)

German and Dutch modals are morpho-syntactically just like main verbs in that they inflect for tense. Based on our null hypothesis we therefore expect that the tense inflection on the modal will determine its temporal perspective. We also predict that Reading C will be available for epistemic modals with past tense inflection. These predictions are borne out. The modal *kunnen/können* can either combine with the N operator, yielding a present (or future) temporal perspective, as in (10a), or with the P operator for a past temporal perspective, as in (10b):

- (10) a. De sleutel-s *kunn-en* in de la ligg-en (Dutch)  
the key-PL *can-PRS.PL* in the drawer lie-INF  
'The keys may/might be in the drawer.' (PRESENT TP, PRESENT/FUTURE TO)
- b. De sleutel-s *kon-den* in de la ligg-en (Dutch)  
the key-PL *can-PST.PL* in the drawer lie-INF  
'The keys might have been in the drawer.' (PAST TP, PRESENT/FUTURE TO)

(10a) says that it is epistemically possible at the speech time that the keys are in the drawer. (10b) can be paraphrased as follows: At a (contextually salient) time *t* preceding the speech time, it was epistemically possible that the keys were in the drawer (either at *t*, making this an instantiation of Reading C-present, or after *t*, making it C-future).

German examples showing present and past TP are given in (11-12). Crucially, as shown by the temporal adverbs, (11) cannot be interpreted with past temporal perspective and (12) cannot

have a present temporal perspective:

- (11) Der FC Chelsea *kann* {zum jetzigen Zeitpunkt / #damals} die  
the FC Chelsea *can.PRS.SG* at+the now time.point / #then(PST) the  
Champions League noch gewinn-en.  
Champions League still win-INF (German)

‘Right now/#Back then, FC Chelsea can still win the Champions League.’

(PRESENT TP, FUTURE TO)

- (12) Borussia Dortmund *konn-te* {zu diesem Zeitpunkt / #zum jetzigen Zeitpunkt}  
Borussia Dortmund *can-PST.SG* at this time.point / at+the now time.point  
sogar noch gewinn-en.  
even still win-INF (German)

‘At this point in the game /#Right now, Borussia Dortmund could still win.’

(PAST TP, FUTURE TO)

A past temporal perspective for epistemic modals (Reading C) is somewhat more difficult to obtain than a present one, but these readings can be facilitated by an appropriate discourse context.

Here is a context for (10b) in which the past epistemic perspective is very natural:

- (13) **Context for (10b):** *When I arrived at work yesterday, I discovered that I didn't have my keys on me. I called my wife and asked if I had left them somewhere at home by any chance. She asked me where she should look. I tried to remember where I might have left them the previous night. They might have been in the drawer, but perhaps they were still in the pocket*

*of my pants.*

Past temporal perspective can also be expressed by putting the modal in the past perfect (the German analogue of this would be the past subjunctive):<sup>4</sup>

- (14) De sleutel-s *hadd-en* in de la *kunn-en* ligg-en (Dutch)  
the key-PL *have-PST.PL* in the drawer *can-INF* lie-INF  
'The keys might have been in the drawer.' (PAST TP, PRESENT TO)

(14) is ambiguous. In addition to a past counterfactual (circumstantial) interpretation, it can also express epistemic modality with past temporal perspective (and present orientation). The past-perspective reading of (14) is very similar to that of the modal in the simple past, as in (10b), but there is a subtle difference. (14) expresses "hindsight" knowledge, in the sense that at the utterance time, the speaker knows that the prejacent was false. (15) would be an appropriate context:

(15) **Context for (14):**

A: Why did you turn the whole drawer upside down? Your keys were on the counter, weren't they?

B: Yes, but I didn't know that then. I had to find them, but I had no idea where I had left them. They might have been in the drawer.

Here the speaker knows at the speech time that the keys were not in the drawer, but at the reference

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<sup>4</sup> The modal in (14) is an infinitive instead of a past participle, as would normally be expected for a verb in the perfect. This is a well-known morpho-syntactic quirk, which need not concern us here.

time (the time that she was looking for her keys) they could have been in the drawer for all she knew then. We assume that this difference between an epistemic modal in the simple past (as in (10b)) and in the past perfect (as in (14)) is due to the fact that the past perfect has an additional counterfactual component (i.e., a presupposition or implicature to the effect that the prejacent is false at the utterance time), but analyzing this further is beyond the scope of this paper, given the wide range of variation in the morphosyntactic expression of counterfactuals crosslinguistically.

### 12.2.1.3 Temporal orientation given by aspect and the Diversity Condition

As predicted by our null hypothesis, the temporal orientation of Dutch and German modals is determined by temporal (aspectual) operators that scope below the modal (in combination with the lexical aspect of the predicate). The prejacent proposition can feature either of the temporal operators in (6) and (7), in addition to the choice of imperfective versus perfective, as sketched in (16).

$$(16) \quad [_{\langle s, t \rangle} \lambda w [ [_{\langle \langle i, t \rangle, t \rangle} \{ \mathbf{N/P} \} t' ] [_{\langle i, t \rangle} \lambda t [_{\langle \langle v, t \rangle, t \rangle} \{ \mathbf{PFV/ IPFV} \} t ] [_{\langle v, t \rangle} \lambda e \dots w, e ] ] ] ]$$

Let's first consider cases where the non-past operator N appears below the modal. Because N is phonologically empty, the prejacent predicate lacks any overt temporal or aspectual marking. If the predicate is stative, the temporal orientation is present (as in the most common interpretation of (10a,b)) or future, as in (17):

- (17) Als je thuis-kom-t, kunn-en de sleutel-s in de la ligg-en  
 when you home-come-PRS.2SG can-PRS.PL the key-PL in the drawer lie-INF  
 ‘When you come home, the keys might be in the drawer.’ (Dutch) (PRESENT TP, FUT. TO)

We assume for concreteness that if the prejacent predicate is stative, the imperfective operator is always selected. If the predicate is eventive, we assume the perfective operator is normally selected (unless it is possible to give the verb an imperfective interpretation; see below), and we get future temporal orientation, just as in English. In that case, the modal can be interpreted epistemically or non-epistemically. German examples were given in (11-12); (18) is a Dutch case:

- (18) We {*kunn-en* / *kon-den*} winn-en (Dutch)  
 we *can*-PRS.PL / *can*-PST.PL win-INF  
 ‘We are / were able to win.’ (PRESENT/PAST TP, FUTURE TO)

However, here there is one relevant difference between Dutch and German on the one hand, and English on the other. In Dutch/German, bare activity verbs in the complement of an epistemic modal often allow for present temporal orientation, whereas their English counterparts can only have future orientation. This contrast is illustrated in (19-21).<sup>5</sup>

- (19) a. It might rain {\*right now / tomorrow}.  
 b. It might be raining {right now / tomorrow}.

- (20) Het *kan* {op dit moment / morgen} regen-en. (Dutch)  
 it *can*.PRS.SG at this moment / tomorrow rain-INF  
 ‘It might be raining right now’ or ‘It might rain tomorrow.’

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<sup>5</sup> (21) uses the subjunctive to weaken the modal claim. Since it is not immediately relevant to the null hypothesis, we do not explore the semantic contribution of the subjunctive further.

(21) Es *könnte* ja {gerade / morgen} regn-en. (German)  
 it *can.SBJV.PRS.SG* DISC right.now / tomorrow rain-INF

‘It might be raining right now.’ or ‘It might rain tomorrow.’

(PRESENT TP, PRESENT/FUTURE TO)

This difference between the Dutch/German and English aspectual systems exists independently of modality. Exactly the same contrast is observed in *non*-modal sentences. In Dutch and German, an activity verb in the simple present tense can have an “in-progress” interpretation (as in (22)), whereas English requires the use of the present progressive in such cases.

(22) Het regen-t op dit moment. (Dutch)  
 Es regne-t in diesem Moment. (German)  
 it rain-PRS.3SG at this moment

‘It is raining right now.’

This suggests that (some) eventive verbs in Dutch and German that lack overt viewpoint aspect can optionally have the IPFV operator and therefore allow an imperfective interpretation, unlike English, which requires them to be overtly marked with progressive aspect.

In order to get a *past* temporal orientation, the P operator is selected in the scope of the modal. This is illustrated for Dutch in (23). In this case, an epistemic interpretation is the only possible one, because of Condoravdi’s Diversity Condition, which rules out past-oriented circumstantial modals.

- (23) Hij kan / kon *gewonnen* *hebb-en* (Dutch)  
 he can.PRS.3SG / can.PST.3SG *win.PST.PTCP* *have-INF*  
 ‘It is/was possible that he won.’ (PAST/PRESENT TP, PAST TO)

Morphologically, P scoping below the modal is expressed by marking the modal’s complement with the periphrastic perfect, much as in English. This is independent of whether the particular variety of Dutch/German uses the periphrastic perfect to express past tense. That is, even those varieties (like standard Dutch and western dialects of German) that in non-modal sentences use a morphological past tense to express P, uniformly use the periphrastic perfect to express P when it scopes below the modal. The explanation, of course, is that for morpho-syntactic reasons the complement of the modal has to be in the infinitive form, and hence cannot be inflected for tense, leaving the periphrastic perfect as the only available temporal operator that can shift the temporal orientation backwards. We conjecture that in the scope of a modal the semantic/pragmatic contrast between the morphological past and the periphrastic perfect is neutralized. (The same thing seems to happen in the pluperfect, in Dutch/German as well as English.)

Note again that in English the facts are essentially the same (i.e., English uses the periphrastic perfect to express P scoping below the modal), except for one wrinkle. Because (present-day) English modals cannot be inflected for tense, *have* in the complement of certain modals (including *might*, but not *must* and *may*) can also express past temporal *perspective* rather than past temporal *orientation*, which leads to the ambiguity that Condoravdi analyzed in terms of the relative scope of *have* and the modal. In this regard, Dutch and German are ‘better behaved’ languages, which express past temporal perspective by means of a tense operator (either the morphological past or the periphrastic perfect) scoping over the modal, and past orientation by means of perfect aspect with the semantics of P in the complement of the modal.



Finally, note that it is possible to have both past TP and past TO. Here is an example in both languages:

(24) **Context:** *Polina is about to leave for work. As she leaves her apartment, her neighbor's son runs past her through the hallway. She then hears a loud bang. She fears that the boy might have fired a gun and calls the police. The next day, the boy's mother tells her that the boy only used a firecracker. She is quite upset because she had to deal with the police and a youth welfare officer. She wants to know why Polina even called the police. Polina justifies herself:*

- a. Ihr Sohn hätte ja jemand [erschossen hab-en] könn-en.  
 your son have.SUBJ.PST.SG DISC somebody shot.PST.PTCP have-INF can-INF (German)
- b. Uw zoon had immers iemand neergeschoten kunn-en hebb-en  
 your son have.PST.SG DISC somebody shot.PST.PTCP can-INF have-INF (Dutch)
- ‘Your son could have shot somebody.’ (PAST TP, PAST TO)

Note that (24) additionally employs counterfactual marking (encoded in German by the past subjunctive *hätte können* and in Dutch by the past perfect *had kunnen*). Again, we hypothesize that this counterfactual form is required to indicate that, at the utterance time, Polina knows for a fact that her neighbor's son has not shot somebody.

### 12.2.2 Gitksan

In this section we illustrate modal-temporal interactions in Gitksan with respect to two representative modals, epistemic *ima('a)* and the circumstantial possibility modal *da'akhlxw*. These modals are lexically specialized for epistemic and circumstantial conversational backgrounds

respectively; for evidence, see Peterson (2010) and Matthewson (2013).

### 12.2.2.1 Tense and aspect

Gitksan does not overtly mark past or present tense, but has obligatory marking for future eventualities (Jóhannsdóttir and Matthewson 2007; Matthewson 2013). (25) shows that eventive and stative predicates can be interpreted with either past or present time reference, in the absence of overt temporal marking.

- (25) a.    ba $\underline{x}$ =t     Yoko  
          run=DM    Yoko  
          ‘Yoko ran’ / ‘Yoko is running.’                    (Jóhannsdóttir and Matthewson 2007)
- b.    siipxw=t   James  
          sick=DM   James  
          ‘James was sick’ / ‘James is sick.’

(26-27) show that the prospective aspect marker *dim* is necessary and sufficient for a future interpretation. See Rigsby (1986:279), Jóhannsdóttir and Matthewson (2007), Matthewson (2013) for further data and discussion.

- (26)   \*(*dim*)    ha'w=t           James t'aahlakw  
          \*(*PROSP*) go.home=DM James tomorrow  
          ‘James will go home tomorrow.’

- (27) \*(*dim*) siipxw=t James t'aahlakw  
 \*(*PROSP*) sick=DM James tomorrow  
 'James will be sick tomorrow.'

Following Jóhannsdóttir and Matthewson (2007) and Matthewson (2012, 2013), we assume that Gitksan possesses a phonologically null non-future tense morpheme, as in (28); this tense refers to the contextually salient reference time provided by the assignment function  $g$ , and presupposes that this time interval does not follow the utterance time. The obligatory presence of the non-future tense morpheme restricts the temporal reference to non-future in sentences like (25a,b).<sup>6</sup>

- (28)  $[[ \text{NON-FUT}_i ]]$ <sup>g,c</sup> is only defined if no part of  $g(i)$  is after  $t_c$ .  
 If defined,  $[[ \text{NON-FUT}_i ]]$ <sup>g,c</sup> =  $g(i)$ .

In cases of future time reference, the null tense co-occurs with prospective *dim*, just as proposed by Abusch (1985) for English WOLL (the element which surfaces either as *will* or *would*, depending on whether it combines with present or past tense). *Dim* is thus an aspect marker, not a tense: it co-occurs with tense, and orders event time with respect to reference time (cf. Klein 1994). This correctly predicts that *dim* allows 'past future' readings, where the event precedes the utterance time, as in (29).

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<sup>6</sup> The fact that (28) adopts a referential analysis of tense, while (7) above adopts an existential analysis, is an artifact of prior analyses of the respective languages and has no import for our main claims.

(29) hlaa gilbil=hl ganuutxw lhi-daa-t mahl-is Diana *dim* yee-t  
 INCEP two=CN week NMLZ-SPT-3SG.II tell-PN Diana *PROSP* go-3SG.II  
 goo=hl Winnipeg ji hlaa k'i'ihl ganuutxw  
 LOC=CN Winnipeg HYP INCEP one week

‘Two weeks ago Diana said that she would go to Winnipeg in a week.’

(adapted from Jóhannsdóttir and Matthewson 2007)

There does not appear to be a dedicated marker for perfect aspect in Gitksan. Present perfect meanings are often rendered without any overt marking, as shown in (30).

(30) 'witxw=hl ts'awat  
 arrive=CN smart

‘The smart one has arrived.’

The analysis just sketched of the Gitksan temporal system leads us to expect the following: modals should receive their TP from the null non-future tense, thus being able to have either past or present temporal perspective without overt marking. Future TO should be marked by *dim* below the modal. Past TO should be possible without any overt aspectual marking.

#### 12.2.2.2 Temporal perspective given by tense, and availability of Reading C

As we predict, the temporal perspective of Gitksan modals may be either present or past, without any overt temporal marking. Representative examples are given in (31-32). (31a) talks about a sickness which is epistemically possible at the utterance time (present TP), while (31b) has a past TP. The speaker of (31b) is aware at the utterance time that the animal in question is not (and never

was) a rabbit. The sentence asserts that it was compatible with the speaker’s epistemic state at some past time that he was a rabbit. (31b) is thus a clear case of Reading C.

(31) a. **Context:** *Why isn’t Joe here?*

yugw=*imaa/ima'*=hl siipxw-t

IPFV=*EPIS*=CN sick-3SG.II

‘He might be sick.’

(Matthewson 2013)

b. **Context:** *Stacey bought food to feed Pat’s pet, but she didn’t know what kind of pet he had, so she bought all the wrong kinds of food. Later she finds out Pat’s pet is a snake. Pat asks ‘Why did you buy a carrot?’ Stacey replies:*

yugw=*imaa*=hl gax

IPFV=*EPIS*=CN rabbit-3SG.II

‘He might have been a rabbit.’

(TFS 2012, ‘Feeding Fluffy’)

Examples of present and past TP with circumstantial *da'akhlxw* are given in (32). In (32a), the speaker is talking about her utterance-time abilities (present TP), and in (32b), the speaker is reporting a girl’s past ability (past TP).

(32) a. nee=dii=n            *da'akxw*    #(dim)    xsaw-i'y / xsaxw-i'y

NEG=CNTR=1SG.I    *CIRC.POS*    #(PROSP)    go.out-1SG.II

‘I am not able to go out.’

(TFS 2011, ‘Chore Girl’)

b. ii    nee=dii-t            *da'akxw*    dim    ma'us-t

and    NEG=CNTR-3SG.II    *CIRC.POS*    PROSP    play-3SG.II

‘And she was not able to play.’

(TFS 2011, ‘Sick Girl’)

### 12.2.2.3 Temporal orientation given by aspect and the Diversity Condition

Our null hypothesis predicts that future TO will appear with the prospective marker *dim*, and this is what we find, as shown in (33-34) for epistemic *ima(')a*. The *dim*-less version is only acceptable in contexts which support a past or present TO, and the version with *dim* is only acceptable with future TO.

(33) *yugw=ima'=hl siipxw-t*

IPFV=EPIS=CN sick-3SG.II

'He might have been sick.' / 'He might be sick (now).' / ≠'He might be sick (in future).'

**Contexts:**

√ Why wasn't Joe at the meeting yesterday? (PAST TO)

√ Why isn't Joe here? (PRESENT TO)

# He's wearing no coat in the rain, he might get sick. (FUTURE TO)

(34) *yugw=ima'=hl dim siipxw-t*

IPFV=EPIS=CN PROSP sick-3SG.II

≠'He might have been sick.' / ≠'He might be sick (now).' / 'He might be sick (in future).'

**Contexts:**

# Why wasn't Joe at the meeting yesterday? (PAST TO)

# Why isn't Joe here? (PRESENT TO)

√ He's wearing no coat in the rain, he might get sick. (FUTURE TO)

(Matthewson 2013)

With the circumstantial modal *da'akhlxw*, we get a slightly different result. Future TO is still

marked by *dim*, as predicted by the null hypothesis, but *dim* is obligatory, as shown in (35).

- (35) *da'akhlxw-i-s*      Henry    #(dim)      jam-t  
*CIRC.POS-TRA-PN*    Henry    #(PROSP)    cook-3SG.II  
'Henry is able to cook.' / 'Henry was able to cook.'  
(Matthewson 2013)

The obligatoriness of *dim* with *da'akhlxw*, and indeed with *all* circumstantial modals in Gitksan (Matthewson 2013), is a straightforward Diversity Condition effect. The language enforces obligatory prospective aspect to ensure that circumstantial modals are always future-oriented.

### 12.2.3 St'át'imcets

#### 12.2.3.1 Tense and aspect

St'át'imcets is another language which lexically restricts the conversational background of modals (Rullmann et al. 2008; Davis et al. 2009). The language does not obligatorily overtly encode a distinction between present and past tense, but obligatorily overtly marks prospective aspect (Matthewson 2006; see also van Eijk 1997). This is shown in (36-38); the possible temporal interpretations are the same for stative predicates.

- (36) *k'ác-an'=lhkan*  
dry-DIR=1SG.SU  
'I dried it / I am drying it / ≠ I will dry it.'

(37) \* k'ác-an'=lhkan    *nacw / zánucwem*  
 dry-DIR=1SG.SU    *one.day.away / next.year*  
 'I will dry it tomorrow / next year.'  
 (Matthewson 2006)

(38) k'ac-an'-lhkán=*kelh*  
 dry-DIR=1SG.SU=*PROSP*  
 '≠ I dried it / ≠ I am drying it / I will dry it.'  
 (Matthewson 2006)

*Kelh* is a prospective aspect which gives rise to 'past future' interpretations when the reference time is in the past; this is shown in (39). *Kelh* is therefore parallel to Gitksan *dim* and English WOLL.

(39) **Context:** *Mike Leech is currently chief of T'it'q'et. His (deceased) mother was called Julianne.*

zwát-en-as	s=Julianne	[k=wa=s	kúkwi7= <i>kelh</i>
know-DIR-3ERG	NMLZ=Julianne	[DET-IPFV-3POSS	chief= <i>PROSP</i>
ta=skúza7=s=a]		i=kwís=as	
DET=child-3POSS=EXIS]		when.PST=fall=3SBJV	

'Julianne knew when he was born that her child would become chief.'

We adopt a non-future tense analysis of St'át'imcets, just as in (28) above, following Matthewson (2006).

### 12.2.3.2 Temporal perspective is given by tense, and availability of reading C

As St'át'imcets lacks overt tense marking, we predict that all its modals will allow both present and



past temporal perspectives, without overt marking. This is upheld, as shown in (40) and (41) for an epistemic and a circumstantial modal respectively. In each case, the (a) example has present TP and the (b) example has past TP. (40b) shows that St'át'imcets allows Reading C, as the epistemic modal here has a past temporal perspective.

(40) a. wa7=k'a séna7 qwenúxw

IPFV=EPIS COUNTER sick

'He may be sick.' (**Context:** Maybe that's why he's not here.)

(Rullmann et al. 2008:321)

b. **Context:** *The Canucks were playing last night. You weren't watching the game, but you heard your son sounding excited from the other room, where he was watching.*

*You thought the Canucks were winning, and you called up your friend and said:*

*'Good sports news!' But after the game, you found out that the Canucks had actually*

*lost, and your son was excited about something his friend was telling him on his*

*cellphone. The next day, you see your friend and he asks you why you had told him*

*there was good sports news when the Canucks had lost. You say:*

wá7=k'a t'cum i=Canucks=a

IPFV=EPIS win PL.DET=Canucks=EXIS

'The Canucks might have been winning.'

(41) a. wá7=lhkan ka-cát-s-a ta=k'ét'h=a

IPFV=1SG.SU CIRC-lift-CAUS-CIRC DET=rock=EXIS

'I can lift the rock.'

- b. qwenúxw=kan i=nátcw=as, t'u7 ka-tsunam'-cal=lhkán-a=t'u7  
 sick=1SG.SU when.PST=day=3SBJV but CIRC-teach-ACT=1SG.SU-CIRC=ADD  
 'I was sick yesterday, but I still was able to teach.' (Davis et al. 2009)

### 12.2.3.3 Temporal orientation given by aspect and the Diversity Condition

As prospective marking is obligatory whenever the event time follows the reference time, we predict the obligatory presence of *kelh* under modals when they are future-oriented (and the absence of *kelh* when the modals are past or present-oriented). This is correct for epistemic modals, as shown in (42-43). In (42), the TO is past, and there is no prospective; in (43), the TO is future, and *kelh* appears.

- (42) **Context:** *You've been watching the gold medal hockey game, but in the middle of it the power went off, so you had no TV. My power is out too, so I call up and ask: Did the Canadians win?*

t'cúm=wit=k'a skánas, cw7aoz kw=s=áts'x-en=an  
 win=3PL=EPIS YNQ NEG DET=NMLZ=see-TR=1SG.SBJV  
 'They might have won, I didn't see it.'

- (43) **Context:** *Your grandson is celebrating a Canadian victory, but the game is only half over and so you say 'The Americans might win.'*

sxek tc'úm=kelh=tu7 i=telh-álqw-emc=a  
 EPIS win=PROSP=then DET.PL=line-mass-people=EXIS  
 'The Americans might win.'

These data are broadly in accordance with the null hypothesis, but two things must be noted. First, (42) lacks any aspectual marking, rather than having the marking one would usually expect for a perfect meaning in St’át’imcets, the auxiliary *plan*, as in (44) (see Davis 2012).

- (44) *plán*=lhkan t’cum  
 PRF=1SG.SU win  
 ‘I have/had (already) won.’

This suggests that past TO may in some languages be given by a lower past (or in this case, non-future) tense, rather than by perfect aspect, as in English. The second thing to note is that future temporal orientation is not overtly marked for circumstantial modals in St’át’imcets; this can be seen in (41a-b) and (45), which are future-oriented.

- (45) *lán*=lhkacw=*ka* áts’x-en ti=kwtám<sup>s</sup>-sw=a  
 PRF=2SG.SU=CIRC see-DIR DET=husband-2SG.POSS=EXIS  
 ‘You may go to see your husband.’

This is again a Diversity Condition effect, but it is the inverse of the Gitksan pattern, where prospective aspect was obligatory with circumstantial modals. We see that in some languages, the inherent future TO of circumstantials is overtly marked by prospective aspect, while in other languages, the circumstantial modals themselves are perhaps inherently future-oriented and thus require no overt marking. We will see other instances of the latter type of case in following sections.

#### 12.2.4 Javanese

In this section we investigate the Javanese epistemic possibility modal *paleng* and the circumstantial possibility modal *iso*, which both lexically restrict their respective modal base (Vander Klok 2013).

##### 12.2.4.1 Tense and aspect

Verbs in Javanese are not marked for tense or aspect (Horne 1961:50; Robson 2002:54). All clauses are compatible with past, present, or future reference times, as shown in the following dialogue; the same facts hold for stative predicates.

- (46) a.   Wingi /   sa'iki / sesok   ewoh   opo?  
          yesterday / now / tomorrow busy   what  
          ‘Yesterday what [were you] doing?’  
          ‘Now what [are you] doing?’  
          ‘Tomorrow what [will you be] doing?’
- b.   aku   marut   kelopo  
          1SG   AV.grate coconut  
          ‘I shaved / was shaving / am shaving / will be shaving / coconut.’

We assume a tenseless analysis of Javanese, wherein only context and temporal expressions serve to restrict the temporal reference (in matrix clauses) (cf. Tonhauser 2011 for Paraguayan Guaraní).<sup>7</sup>

This is different from St'át'imcets or Gitksan, which we analyzed as having a covert non-future

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<sup>7</sup> In out-of-the-blue contexts or in translations to English, only present temporal reference is felicitous. This suggests that when the context does not provide an antecedent temporal reference time, the default is to fix the reference time to the utterance time.

tense morpheme.

While temporal marking is not required in Javanese, optional aspectual auxiliaries or adverbial/nominal temporal expressions can explicitly indicate the reference time. Future reference in Paciran Javanese for both eventive and stative predicates can be indicated by a prospective aspect auxiliary *ape* or by temporal adverbs like *sesok* ‘tomorrow; in the future’. See Vander Klok (2012) for further discussion.

- (47) a. Pak Bambang *wingi-nan-e* loro  
Mr. Bambang *yesterday-NMLZ-DEF* sick  
‘Mr. Bambang was sick in the past.’
- b. bocah Paciran podho *ape* dolan nok WBL  
child Paciran PL *PROSP* visit at WBL  
‘Paciran children will play at WBL (*Wisata Bahari Lamongan*).’

Evidence that *ape* is a prospective aspect marker is given in (48), which shows a ‘past future’ interpretation when the reference time is in the past.

(48) **Context:** *Dino iki april 20. Today is April 20.*

Sak wulan kepungkor kepala sekolah ngomong *ape* ono prei tanggal 1 april.  
one month ago head school AV.say *PROSP* EXIS holiday date 1 April  
Tapi gak sido  
but NEG go.ahead

‘One month ago, the school headmaster said that there would be a holiday on April 1<sup>st</sup>. But it never happened.’

#### 12.2.4.2 Temporal perspective given by tense, and availability of Reading C

Assuming a tenseless analysis for Javanese, we expect that possibility modals will be compatible with past, present, or future temporal perspective, given by the context or optional temporal markers. This prediction is borne out for the circumstantial modal *iso*, as shown in (49-51).

(49) **Context:** *BG talking to BZ about a deceased family member:*

rondok ra iso obah iku wes patang dino

around NEG CIRC.POS move DEM already four day

‘She couldn’t move for already around 4 days.’

(PAST TP, PRESENT TO)

(50) **Context:** *Mary’s friends are asking her to go out and play now.*

Aku mari tibo, gak iso

1SG finish fall NEG CIRC.POS

‘I fell; [I] cannot [play].’

(TFS 2011, ‘Chore Girl’) (PRESENT TP; PRESENT TO)

(51) **Context:** *Bu Yani ora iso melaku sa'iki. Dokter ngomong nek sa'wise operasi... Mrs. Yani cannot walk now. The doctor said that after the operation...*

Bu Yani iso melaku.

Mrs. Yani CIRC.POS walk

‘Bu Yani will be able to walk.’

(FUTURE TP, FUTURE TO)

(52-54) show that the epistemic possibility modal *paleng* also allows for past, present, and future TP. Importantly, (52) illustrates the availability of past temporal perspective with epistemic possibility (here, Reading C-past). Additional examples of C-readings are given in (55-57).

- (52) **Context:** *When you looked outside earlier this morning, the ground was wet. But later, you found out that Bunga was playing with water. You thought before that:*

*Paleng* (wes) mari udan

*EPIS.POS* (already) finish rain

‘It might have rained.’

(PAST TP, PAST TO)

- (53) **Context:** *You were watching the football game with Surabaya Muda but you fell asleep when the game was tied 2:2. They might have won (but you’re not sure).*

Surabaya Muda *paleng* sing (wes) menang (tapi aku durung weroh)

Surabaya Muda *EPIS.POS* REL (already) win (but 1SG not.yet know)

‘Surabaya Muda might have won.’

(PRESENT TP, PAST TO)

- (54) **Context:** *Tomo’s family are fishermen. But Tomo is an elementary school teacher. He likes teaching. Tomo doesn’t want to fish now. But because fishing is Tomo’s family’s tradition, ...*

*Paleng* Tomo pengen dadi wong miang.

*EPIS.POS* Tomo want become person fisher

‘Tomo might want to be a fisherman.’

(FUTURE TP, FUTURE TO)

#### 12.2.4.3 Temporal orientation given by aspect and the Diversity Condition

Our null hypothesis predicts that temporal orientation is given by aspect; a split is found between epistemic and circumstantial modals in Javanese, which follows from the Diversity Condition. The epistemic modal *paleng* can have past and present TO with no embedded aspectual or temporal markers. Past TO was illustrated in (52), and present TO (Reading C-present) is given in (55):

- (55) **Context:** *Ayu bought food to feed Joni's pet, but she didn't know what kind of pet he had, so she bought all the wrong kinds of food. Later she finds out Joni's pet is a snake. Joni asks 'Why did you buy some fish?' Ayu replies:*

*Paleng* Fluffy iku kucing

*EPIS.POS* Fluffy DEM cat

'Fluffy might have been a cat.' (TFS 2012, 'Feeding Fluffy') (PAST TP, PRESENT TO)

In order to indicate future TO with the epistemic modal *paleng*, the prospective aspect *ape* is obligatory in Paciran Javanese, as shown in (56), an example of Reading C-future.

- (56) **Context:** *This morning when you looked outside, it was cloudy, so you took an umbrella with you when you went to work. Later, you explain to your father why you took an umbrella (when you get home after 'Ashar', the third call to prayer).*

*Paleng* \*(*ape*) udan

*EPIS.POS* \*(*PROSP*) rain

'It might have rained.' (PAST TP, FUTURE TO)

The circumstantial modal *iso* is different from epistemic *paleng* with respect to TO. Like St'át'imcets circumstantial modals, *iso* is future-oriented and does not require overt future marking, as shown in (57). This pattern illustrates one way languages meet the Diversity Condition.

- (57) **Context:** *You were watching the Persela Lamongan game, and at one point in the first half, Persela Lamongan was winning 3-1. But the referee made a bad call, and the other team won.*



Persela Lamongan ranjene *iso* menang, tapi kalah

Persela Lamongan actually *CIRC.POS* win but lose

‘Persela Lamongan could have won, but they lost.’ (PAST TP, FUTURE TO; READING B)

## 12.2.5 Mandarin

### 12.2.5.1 Tense and aspect

The data presented here represent Mandarin as spoken in Taiwan. This language lacks tense morphology, but it has been argued that viewpoint aspect and the telicity of the predicate interact to determine temporal interpretations (Smith and Erbaugh 2005; Lin 2006). Stative predicates can be interpreted as either past or present without additional morphology, as in (58).

(58) tāmen hěn jǐnzhāng.

3PL very nervous

‘They are / were very nervous.’

Atelic eventive predicates can be aspectually unmarked and interpreted as present or past habitual, as in (59a). Most eventives can either take the progressive maker *zài*, yielding a present or past interpretation, as in (59b), or the perfective aspect *-le*, yielding the past only, as in (59c).

Achievements, however, cannot take progressive *zài*, as shown in (60a), but can optionally take the perfective *-le* and have a past interpretation, as in (60b). (A present reading is the default in (59a) and (59b), and a past interpretation usually requires rich context or a temporal adverbial to make the past referent time salient.)

- (59) a. tāmen chàng gē.  
 3PL sing song  
 ‘They sing songs.’ / ‘They used to sing songs.’
- b. tāmen zài chàng gē.  
 3PL PROG sing song  
 ‘They are singing songs.’ / ‘They were singing songs.’
- c. tāmen chàng-*le* gē.  
 3PL sing-PFV song  
 ‘≠ They sing songs.’ / ‘They sang songs.’

- (60) a. \* tā zài dǎ-pò bēizi.  
 3SG PROG break cup  
 Intended: ‘He is breaking cups.’
- b. tā dǎ-pò(-*le*) bēizi.  
 3SG break(-PFV) cup  
 ‘He broke cups.’

Future reference relies on the prospective aspect *huì*, as shown in (61).<sup>8</sup> (62) shows that *huì* can also order the future relative to a past reference time.

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<sup>8</sup> *Huì* has been regarded as a modal as it can also express ability, epistemic and metaphysical interpretations (Ren 2008). We limit ourselves to the temporal use of *huì* here.

- (61) a. tāmen \*(*huì*) hěn máng.  
 3PL \*(*PROSP*) very busy  
 ‘They will be very busy.’
- b. tāmen \*(*huì*) chàng gē.  
 3PL \*(*PROSP*) sing song  
 ‘They will sing songs.’

- (62) zhāngsān shuō tā *huì* hěn máng.  
 zhangsan say 3SG *PROSP* very busy  
 ‘Zhangsan said that he would be busy.’ (Lin 2006:18)

We assume that Mandarin possesses a null non-future tense, which can refer to the present or past depending on context and interaction with lexical and viewpoint aspect; see Sun (2014) for such an analysis. The prospective *huì* combines with the null tense, giving rise to a future (in the present) or future in the past.

### 12.2.5.2 Temporal perspective given by tense, and availability of Reading C

Mandarin modals lexically encode conversational background (except for one weak necessity modal, which allows both epistemic and circumstantial interpretations); see Ren (2008); Chen (2014). In this section, we show that the temporal perspective of two representative possibility modals, circumstantial *kěyǐ* and epistemic *kěnéng*, is given by tense.

Given that tense is covert and underspecified for present vs. past, the null hypothesis predicts that Mandarin modals allow present and past TPs without overt marking. This is borne out. The circumstantial modal *kěyǐ* can be interpreted with a present or past temporal perspective

without additional morphology, as shown in (63-64). (63) says that according to the hearer's goal at the utterance time, consuming more vegetables is possible. (64) talks about a possibility at a past time that the traffic lights were still green and the speaker caught the bus, which is however not true in the actual world. It's thus a counterfactual reading.

(63) nǐ kěyǐ duō chī shūcài  
2SG CIRC.POS more eat vegetable

'(To have a balanced diet) You can eat more vegetables.'

(64) **Context:** *You are late for an appointment with your friend. You are explaining to him the reason. You could have caught the last bus but the traffic lights on your way just turned red and stopped you from crossing the street to the bus stop while the bus was arriving.*

wǒ kěyǐ dǎdào gōngchē de (dànshì wǒ méi gǎn-shàng).  
1SG CIRC.POS catch bus PART but 1SG NEG catch-up

'I could have caught the bus (but I didn't).'

Like circumstantial *kěyǐ*, the epistemic modal *kěnéng* is compatible with present or past temporal perspective with no extra marking. (65) and (66-68) illustrate present and past TP respectively. (65) states that winning the game is epistemically possible at the utterance time, whereas in (66-68) the prejacent is compatible with the evidence available at some past time, but not with the utterance-time evidence. We see that Mandarin exemplifies the corollary of our null hypothesis that past epistemic temporal perspectives (C-readings) are possible.

- (65) **Context:** *You were watching the Canucks but you fell asleep when the game was tied. They might have won (but you're not sure).* (adapted from Matthewson 2013:364)

tāmen kěnéng dǎ-yíng-le.

3PL EPIS.POS play-win-PFV

'They might have won the game.'

(PRESENT TP, PAST TO)

- (66) **Context:** *You and your friend agreed to meet at the 7-11 on 41<sup>st</sup> St., but you didn't see him at the appointed time. The 7-11 clerk told you there's another 7-11 on 41<sup>st</sup> St., so you hastened to go there but still didn't find him. When you came home, you got a call from him. He says, 'Why didn't you wait for me? I was only 15 minutes late!' You reply:*

wǒ zěnmē zhīdào! nǐ kěnéng qù-le língwài yī-jīā 7-11.

1SG how know 2SG EPIS.POS go-PFV another one-CLF 7-11

'How could I know! You might have gone to another 7-11.'

(PAST TP, PAST TO)

- (67) **Context:** *Stacey bought food to feed Pat's pet, but she didn't know what kind of pet he had, so she bought all the wrong kinds of food. Later she finds out that Pat's pet is a snake. Pat asks 'Why did you buy a bone?' Stacey replies:* (TFS 2012, 'Feeding Fluffy')

wǒ zěnmē zhīdào! nǐ yǎng-de kěnéng shì yī-zhī gǒu.

1SG how know 2SG raise-NMLZ EPIS.POS be one-CLF dog

'How could I know! What you raise might have been a dog.'

(PAST TP, PRESENT TO)

- (68) **Context:** *You thought you were going to meet your friend at the 7-11 on 41<sup>st</sup> St., but you didn't see him at the appointed time. You didn't have a cellphone with you so you only*

waited there but never found him. Later when you came home, you got a call from him, saying ‘Why didn’t you go find a booth and call me? I was waiting for you at the 7-11 on 44<sup>th</sup> St. for an hour!’ You reply:

rúguǒ wǒ zǒu-le, nǐ kěnéng huì zhǎo-bú-dào wǒ.

if 1SG leave-PFV 2SG EPIS.POS PROSP find-NEG-out 1SG

‘If I left the 7-11 (and you arrived while I was gone), you might not have been able to find me.’ (PAST TP, FUTURE TO)

### 12.2.5.3 Temporal orientation given by aspect and the Diversity Condition

Recall that the prospective *huì* is required to give futurity in unembedded sentences. We predict that *huì* under modals yields future orientation, and the absence of *huì* yields only present or past orientation, with predictable aspectual restriction. This is straightforwardly upheld for the epistemic modal *kěnéng*. *Huì* is always present under *kěnéng* with future TO, irrespective of event type and the telicity of the prejacent. We show this for an atelic eventive predicate in (69).

(69) **Context:** *Your friend caught a cockroach. He tells you he is going to show it to his sister because she is afraid of cockroaches. You persuade him not to do this:*

tā kěnéng \*(huì) kū.

3SG EPIS.POS \*(PROSP) cry

‘She might cry.’

In the absence of *huì*, *kěnéng* is restricted to non-future TO. Prejacent with statives and progressive-marked eventives can receive either present or past TO, as exemplified with progressives in (70-71). *Kěnéng* cannot embed a bare eventive verb; past TO for *kěnéng* with an

eventive prejacents requires the perfective aspect *-le*, as in (72).

(70) **Context:** *You hear the uproar and clink of bottles from the living room.*

tāmen kěnéng zài hē jiǔ.

3PL EPIS.POS PROG drink wine

‘They might be drinking wine.’

(71) **Context:** *You called your neighbour friend but she didn’t sound right. One hour later, she comes to your place with red and swollen eyes. You think:*

tā kěnéng zài kū.

3SG EPIS.POS PROG cry

‘She might have been crying (when I was calling).’

(72) **Context:** *You come home finding some pieces of glass-like fragments on the floor. You suspect that your children broke something.*

tāmen kěnéng dǎpò\*(-le) dōngxī.

3PL EPIS.POS break-\*(PFV) stuff

‘They might have broken something.’

Turning to circumstantial modals, we find that the TO of the circumstantial modal *kěyǐ* is restricted due to the Diversity Condition. Unlike the epistemic modal, circumstantial *kěyǐ* allows a future TO with a bare eventive prejacent. This is shown in (73). In fact, the overt prospective aspect *huì*, which marks a future TO with the epistemic modal, is not allowed on either stative or eventive prejacents with *kěyǐ*.

(73) **Context:** *You acquire a piece of land in a far away country and discover that the soil and climate are very much like at home, where hydrangeas prosper everywhere. Since hydrangeas are your favourite plants, you wonder whether they would grow in this place and inquire about it.* (Kratzer 1991:646)

xiùqíhuā kěyǐ (\**hui*) shēngzhǎng zài zhèlǐ.

hydrangea CIRC.POS (\*PROSP) grow LOC here

‘Hydrangeas can grow here.’

The circumstantial modal is inherently future-oriented, and thus requires no overt marking. This is a manifestation of the Diversity Condition.

## 12.2.6 Ktunaxa

### 12.2.6.1 Tense and aspect

Like Gitksan and St’át’imcets, Ktunaxa does not obligatorily distinguish between past and present tense, but obligatorily marks future time reference. As shown in (74a-b), unmarked predicates may not be interpreted as future. Ktunaxa has two prospective aspect markers, *ɕxat* and *ɕ*, which are compatible with modal meanings (see Larnus 2014 on the difference between them). In order for a predicate to have a future reading, it must be marked with one of them, as shown in (74b).

(74) a. xaqwɪł-ni ɕan

dance-IND John

‘John danced’ / ‘John is dancing’ / \*‘John will dance.’







### 12.2.6.3 Temporal orientation given by aspect and the Diversity Condition

Because prospective marking is required whenever the event time follows the reference time in Ktunaxa, we predict it will be necessary under modals when future-oriented. This is true for the epistemic modal *tin*. Without *ɕxał*, (77) is not compatible with a future reading; with it, as in (78), the sentence is not compatible with a non-future reading.

(77) **Context:** *You were watching the Canucks but you fell asleep when the game was tied. They might have won (but you're not sure).*

*tin*    hukakaʔ-ni    (#miksən    qa    hukakaʔ-ni)

*EPIS*    win-IND    but    NEG    win-IND

‘They might have won (#but they didn’t).’ (PAST TO)

(78) **Context:** *The Canucks are winning by two goals halfway through the third period. Your friend calls to ask how the game’s going. You know they could lose their lead and let the other team win.*

*tin*    ɕxał    hukakaʔ-ni

*EPIS*    PROSP    win-IND

‘They might win.’ (FUTURE TO)

With circumstantial modals, no prospective aspect marking is required to get a future TO, just like in St’át’imcets, Javanese and Mandarin; circumstantial modals are inherently future-oriented in Ktunaxa. Unmarked sentences like (79) are compatible with all three temporal perspectives, but in each case the temporal orientation is future. This is a Diversity Condition effect.

(79) *tat*    q'umniʔ-ni    *ɕan*  
*CIRC*    sleep-IND    John

‘John can sleep/John was able to sleep/John will be able to sleep.’

### 12.2.7 Summary

In this section we have tested a generalized version of Condoravdi’s proposals – one which retains her core architecture, but allows for language-specific differences in tense and aspect systems – on seven languages from six families. It is striking that in all these languages, we see evidence for our null hypothesis that the temporal perspective of the modals is given by tense, while the temporal orientation is given by aspect, or at least by some lower-scoping temporal operator.

In each of these seven languages we found support for Condoravdi’s Diversity Condition, which restricts the temporal orientation of circumstantial modals to non-past. We saw that languages apply different strategies to enforce Diversity Condition effects. In Gitksan, the inherent future TO of circumstantials is obligatorily overtly marked by prospective aspect, while in St’át’imcets, Javanese, Mandarin and Ktunaxa, the circumstantial modals themselves are inherently future-oriented and thus require no overt marking. Alternatively, non-future temporal orientations can trigger a shift in the modal flavour from circumstantial to epistemic (Dutch, German and English).<sup>10</sup>

The next section discusses the remaining four languages: Blackfoot, Northern Straits Salish, Halkomelem and Atayal. We will show how the languages do and do not behave as expected given

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<sup>10</sup> María Luisa Rivero asks (p.c.) whether there is a principled distinction between the languages in which circumstantial modals are inherently future oriented, and those in which additional prospective markers are required. We have to leave this question for future research.

the null hypothesis.

### **12.3 Languages which only partially obey the null hypothesis**

Recall we departed from Condoravdi in our null hypothesis: we hypothesized that epistemic modals would be able to have past temporal perspectives (C-readings). In support of this, we found C-readings for at least one epistemic modal in seven languages (eight, including English). This section shows that the remaining four languages, Blackfoot, Northern Straits Salish, Halkomelem and Atayal, all have epistemic modals that lack C-readings, and hence appear to be exceptions to our null hypothesis. However, we argue that this divergence from the null hypothesis actually follows from either a reformulation of the hypothesis that relies on the structural position of the temporal operators in question, as opposed to their categorization as a tense or aspect, or independently-motivated language-specific properties.

#### **12.3.1 Blackfoot**

In this section, we show that the Blackfoot (variable-force) epistemic modal *aahkam-* behaves (for the most part) as our null hypothesis predicts – its temporal perspective patterns like tense interpretations in non-modal clauses, and its temporal orientation patterns like aspect in non-modal clauses. We also show that Blackfoot’s circumstantial modals *aahkama’p-* ‘might’ and *ohkott-* ‘able to’ have temporal perspectives that pattern like tense and that they display predictable restrictions in temporal orientation, given the Diversity Condition. In section 12.3.1.4 we address the areas where Blackfoot modals deviate from the null hypothesis.

##### **12.3.1.1 Tense and aspect**

Although Blackfoot lacks overt tense morphemes (Ritter and Wiltschko 2004, 2005; Reis Silva and



Table 12.4: Temporal interpretation of Blackfoot non-modal predicates

temporal interpretation	eventive predicate		stative predicate
	PFV	IPFV	
past	√	√	√
present	X	√	√

Reis Silva and Matthewson (2007), following Dunham (2008), assume that the absence of morphological aspect in Blackfoot non-modal claims is always interpreted as perfective. They also assume, following Bennett and Partee (1978), that (i) eventive predicates are inherently dynamic, and (ii) present tense is instantaneous. With these assumptions, they derive the temporal pattern observed above as follows: eventive predicates, being inherently dynamic and involving change, can only hold true of non-instantaneous evaluation times. Under the standard assumption that perfective places the run-time of the event within the evaluation time, a perfective eventive is incompatible with an instantaneous present evaluation time. Thus, perfective eventives like (80b) cannot be interpreted as present. Stative or stativized predicates, on the other hand, can hold true of instantaneous evaluation times, and thus can be interpreted with respect to an instantaneous present evaluation time, or with respect to a (non-instantaneous) past evaluation time. With this analysis, we arrive at the following picture of Blackfoot's tense/aspect inventory:

(82) The Blackfoot Tense/Aspect Inventory (Non-Modal Claims)

**A. Tenses:**

$\emptyset_{\text{PRESENT}}$

$\emptyset_{\text{PAST}}$

**B. Aspects:**

$\acute{a}$ -IPFV

*ikaa-* ~ *akaa*-PRF

$\emptyset_{\text{PFV}}$

### 12.3.1.2 Temporal perspective given by tense, and availability of Reading C

In this section, we first discuss the temporal perspective of *aahkam-*, an epistemic modal, and show the availability of a past temporal perspective for this modal (Reading C). We then discuss the temporal perspective of circumstantial modals (the ability modal *ohkott-*, and *aahkama'p-* ‘might’).

The following data show that the epistemic modal *aahkam-* is compatible with a past temporal perspective. In (83), Tiny’s stealing the painting was compatible with the evidence I had available to me yesterday, but is no longer compatible with the current evidence. Thus this must be a past temporal perspective.

(83) **Context:** *Someone stole a famous painting from a museum three days ago. Yesterday I had it narrowed down to three suspects: Blue-eyes, Eagle, and Tiny, and I had them all brought in for questioning. Today, however, I found a blonde hair at the scene of the crime, which rules out the dark-haired Tiny as a suspect. When my supervisor reviews the evidence and asks me why I bothered bringing in Tiny for questioning yesterday, I explain: “Yesterday Tiny might have still stolen the painting.”*

matónni	<i>aahkam-ikamosat-yii-wa</i>	annisk sinááksin
yesterday	<i>EPIS-steal.VTA-3&gt;3'-3</i>	DEM painting

‘Yesterday she might have stolen that painting.’ (PAST TP, PAST TO)

The context in (84) is similarly one where the prejacent is only compatible with evidence that the speaker had at a previous epistemic state; it is not compatible with the speaker's current epistemic state. On the basis of these data, we conclude that *aahkam-* is compatible with an epistemic past temporal perspective. Note that (84) has a present temporal orientation, while (83) has a past temporal orientation.



- (84) **Context:** *Pat asked Stacey to take care of his pet, Fluffy, while he was away. Stacey, being unaware of what kind of pet Fluffy was, bought some dog food. When Pat asks Stacey why she bought dog food for his pet snake, she says:*

*aahkam-omitaa-wa*

*EPIS-be\_dog.VAI-3PROX*

‘He might have been a dog.’ (TFS 2012, ‘Feeding Fluffy’) (PAST TP, PRESENT TO)

The modal *aahkam-* is also compatible with a present temporal perspective, as shown in (85) and (86), which have a past and present temporal orientation respectively.

- (85) **Context:** *I’m watching the security feed for the museum, which has a very famous painting on display. At one point, I see a man walk into the screen, then the video security feed goes fuzzy. When the feed comes back on, everything looks to be in place. But later I learn that the man I saw on the video feed is a famous art-thief and counterfeit artist. Even though everything looked to be in place when the feed came back on, for all I know, the painting that’s there now might be a forgery. Stunned, I realize: “He might have stolen the painting.”/ “Maybe he stole the painting.”*

*oma nínaa aahkam-ikamo'tsat-yii-wa annisk sinááksin*

*DEM man EPIS-steal.VTA-3>3'-3 DEM painting*

‘That man might have stolen that one painting.’ (PRESENT TP, PAST TO)

(86) **Context:** *I don't see my dad around anywhere, but I notice his running shoes are missing.*

*aahkam-á-ipi-okska'si-wa*

*EPIS-IPFV-far-run.VAI-3PROX*

'He must be going for a long run.'

(PRESENT TP, PRESENT TO)

To summarize, *aahkam-* is compatible with both a past and present temporal perspective. This is what we expect if the temporal perspective is provided by tense.

We now turn to the TP of Blackfoot circumstantial modals: the ability modal *ohkott-* and the modal *aahkama'p-* 'might'. These modals are both compatible with either a past or present temporal perspective, but differ in whether the modal requires additional aspectual morphology in order to be interpreted with a present temporal perspective.

Blackfoot's ability modal is, when unmarked by aspectual morphology, interpreted with a past temporal perspective. In order to be interpreted with a present TP, the ability attribution must first be modified by imperfective aspect. This is shown in (87): (87a) shows that a bare ability modal can only be interpreted with a past TP, while (87b) shows that an imperfective ability claim is compatible with either past or present TP.

(87) a. *ohkott-ihpiyi-wa*

*able-dance.VAI-3*

'He was able to dance.'

≠ 'He is able to dance.'

b. *á-ohkott-ihpiyi-wa*

*IPFV-able-dance.VAI-3*

‘He was able to dance (when young).’

OR ‘He is able to dance.’<sup>11</sup>

The ‘might’ modal *aahkama’p-*, on the other hand, can be interpreted with either a past or present temporal perspective, with no additional aspectual morphology. This is shown in (88), and the overall results are summarized in Table 12.5.

(88) a. **Context:** *My neighbour was born with heart problems, and her mother worries about her over-exerting herself. Tomorrow is her prom, and her mom is really worried.*

*aahkama’p-iik-sska-ihpiyi*

*might-INTS-INTS-dance.VAI*

‘She *might* dance a lot.’

(PRESENT TP, FUTURE TO)

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<sup>11</sup> In the absence of overt temporal adverbials or specific context, the interpretation of an imperfective-marked ability modal, like imperfective marked non-modal predicates, is present. The range of contexts in which an imperfective-marked ability modal with a present interpretation is accepted as felicitous, however, is narrow, as Blackfoot’s imperfective is always interpreted with either an event-in-progress or habitual reading. The present-interpreted imperfective ability attribution thus requires a context where the prejacent event is already in-progress, or a context where the prejacent event is habitually achieved. The more general contexts in which we would assert “He can P” - i.e., cases where “If he chooses to P, he will achieve P” are conveyed with a future-marked ability attribution.

- b. **Context:** *Martina’s hockey team was down a player, and they tried to get Heather as a ringer, but Heather couldn’t play, and they lost.*

anna Heather waawahkaa-ohtopi    *aahkama'p-omo'tsaaki-yaawa*

DEM Heather play.VAI-UNR            *might-win.VAI-3PL*

‘If Heather had played, they *might have* won.’            (PAST TP, FUTURE TO)

Table 12.5: Range of temporal perspectives for Blackfoot circumstantial modals

temporal interpretation	<i>ohkott-</i> ‘can/able’		<i>aahkama'p-</i> ‘might’
	PFV	IPFV	
past perspective	√	√	√
present perspective	X	√	√

The pattern of temporal perspective represented in Table 12.5 directly parallels the pattern of tense interpretations for non-modal claims in Table 12.4. This suggests that the temporal perspective of circumstantial modal claims is determined by tense: the modal claim can combine with either the null present, or the null past, if the modal is stative-like (*aahkama'p-*), or stativized by the imperfective. These modals can thus be interpreted with either past or present TPs. If the modal is perfective and eventive-like (*ohkott-*), however, it can only combine with the null past, and thus can only be interpreted with a past temporal perspective. Louie (2015) proposes that the eventive nature of Blackfoot’s ability modal is derived from a lexically-encoded agentivity requirement on its prejacent.<sup>12</sup>

<sup>12</sup> The reader may note that the examples in (88a) and (88b) are not minimal pairs; this is because without a conditional antecedent, the modal *aahkama'p-* cannot be interpreted with a past temporal perspective. This contrasts with Blackfoot’s ability modal, which can be past-shifted via context and overt temporal adverbials. At this point, the authors are hesitant to hypothesize as to why this is the case.

### 12.3.1.3 Temporal orientation given by aspect and the Diversity Condition

The temporal orientation of Blackfoot circumstantial modals can be analyzed according to our null hypothesis, whereby TO is given by a lower-scoping temporal operator like aspect, modulo the Diversity Condition. Blackfoot *ohkott-* ‘able to’ claims, with their default temporal perspective (past), can only take aspectually-bare eventive complements, and these are always interpreted with a perfective/past temporal orientation.<sup>13</sup> This is exactly what we expect given the aspectual system discussed above; the absence of overt aspect with bare eventives is interpreted as perfective.

Blackfoot *aahkama 'p-*, on the other hand, takes the instantaneous present as its default temporal perspective. We thus expect that this modal is incompatible with a perfective/past temporal orientation, which appears to be the case: bare eventive complements to *aahkama 'p-* are always interpreted with future TO, which Louie (2013) argues is provided by a null prospective aspect. When *aahkama 'p-* takes stative (or stativized) prejacent, however, it is interpreted with present temporal orientation. This is shown in (89); (89a) has a lexical stative prejacent, and (89b,c) have eventive prejacent stativized by the imperfective and perfect respectively. These examples can be analyzed as epistemic, as they appear to express what is possible given the speaker’s evidence; i.e., the observation that saskatoon berries are normally ripe at this time in (89a), the low rumbling sounds in (89b), and the closed eyes in (89c).<sup>14</sup>

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<sup>13</sup> We use the term ‘perfective/past temporal orientation’ instead of ‘past temporal orientation’ for Blackfoot, to indicate that the run-time of the event is contained within the past interval taken as the modal evaluation time, rather than preceding the modal evaluation time (cf. Louie 2013).

<sup>14</sup> We must point out, however, that with a present temporal perspective, circumstantial and epistemic readings are empirically impossible to distinguish. Without hindsight to distinguish between a speaker's *evidence* regarding a state of affairs at *t*, and the *actual circumstances* of that state of affairs at *t*, from that speaker’s perspective, epistemic and circumstantial modal bases are

- (89) a. **Context:** *Saskatoon berries are usually ripe this time of year, but it's been irregularly cold.*

*aahkama'p-i'tsii-yi-aawa*

*might-be\_ripe.VII-3PL-DTP*

'They (saskatoon berries) might be ripe.' (PRESENT TP, PRESENT TO)

- b. **Context:** *After a long shift at the hospital, my sister often falls asleep sitting up while watching t.v. Right now she's sitting on the sofa, and I think I hear some low, rumbling sounds coming from her.*

*aahkama'p-á-sohk-aanistsii-wa*

*might-IPFV-loud-do\_sthing.VAI-3*

'She might be snoring.' (PRESENT TP, PRESENT TO)

- c. **Context:** *After a long shift at the hospital, my sister often falls asleep sitting up while watching t.v. Her eyes are closed, and she might just be resting them, but I doubt it.*

*aahkama'p-ikaa-yo'kaa-n-opii-wa*

*might-PRF-sleep.VAI-?-sit.VAI-3*

'She might have already fallen asleep sitting up.' (PRESENT TP, PRESENT TO)

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identical. Thus while (89) could be interpreted as an epistemic claim, it could equally be interpreted as a circumstantial claim. Nevertheless, *aahkama'p-* provides the closest candidate to an existential epistemic modal in Blackfoot, and even with an alternative analysis whereby *aahkama'p-* yields solely circumstantial claims, it does not pose a problem for the main claim of this paper: the data in (88) show that its temporal perspective behaves as if dictated by tense, and the data forthcoming in (90-91) are no longer problematic – as a dedicated circumstantial modal, we would not expect *aahkama'p* to have a Reading C interpretation.

The modal *aahkama'p-* thus appears to be compatible with either circumstantial or epistemic interpretations, but the various readings are temporally/aspectually conditioned: future orientations, which arise with eventive prejacent, are interpreted as circumstantial, and present orientations, which arise with stative prejacent, are interpreted as epistemic.<sup>15</sup> This is in accord with the predictions of the Diversity Condition, and parallels what we observed in section 12.2 with Dutch *kunnen* and German *können*.

#### 12.3.1.4 Areas where Blackfoot deviates from the null hypothesis

The temporal orientation of *aahkam-* does not behave exactly as expected given our null hypothesis. Recall that while statives in Blackfoot are compatible with evaluation times that are either instants (like the present) or intervals (like the past), eventives are only compatible with the latter. If temporal orientation is given by aspect, we predict that stative prejacent should be interpreted with a present/coinciding temporal orientation, whether the modal claim has an instantaneous/present TP, or an interval/past TP. This is exactly what we saw in (86) and (84) respectively. We also predict, however, that eventive prejacent with a present temporal perspective should either (i) like non-modal eventives, be interpreted as perfective and thus, be impossible (as eventive perfectives and the present are incompatible in Blackfoot), or (ii) like with *áak* and *aahkama'p*, be interpreted with a null prospective aspect and thus receive a prospective TO. This is not the case. As shown in (83) and (85), eventives receive a past temporal orientation whether the temporal perspective is an

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<sup>15</sup> Given the obvious morphological similarity between *aahkam-* and *aahkama'p-*, the reader may wonder whether a derivational relationship between these two morphemes is possible. But given differences in their temporal behaviour, range of modal flavour, and uncertainty regarding the meaning of the morpheme *a'p-* (glossed as “about” in Frantz & Russell 1998), we are not in a position to propose such a relationship at this time.





(91) **Context:** *Pat asked Stacey to take care of his pet, Fluffy, while he was away. Stacey, being unaware of what kind of pet Fluffy was, bought some dog food. When Pat asks Stacey why she bought dog food for his pet snake, she says:*

# *aahkama'p-omitaa-wa*

*might-be\_dog.VAI-3*

'He might have been a dog.' (TFS 2012, 'Feeding Fluffy') (PAST TP, PRESENT TO)

**Consultant:** "Not a clear sentence. Mind-boggling."

In order to use *aahkama'p-* with this interpretation, the modal claim must be embedded under an attitude predicate like *nisóóksst* 'I thought/used to think' - this is shown in (92).

(92) **Context:** *We live in Richmond, where the largest percentage of the inhabitants are Chinese. My mom sees someone who looks Chinese, and asks her directions in Cantonese. The person turns out to be Korean though. My mom is a bit embarrassed, but she says:*

a. #*máát-wapatamsstsini-maa-waatsiksi* ki *aahkama'p-wapatampsstsini-maa-wa*

*NEG-be\_chinese.VAI-NONAFF.SG* CONJ *might-be\_chinese.VAI-3*

'She's not Chinese, but she might have been Chinese.'

**Consultant:** You're saying two things at once.

b. *ni-sook-sstaa* *aahkama'p-wapatampsstsini-maa-wa* ki

*I-used\_to-think.VAI* *might-be\_chinese.VAI-3* CONJ

*máát-wapatamsstsini-maa-waatsiksi*

*NEG-be\_chinese.VAI-NONAFF.SG*

'I thought she might be Chinese, but she's not Chinese.'

This shows that while *aahkama'p-* is compatible with a past temporal perspective, this is only so for its metaphysical/counterfactual readings; when interpreted epistemically, it is restricted to a present temporal perspective. We return to possible reasons for this absence of Reading C in section 12.4 below.

### 12.3.2 SENĆOFEN and Hul'q'umi'num'

In this section, we show that SENĆOFEN and Hul'q'umi'num' partially fit the null hypothesis. Several lexical items of various syntactic types can be analyzed as modals in the two languages, as shown in descriptive works (including Montler 1986; Galloway 1993; Suttles 2004) and one semantic categorization in terms of modal type (Jelinek 1987). However, only one circumstantial modal and one epistemic modal have been studied in-depth semantically (Turner 2013), and these are the only two considered in this paper. We start with a discussion of tense and aspect in the two languages.

#### 12.3.2.1 Tense and aspect

Tense in SENĆOFEN and Hul'q'umi'num' is encoded by two second position clitics: *ləʔ/əʔ* indicates that the reference time is prior to the utterance time (93), while *səʔ/ceʔ* indicates that the reference time is subsequent to the utterance time (94).<sup>17</sup> We leave aside a modal analysis of the future here, and instead treat the future as comparable to the past tense. The data in this subsection come from SENĆOFEN.

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<sup>17</sup> The Halkomelem past tense marker is sometimes treated as a suffix. Suttles (2004: 368) notes that it behaves phonologically like a suffix and grammatically like a particle and includes it in a list of second position particles. It is treated as a second position clitic here, like the SENĆOFEN cognate.

(93) **Context:** *You see that the ground is wet, so you know that it was raining this morning.*

O     ĽEMEW̄ LO

?a     łm̄x<sup>w</sup>=l̄ə?

oh     rain=*PST*

‘Oh, it rained some.’

(94) **Context:** *You go outside and you see the raindrops just starting to fall.*

O     ĽEMEW̄ SE

?a     łm̄x<sup>w</sup>=sə?

oh     rain=*FUT*

‘Oh, it’s going to rain.’

There is no morphological present tense, but in order to indicate that the RT and UT overlap, the clause is uttered with no overt tense marker.

(95) ĽEM,Ŵ           TFE           SAKEL

łm̄x<sup>w</sup>           tθə           seqəł

rain[*IPFV*]     GNRL.DET     outside

‘It’s raining outside.’

In SENĆOFEN, clauses without a tense clitic can also be interpreted with past or future reference times, particularly when it is clear from adverbials or the discourse context (Montler 1986; Turner 2011).

(96) NEN LEMEW E TFE PEXSISEN  
 ŋən ləməx<sup>w</sup> ʔə tθə pəχsísəŋ  
 much rain OBL GNRL.DET spring  
 ‘It rained a lot in the spring.’

(97) TU ŁĆIU,S SEN (SE) ĆEĆÁĆELES  
 tuʔ łćíws=sən(=səʔ) k<sup>w</sup>ək<sup>w</sup>éćələs  
 a.bit tired[IPFV]=1SG.SBJ(=FUT) tomorrow  
 ‘I’ll still be tired tomorrow.’

In Hul’q’umi’num’ too, sentences with no past clitic can be interpreted as past (Suttles 2004: 508). This is true for the future clitic in at least some contexts. In the literature on Halkomelem, Suttles (2004: 508, Musqueam dialect) states that future marker “may be” obligatory, while Wiltschko (2003: 687, Upriver dialect) states that it is optional.

Other factors also affect temporal interpretation, such as predicate type in SENĆOFEN (Kiyota 2008; Turner 2011) and locative auxiliaries in Hul’q’umi’num’ (Suttles 2004: 36), but neither of these obligatorily restricts reference time. Thus, SENĆOFEN and Hul’q’umi’num’ exhibit superficial tenselessness, since past, present or future reference times are all available without overt tense.

SENĆOFEN contains two contrasting viewpoint aspects: perfective and imperfective (Kiyota 2008; Turner 2011). We assume that the semantics of aspect is the same in Hul’q’umi’num’, since the behaviour of the two aspects in both languages appears to be identical. Perfective aspect is shown above in examples (93), (94) and (96). Imperfective is shown in (95) and (97). In the glosses, verbs not glossed as imperfective (IPFV) are in the perfective aspect.

In addition, Kiyota (2008) has proposed that there is a perfect in SENĆOŦEN, indicated by the particle *kʷl*. Kiyota shows that the range of readings associated with *kʷl* largely overlap those of the English perfect. The cognate in Hul’q’umi’num’ is *wəł* and appears to behave similarly. In some of the other languages discussed in this paper, perfect or its future counterpart, prospective, provide temporal orientation in modal sentences. This is not the case in SENĆOŦEN and Hul’q’umi’num’, where both TP and TO are provided by tense, except in the case of circumstantial modals, which have inherent future temporal orientation.

### 12.3.2.2 Temporal perspective is partially provided by tense

SENĆOŦEN and Hul’q’umi’num’ lexically distinguish circumstantial from epistemic modality; only one circumstantial modal and one epistemic modal are discussed here. The two languages partially fit the first part of our null hypothesis, since temporal perspective is provided by tense for the (variable-force) circumstantial modal *ǰʷəŋ/ǰʷəm*. Tense does not provide temporal perspective for the epistemic modal *ʔiʔwawə/wəw’aʔ*; this will be discussed in section 12.3.2.4.

Examples (98-99) show that when the circumstantial modal appears with tense clitics, the clitics provide temporal perspective.

(98) *Hul’q’umi’num’*:

**Context:** *A mother and child went and looked at some scenery next to a fence on the edge of a cliff. When they got back in the car, the mother said:*

ʔəy	kʷə=ŋ=s	ʔəwə	niʔ-əxʷ	kʷiʔ	ʔə	t <sup>θ</sup>
good	DET=2SG.POSS=NMLZ	NEG	AUX-2SG.SUB.SBJ	climb	OBL	GNRL.DET
	qələxəctən	ǰʷəm=əł=č	ʔiʔ	hiləm.		
	fence	CIRC=PST=2SG.SBJ	COM	fall		

‘It’s good that you didn’t climb onto the fence, because you would have/might have fallen.’

(PAST TP)

(99) *SENĆOFEN*:

**Context:** *Right now I can’t walk, but the doctor says that next month I’ll be able to.*

AXEN TFE doctor ĆS XEN SEN SE ŠTEN.

ʔeǰəŋ tθə doctor k<sup>w</sup>=s ǰ<sup>w</sup>əŋ=sən=səʔ štəŋ

say GNRL.DET doctor DET=NMLZ CIRC=1SG.SBJ=FUT walk

‘The doctor said I will be able to walk.’

(FUTURE TP)

As predicted by the fact that overt tense marking is optional, circumstantial clauses with no overt tense can have future temporal perspective. In (100), the future clitic *səʔ* is optional.

(100) *SENĆOFEN*:

AXEN TFE doctor ĆS XEN SEN (SE) ŠTEN

ʔeǰəŋ tθə doctor k<sup>w</sup>=s ǰ<sup>w</sup>əŋ=sən(=səʔ) štəŋ

say GNRL.DET doctor DET=NMLZ CIRC=1SG.SBJ(=FUT) walk

EĆS YE,Á,WE ŁKÁLC.

ʔə=k<sup>w</sup>=s yəʔewə lqelč

OBL=DET=NMLZ coming moon

‘The doctor said I will be able to walk in the next month.’

(FUTURE TP)

In (99-100), *ǰ<sup>w</sup>əm* gets an ability reading and has future temporal perspective, since the time that the modal base will be evaluated is in the future. The speaker claims that in the future certain

circumstances (she has her cast off, and her leg is healed) will allow for the possibility of walking. It is not always possible to distinguish between present and future TP, but here the context makes it clear that the speaker does not have the ability to walk in the present. We assume that the temporal orientation is also future, as with circumstantial modals generally. Thus, it may appear possible that the future clitic in (99-100) is indicating future temporal orientation, not perspective. However, that cannot be the case, since the future clitic is infelicitous when the temporal perspective is non-future:

- (101) XEN SEN SE I ŠTEN.  
 ʃˈwəŋ=sən=səʔ ʔiʔ štəŋ  
 CIRC=1SG.SBJ=FUT COM walk  
 ‘I will be able to walk.’ / # ‘I can walk.’

Overt past tense is required to get past temporal perspective for all examples tested, as shown in (102), which cannot have past TP.

- (102) SEN COFEN:  
XEN I TWENEK.  
 ʃˈwəŋ ʔiʔ ʔxˈwənəq  
 CIRC COM win  
 ‘They could win.’ / # ‘They could have won.’ (PRESENT TP ONLY)

This may be due to the fact that all of these examples are counterfactual; further research is required to determine whether past tense is required for past TP in non-counterfactual circumstantial sentences.

### 12.3.2.3 Temporal orientation of circumstantials

With respect to the temporal orientation of circumstantial modals, SENĆOTEN and Hul'q'umi'num' behave like several other languages in that there is no separate marker of temporal orientation. Temporal orientation is always future, yet no marker of futurity is used in circumstantial clauses. This is a systematic Diversity Condition effect: circumstantial modals seem to be inherently future-oriented. This matches the strategy we saw in section 12.2 for St'át'imcets, Mandarin and Ktunaxa.

(103) *Hul'q'umi'num'*:

m̥i    nəw̥-əš    t<sup>θ</sup>ə    pipə,    ʃ<sup>w</sup>əm    ʔiʔ    ləməx<sup>w</sup>    ʔə    təna    snet  
come go.in-TR DET paper CIRC COM rain OBL PROX.DEM night  
'Bring the paper in, because it might rain tonight.'

### 12.3.2.4 Areas where SENĆOTEN and Hul'q'umi'num' modals do not fit the null hypothesis

There are three ways in which SENĆOTEN and Hul'q'umi'num' do not fit the null hypothesis. First, unlike with the circumstantial modal, tense does not provide temporal perspective in clauses with the epistemic modal *ʔiʔwawə/wəwəʔ*. Second (relatedly), Reading C is not available. And third, temporal orientation in epistemic clauses is not provided by aspect. Each of these properties is discussed here. We will argue that they all result from the fact that the epistemic modal *ʔiʔwawə/wəwəʔ* always scopes higher than tense; i.e., there is no tense node above the modal.

First, SENĆOTEN and Hul'q'umi'num' appear not to allow a past temporal perspective (Reading C) for epistemic modals. Instead, the epistemic modal always has a present temporal perspective. In Reading C contexts, speakers of both languages either give a non-modal sentence, or embed the epistemic modal under an attitude predicate like *think*. This is shown here for past,



present and future temporal orientations. (104) is a variation on von Fintel and Gillies' (2008:81) ice-cream example from (4) above. For Hul'q'umi'num', this context prompted the use of the attitude verb *št'e:wən* 'think'. The epistemic modal can but need not be used; if it is used it is embedded under this attitude verb.

(104) *Hul'q'umi'num'*:

**Context:** *I can't find my keys and start looking around, including looking in the fridge. You ask me why I looked in the fridge. I reply:*

ʔi=cən	št'e:wən'	wəw'aʔ	niʔ=cən		
AUX=1SG.SBJ	think	EPIS	AUX=1SG.SBJ		
ʔiʔel	nəw'-əš	ʔə	t <sup>θ</sup>	šχey'λ'əl's.	
expected	go.in-TR	OBL	GNRL.DET	fridge	

'I thought I may have put it in the fridge.' (based on von Fintel and Gillies 2008:81)

An attempted Reading C with present orientation is given in (105). If the speaker already knows that Fluffy is a snake, then the modal must be embedded under *št'éwən* 'think' (or the SENĆOFEN equivalent).

(105) *Hul'q'umi'num'*:

**Context:** *You bought a bone for your friend's pet snake Fluffy, and he asks you why.*

ʔi=cən	št'e:wən	wəw'aʔ	peʔ	sqwəmey	k <sup>w</sup> θə	Fluffy.	ʔəwəteʔ
AUX=1SG.SBJ	think	EPIS	indeed	dog	REM.DET	Fluffy	not.any
nə	š-ta~təl-stəx <sup>w</sup>		ʔəw'	stem-əs	k <sup>w</sup> θə	Fluffy.	
1SG.POSS	NMLZ-IPFV~know-CAUS		CONTR	what-3SUB.SBJ	REM.DET	Fluffy	

‘I thought that maybe Fluffy is a dog. I don’t know what Fluffy is.’

(TFS 2012, ‘Feeding Fluffy’)

The attitude verb is interpreted with a past perspective in (104-105); the speaker’s belief that the keys were in the fridge or that Fluffy was a dog is in the past. However, note that the past tense does not occur in the matrix clause containing the attitude verb. It is possible to use the optional past tense marker, as shown by (106), though this has not been extensively tested.<sup>18</sup>

(106) *Hul’q’umi’num’*:

nił	k <sup>w</sup> θə	Oliver	niʔ	k <sup>w</sup> ənət	lə̀na	sləpəs.	<i>ʔi:t=cən</i>
3EMPH	DET	Oliver	AUX	take-C.TR	DEM	slippers	<i>AUX:PST=1SG.SBJ</i>
ʃte:wən̩	k <sup>w</sup> =s	nił=s		k <sup>w</sup> θə	nə̀caʔ	sq <sup>w</sup> əmey̩	
think	DET=NMLZ	3EMPH=NMLZ	DET	one	dog		
	niʔk <sup>w</sup> ən-ət	lə̀na	sləpəs.	ʔəwə	nił-əs	k <sup>w</sup> θə	Oliver.
	AUXtake-C.TR	DEM	slippers.	NEG	3EMPH-NEG	DET	Oliver.

‘It was Oliver that took my slippers. I thought that it may have been the other dog that took them, not Oliver.’

A sentence where the modal is not embedded, as in (107), is only compatible with a context where the friend still does not know what kind of animal Fluffy is.

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<sup>18</sup> The past tense appears on the auxiliary *ʔi*, rather than the verb. This is due to a syntactic property of tense in both Halkomelem and Northern Straits, which always appears on the clause initial auxiliary, if there is one.

(107) *Hul'q'umi'num'*:

**Context:** *You don't know what kind of animal your friend's pet is.*

<i>wəwəʔ</i>	<i>sqʷəmey</i>	<i>kʷθə</i>	Fluffy.	<i>ʔəwəteʔ</i>	<i>nə</i>
<i>EPIS</i>	dog	REM.DET	Fluffy	not.any	1SG.POSS
	<i>š-ta~təl~stəxʷ</i>		<i>ʔəw'</i>	<i>stem~əs.</i>	
	NMLZ-IPFV~know-CAUS		CONTR	what-3SUB.SBJ	

'Maybe Fluffy is a dog. I don't know what he is.' (TFS 2012, 'Feeding Fluffy')

A Reading C context with future temporal orientation is given in (108); this morning it was an epistemic possibility that it would rain later in the day, based on the speaker's observation of clouds in the sky. Again, an attitude predicate is used: *šʷənəkʷen* 'think'.

(108) *SENĆOFEN*:

<i>QENNEW SEN</i>	<i>TTE</i>	<i>SNOUES</i>	<i>E</i>	<i>TI,Á</i>	<i>ØEĆIL.</i>
<i>kʷən-nəxʷ=sən</i>	<i>tθə</i>	<i>snawəs</i>	<i>ʔə</i>	<i>tiʔe</i>	<i>kʷəčil</i>
see-NC.TR=1SG.SBJ	GNRL.DET	clouds	OBL	PROX.DEM	morning
<i>ĀXENEĆÁN SEN</i>	<i>ĀLEMEW SE.</i>				
<i>šʷənəkʷen=sən</i>	<i>ləməxʷ=səʔ</i>				
<i>think=1SG.SBJ</i>	<i>rain=FUT</i>				

<i>ØIL</i>	<i>TTE</i>	<i>SKEKEL</i>	<i>I</i>	<i>EWENE</i>	<i>SLEMEW.</i>
<i>kʷil</i>	<i>tθə</i>	<i>sqʷəqʷəl</i>	<i>ʔiʔ</i>	<i>ʔəwənə</i>	<i>s-ləməxʷ</i>
appear	GNRL.DET	sun	COM	not.any	NMLZ-rain

'This morning I saw some clouds and I thought it was going to rain. Then the sun came out and it didn't rain.'

When tense appears in clauses containing the epistemic modal *ʔiʔwawə/wəwəʔ*, it does not indicate temporal perspective. Since Reading C is unavailable, the temporal perspective is always the utterance time, or the reference time associated with an attitude predicate in a higher clause. The tense clitics instead appear – unexpectedly – to indicate temporal *orientation* when they co-occur with the epistemic modal *ʔiʔwawə/wəwəʔ*. (109) is an example of this with past TO, and (110) is an example with future TO.

(109) *Hul’q’umi’num’*:

**Context:** *When you go out to the field, take a blanket to spread...*

<i>wəwəʔ</i>	<i>ʔi:l</i>	<i>ləməx<sup>w</sup></i>	<i>ʔə</i>	<i>k<sup>w</sup>əña</i>	<i>netəl,</i>
<i>EPIS</i>	<i>AUX;PST</i>	rain[IPFV]	OBL	REM.DEM	morning
	<i>ʔi=çtwaʔ</i>	<i>ləq<sup>w</sup></i>	<i>t<sup>θ</sup>ə</i>	<i>saχ<sup>w</sup>əl.</i>	
	AUX=EVID	wet	GNRL.DET	grass	

‘...it may have been raining earlier, and the grass might be wet.’

(110) *SENĆOFEN*:

**Context:** *We look outside and there are lots of dark clouds.*

<i>I WOVE</i>	<i>JÁN SE</i>	<i>U</i>	<i>ĆEK</i>	<i>ŁEMEW</i>	<i>ENÁ,E.</i>
<i>ʔiʔ wawə</i>	<i>č̣en=səʔ</i>	<i>ʔuʔ</i>	<i>čəq</i>	<i>ləməx<sup>w</sup></i>	<i>ʔəne&lt;ʔə&gt;</i>
<i>EPIS</i>	really= <i>FUT</i>	CONTR	big	rain	come<IPFV>

‘A really big rainfall must be coming here.’

Both of these examples contain overt tense clitics. However, since overt tense is optional in *SENĆOFEN* and *Hul’q’umi’num’*, epistemic clauses with no overt tense clitic can also have past

(111) or future (112) temporal orientation, in addition to present orientation.

(111) *SENĆOFEN*:

**Context:** *I left a bowl of cherries on the table and when I got back the bowl was empty.*

<i>I</i>	<i>WOWE</i>	NIE	FE	Claire	NOT	TFE	cherries
<i>ʔiʔ</i>	<i>wawə</i>	nił	θə	Claire	ŋa-t	tθə	cherries
<i>EPIS</i>	3PRED	F.DET	Claire	eat-C.TR	GNRL.DET	cherries	

‘Maybe it was Claire that ate the cherries.’

(112) *Hul’q’umínum’*:

<i>ʔəy</i>	<i>k<sup>w</sup>ə=ni=s</i>	<i>ʔiləqəłs</i>	<i>ʔə</i>	<i>k<sup>w</sup>θə</i>
good	DET=2SG.POSS=NMLZ	buy	OBL	REM.DET
<i>ǰəłə-st-əṃ</i>		lotterytickets,	<i>wəw’aʔ</i>	<i>ǰx<sup>w</sup>ənəq=č</i>
say[IPFV]-CAUS-PASS	lottery.tickets	<i>EPIS</i>	win=2SG.SBJ	

‘You better buy some lottery tickets. You might win.’

We have shown that tense indicates temporal orientation in *SENĆOFEN* and *Hul’q’umi’num’* modal claims containing *ʔiʔwawə/wəw’aʔ*. This appears to go against our null hypothesis that temporal orientation is determined by aspect. However, it does not actually go against the spirit of our analysis, which states that the reason temporal orientation is normally determined by aspect is that aspect is a lower temporal operator, scoping under the modal. This will be discussed in section 12.4 below.

### 12.3.3 Atayal

Atayal has several modals, all of which lexically distinguish between modality type and quantificational strength. This section shows that the circumstantial possibility modal *blaq* fits our null hypothesis: its temporal perspective is provided by tense, and its temporal orientation is provided by aspect, with the restriction that past TO is not possible, following Condoravdi's (2002) Diversity Condition. In addition, Atayal has circumstantial modals specialized for deontic and ability readings, both of which behave like *blaq* except that ability modals can be marked with overt aspect, yielding predictable aspectual interpretations; see Chen (in prep.) for details. The epistemic modals in Atayal, however, use different strategies for TP and TO; this will be addressed in 12.3.3.4.

#### 12.3.3.1 Tense and aspect

Like many other Formosan languages, Atayal exhibits a grammatical distinction between future and non-future (Zeitoun et al. 1996). Future is obligatorily indicated either by the prefix *p-* in active voice, by reduplication of the first consonant of the verb stem in non-active voice, or by means of an auxiliary *musa'*. (113) and (114) give examples of the morphological strategies and the auxiliary *musa'* respectively.

- (113) a. *\*(p-)qwalax.* ACTOR VOICE  
*\*(PROSP.AV-)rain*  
'It will rain.'
- b. *\*(t-)thaygal-an ni tali' laqi' qasa.* NON-ACTOR VOICE  
*\*(PROSP-)bully-LV ERG Tali' child that*  
'Tali will bully that child.'

- (114) a. *\*(musa')* m-qwalax. ACTOR VOICE  
*\*(PROSP)* AV-rain  
 'It will rain.'
- b. *\*(musa')* thaygal-an ni tali' laqi' qasa. NON-ACTOR VOICE  
*\*(PROSP)* bully-LV ERG Tali' child that  
 'Tali will bully that child.'

Non-future tense distinctions are not overtly marked on the verb but partially depend on the viewpoint aspect. Imperfective aspect is aspectually unmarked: a stative can have a past or present interpretation, as shown in (115), and an eventive can have a past or present (non-progressive) episodic interpretation, as shown in (116).<sup>19</sup> A progressive reading uses an additional marker *cyux/nyux*, with different forms indicating spatial deixis, which can be interpreted as either past or present as well, as shown in (117).

- (115) m'uy=saku' la. STATIVE  
 tired=1S.ABS PART  
 'I am tired.' / 'I was tired.'

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<sup>19</sup> Zeitoun et al. (1996) claim that the unmarked eventives in Squliq (Wulai variant) can have a present progressive reading. The progressive reading is, however, absent for the speakers consulted in this paper. The unmarked form instead allows a past/present unbounded, rather than progressive, interpretation with an accomplishment or activity predicate.

(116) m-nbuw tali'. EVENTIVE

AV-drink Tali'

'Tali' is drinking.' / 'Tali' drank.'

(117) nyuw/cyiw m-nbuw tali'.

PROG.PROX/PROG.DIST AV-drink Tali'

'Tali' is drinking (here/over there).' / 'Tali' was drinking (here/over there).'

Perfective aspect is overtly marked with *wal/wayal*, and perfective marked predicates are only compatible with a past interpretation, as shown in (118). There is also a dedicated marker *-in/-n-* for experiential perfect, as shown in (119a), and for anteriority of an adverbial event, as in (119b).

(118) wal niq-un ni tali' qulih qasa.

PFV eat-PV ERG Tali' fish that

'Tali' ate that fish.' / ≠ 'Tali' is eating that fish.'

(119) a. q<m><n>alup mit sraral hiya'.

hunt<AV><PRF> goat before 3S.ABS

'He has hunted goats before.'

b. m-<in>aniq=saku' kira' lga, p-tzyuwaw=saku' la.

AV-<PRF>eat=1S.ABS today.later PART.TOP PROSP.AV-work=1S.ABS PART

'After I eat, I will work.'

We assume that Atayal possesses a phonologically null non-future tense morpheme, which can



contribute either a past or present reference time, and we leave the question open whether the perfective aspect *wal/wayal* lexically encodes pastness or whether the pastness is attributed to a finer tense distinction. This covert tense can combine with prospective aspect to give a future reading. The prospective is an aspect marker rather than a tense, as it can order the event time after a present reference time, as shown in (113-114) above, or a past reference time, as in (120).

(120) *baq-un=nya' mha musa' h<m>swa' m-qyanux m-aki' qsahuy na hlahuy.*  
 know-PV=3S.ERG COMP *PROSP* how<AV> AV-live AV-be inner GEN forest  
 'He knew how he would live inside the forest.'

(Yuqih and Yupas 1991:53, cited by Huang 2008:30)

### 12.3.3.2 Temporal perspective is given by tense with circumstantial modals

In this section, we focus on the circumstantial possibility modal *blaq*. This modal is usually interpreted with a present temporal perspective. For example, (121) talks about the possibility of staying here, based on relevant facts which hold at the utterance time.

(121) **Context:** *You visit your friend and talk to the extent that you forget the time. Your friend offers:*

*blaq m-'abi=su' sqa.*  
*CIRC.POS AV-sleep=2S.ABS here*  
 'You can stay here (if you like).'

The modal *blaq* is also compatible with a past temporal perspective. In (122), the context describes what might have happened (and actually happened), given the relevant facts at some time in the past;

present TP is not available since the speaker is no longer allowed to take the road.

(122) **Context:** *You are driving to the road that you usually take but a policeman prevents you from taking the same road today.*

*blaq*    wah-an sa    wayal hrwa, swa' ini' baq-i    m-usa'=misu    qa    la?  
CIRC.POS go-LV    LOC PFV    PART why NEG able-NEG AV-go=1S.ERG.2S.ABS here PART  
'I could go this way before! Why can't you let me go now?'

The data above show that in the absence of overt marking, *blaq* is ambiguous between a present and past temporal perspective. In analogy to the present/past ambiguity of an aspectually unmarked predicate in Atayal, this is what we expect if tense provides the temporal perspective of *blaq*.

Future TP is overtly marked by the prospective *musa'* above the modal. (123) shows that *musa'* is obligatorily required when there is no possibility at the utterance time of a future event but it will become a possibility at some future time. Note that *blaq* cannot co-occur with the other overt aspects; both progressive and perfective markers are incompatible with *blaq*.

(123) **Context:** *Although you don't have money, you will get a job soon, and then you will have money.*

\*(*musa'*) *blaq*    m-bazi=su'    sa    ana    nanu sawyan=su'.  
\*(*PROSP*) CIRC.POS AV-buy=2S.ABS LOC even what like-LV=1S.ERG  
'You will be able to buy whatever you like (if you have a job).'

To summarize, the modal *blaq* is compatible with both a past and present temporal perspective without overt marking, and with future temporal perspective with the prospective *musa'*. This is

what we expect if the temporal perspective of *blaq* is provided by tense.

### 12.3.3.3 Temporal orientation given by the Diversity Condition

The temporal orientation of the circumstantial modal *blaq* displays a Diversity Condition effect: it is always future-oriented. Moreover, as shown in (124-125), future temporal orientation for *blaq* does not permit overt marking of futurity: neither the auxiliary *musa'* nor a morphological prospective aspect is allowed. This is a similar effect to that seen with SENĆOŦEN/Hul'q'umi'num' above, and with St'át'imcets and Mandarin in section 12.2.

(124) **Context:** *Your children ask your permission to go out. You say:*

aw, *blaq* {m-usa'/\*m-awsa'}=simu g<m>naw.

yes, *CIRC.POS* {AV-go/\*AV-go.PROSP}=2PL.ABS play<AV>

'Sure, you can go to play.'

(125) **Context:** *Given that you want to be thinner, ...*

*blaq* (\**musa'*) spng-un cikay qa-qaniq.

*CIRC.POS* (\**PROSP*) control-PV a.bit NMLZ-eat

'You can control your food.'

### 12.3.3.4 Areas where Atayal modals do not fit the null hypothesis

When we turn to Atayal epistemic modals, we see a departure from our null hypothesis. In this section, we show that the epistemic possibility modal *ki'a* behaves differently from circumstantial possibility modals in the language with respect to TP and TO, and shows similarity to the SENĆOŦEN/Hul'q'umi'num' data. It is the temporal orientation, rather than the temporal

perspective, of *ki'a* which patterns in a parallel fashion to temporal reference in non-modal claims. The temporal perspective appears to be always present (that is, C-readings do not exist).

Given our null hypothesis that tense provides the temporal perspective of modals, and the fact that tense in Atayal displays a future vs. non-future distinction, as discussed in section 12.3.3.1, we expect that the epistemic modal *ki'a* should allow present and past TPs with a null tense. Nevertheless, past temporal perspective for the epistemic modal *ki'a* (i.e., Reading C) preferably arises only if the modal is embedded under an attitude predicate, usually *maha=saku* 'I thought'. Examples are given in (126-128), where the prejacent is only compatible with a previous epistemic state, as the speaker is aware at the present time that the prejacent is not true anymore.

(126) **Context:** *It was very cloudy when I left home to go to school this morning so I brought my umbrella. But it turns out to be sunny later all the day. My classmate asks me why I brought my umbrella. I say:* (adapted from Matthewson 2013:366)

*ki'a* p-qwalax ??(*maha=saku*).

EPIS.POS PROSP-rain ??(*say=IS.ABS*)

'I thought it might rain.'

(PAST TP, FUTURE TO)

(127) **Context:** *When you sat in the office earlier today, you heard water pouring, so it sounded like it was raining. But you found out later it was the operating sound of your fan. (modified from Matthewson 2013:363)*

*ki'a* cyux m-qwalax tanux la ??(*maha=saku*).

EPIS.POS PROG.DIST AV-rain outside PART ??(*say=IS.ABS*)

'I thought it might be raining.'

(PAST TP, PRESENT TO)

(128) **Context:** *You saw your classmate leaving the class in pouring rain and the next morning she's absent from class. You thought she might get sick from the rain and told the teacher. Later in the afternoon, she showed up and asked why you said that.* (adapted from Matthewson 2013:366)

*ki'a=su' wal m-nbu' ??(maha=saku').*

*EPIS.POS=1S.ABS PFV AV-sick ??(say=1S.ABS)*

'I thought you might have gotten sick.'

(PAST TP, PAST TO)

The unavailability of past temporal perspective suggests that the TP of the Atayal epistemic modal *ki'a* is not provided by tense; instead, it is always present with respect to the utterance time or the reference time of a higher attitude predicate.

Turning to temporal orientation, recall that Atayal has a covert non-future tense, which picks out either a present or past reference time. The covert tense can combine with prospective aspect to give future interpretation. This tense system is directly parallel to the temporal orientation of the epistemic modal *ki'a*. The presence of prospective aspect under *ki'a* obligatorily gives future TO, as shown in (129).

(129) a. *ki'a musa' m-s'ang.*

*EPIS.POS PROSP AV-scold*

'He might scold / ≠ He might be scolding / ≠ He might have scolded.'

b. *ki'a p-ks'ang.*

*EPIS.POS PROSP.AV-scold*

'He might scold / ≠ He might be scolding / ≠ He might have scolded.'

In the absence of the prospective, an aspectually unmarked eventive prejacents allows for past TO, as shown in (130). While present TO requires the progressive aspect, a progressive-marked prejacents is also compatible with a past TO, as shown in (131-132).

(130) *ki'a*        *m-qwalax*        (*ssawni'/??misu/\*kira'*).

*EPIS.POS*    *AV-rain*        *today.earlier'/??now/\*today.later*

'It might have rained (just now) / ??It might be raining (now) / ≠ It might rain (later).'

(PRESENT TP, PAST TO)

(131) **Context:** *You hear pattering when you are sitting in front of your laptop.*

*ki'a*        *cyux*        *m-qwalax*.

*EPIS.POS*    *PROG.DIST*    *AV-rain*

'It might be raining.'

(PRESENT TP, PRESENT TO)

(132) **Context:** *You wonder why you didn't see your cousin Tali' when you came to your uncle's place yesterday.*

*m-wah=saku'*    *shira'*        *ga, ki'a*        *cyux*        *m-'abi*    *qu*    *tali'*.

*AV-come=1S.ABS*    *yesterday*    *TOP*    *EPIS.POS*    *PROG.DIST*    *AV-sleep*    *ABS*    *Tali'*

'When I came yesterday, Tali' might have been sleeping.'

(PRESENT TP, PAST TO)

Moreover, perfective aspect under the modal always yields a past TO, as shown in (133), just like with non-modal claims.

(133) **Context:** *You hear that Tali' and Rimuy have a baby but you can't remember when they got*

*married. You recall they held a party last year, which you didn't attend.*

*ki'a wal msqun sa kawas wayal.*

*EPIS.POS PFV combine.AV LOC year past*

'They might have gotten married last year.

(PRESENT TP, PAST TO)

We can thus conclude that the temporal orientation of the epistemic modal *ki'a* is given by tense, rather than by aspect as predicted by our null hypothesis. We will explain below that this is, however, expected given that the syntactic position of the epistemic modal is higher than tense, and tense only scopes under the modal.

#### 12.3.4 Summary

In this section we discussed modals in Blackfoot, SENĆOŦEN, Hul'q'umi'num' and Atayal. For the most part, the modals pattern as we expect given our null hypothesis: tense encodes temporal perspective, while aspect encodes temporal orientation. We also saw that patterns of temporal orientation differ in a predicted way from the aspectual patterns in non-modal claims, due to the influence of Condoravdi's Diversity Condition. We saw different strategies to satisfy the Diversity Condition. Blackfoot *aahkama'p-*, like Dutch *kunnen* and German *können*, avoids circumstantial modals with non-future temporal orientations by shifting to an epistemic flavour.

SENĆOŦEN/Hul'q'umi'num' *ǰʷəŋ/ǰʷəm* and the Atayal modal *blaq* allow for future orientations without overt prospective/future morphology, just like the St'át'imcets modal *ka-...-a*, the Mandarin modal *kěyǐ*, and Ktunaxa *taʔ*.

We also saw several respects in which the languages deviate from our null hypothesis. We turn to discussion of these in the next section.

## 12.4 Diverging from the null hypothesis: tense and temporal orientation

In the previous section we saw three cases where, contrary to our null hypothesis but consistent with Condoravdi's (2002) initial assumption, epistemic modals disallow past temporal perspectives unless they are embedded under a higher attitude predicate. These modals thus do not behave as if their temporal perspective is given by tense. SENĆOFEN *ʔiʔwawə*, Hul'q'umi'num' *wəw'aʔ*, and Atayal *ki'a* further pattern together in that their preadjacent's temporal *orientation* patterns as if determined by tense. We will suggest that these three deviations from the null hypothesis result from a single property of the particular epistemic modals discussed in this section: they always scope higher than tense.

In discussion of SENĆOFEN and Hul'q'umi'num' epistemic modals, Turner (2013) suggests that the restriction on Reading C is not due to their being epistemic modals, but rather to their syntactic properties, which differ from that of the circumstantial modal *ǰʷəŋ/ǰʷəm*. Recall that the tense markers in SENĆOFEN and Hul'q'umi'num' are second position clitics. As such, they cliticize to the main verb of the clause, or, if there is an auxiliary, to the auxiliary. The circumstantial modals *ǰʷəŋ/ǰʷəm* are auxiliaries, and so the second position clitics, including past and future tense, cliticize to them.

(134) *Hul'q'umi'num'*:

...ǰʷəm=əʔ=č            ʔiʔ    hiləm.

...CIRC-PST=2SG.SBJ    COM    fall

‘...you would have/might have fallen.’ (from (98) above)

*ǰʷəŋ/ǰʷəm* are thus similar to Dutch *kunnen* (discussed in section 12.2) in that they are directly in the scope of tense.



The epistemic modals *ʔiʔwawə/wəwəʔ* are different. They are not verbs or auxiliaries and so never take second position clitics. When they appear in a clause, the second position clitics are cliticized to the verb (or auxiliary).

(135) *SENĆOFEN*:

... *wəwəʔləmæx<sup>w=ce</sup> ʔə təna snet*  
 ... *EPIS rain=FUT OBL PROX.DEM night*  
 ‘... it might rain tonight.’ (from (103) above)

In work on *SENĆOFEN*, the epistemic modal has been termed a ‘pre-predicate particle’ (Montler 1986), which is a pretheoretical term capturing the fact that it always appears before the main verb/auxiliary of the clause. In terms of its semantic scope and its syntactic position, it is similar to the English modal adverbs *maybe* and *perhaps*. Notice that English *maybe* behaves like *ʔiʔwawə/wəwəʔ* with respect to temporal perspective too: unlike *might*, it is unable to get a past temporal perspective. This is illustrated in (136).

(136) **Context:** *Sophie is looking for some ice cream and checks the freezer. There is none in there. Asked why she opened the freezer, she replies:*

- a. There *might have* been ice cream in the freezer. (von Stechow and Gillies 2008:87)
- b.# *Maybe* there was ice cream in the freezer.
- c. I thought *maybe* there was ice cream in the freezer.

One of the claims of this paper is that modals are not inherently temporally restricted. In particular, both epistemic and circumstantial uses are compatible with past or present temporal perspective.

The failure of the epistemic modals *ʔiʔwawə/wəw'aʔ* to allow past TP appears at first to weaken our claims; however, if the syntactic properties of the epistemic modals are taken into consideration, the facts actually support our basic framework. We have suggested that, as an adverb (or pre-predicate particle), *ʔiʔwawə/wəw'aʔ* always scopes over the entire clause and thus always scopes above tense. This means that tense will always indicate temporal *orientation* for *ʔiʔwawə/wəw'aʔ*. The temporal perspective of *ʔiʔwawə/wəw'aʔ* then comes from the context; it is tied to the utterance time in regular extensional contexts, the current narrative time in narrative contexts, and the reference time of the higher clause in intensional contexts. This can be achieved via a temporal index in the lexical semantics of the epistemic modal, as in Absuch's (1997) analysis of *might*; the index can be free and thus the TP is interpreted as present to the utterance time, or it can be bound by the temporal reference of a higher attitude predicate.

Lastly, consider temporal orientation, which appears to be provided by tense. Since *ʔiʔwawə/wəw'aʔ* is unable to scope under tense, tense scopes under the modal and over aspect. Therefore, tense performs the same role that it does in non-modal sentences: it restricts the reference time of the aspect-inflected main predicate with respect to the evaluation time  $t_0$ . This temporal location also indicates the temporal orientation because in epistemic claims containing *ʔiʔwawə/wəw'aʔ*, the temporal perspective is always at  $t_0$ . Thus, the relationship between  $t_0$  and the reference time is the same as the relationship between the temporal perspective and the reference time (temporal orientation), and tense indicates the temporal orientation as a result. For further details, see Turner (2013).

The same explanation holds for Atayal's epistemic modal *ki'a*, which (unlike the Atayal circumstantial modal *blaq*) resists past TP and has its TO determined by tense. The difference can again be attributed to the syntactic positions of the two types of modals. Independent evidence for this proposal comes from the relative position of the two modals and the prospective auxiliary

*musa'*. The epistemic modal *ki'a* always precedes *musa'*, as shown in (137), whereas the circumstantial modal *blaq* always follows *musa'*, as shown in (138) (repeated from (123)). Crucially, the lower-scoping *musa'* provides the epistemic modal with future TO, while the higher-scoping *musa'* provides the circumstantials with future TP.<sup>20</sup>

(137) **Context:** *You are watching a game, and in the middle part, the team which was falling behind starts to score.*

*ki'a        musa'    l<m>aqux    la.*

*EPIS.POS    PROSP    win<AV>    PART*

'They might win.'

(PRESENT TP, FUTURE TO)

(138) **Context:** *Although you don't have money, you will get a job soon, and then you will have money.*

*musa'    blaq        m-bazi=su        sa    ana    nanu    sawyan=su.*

*PROSP    CIRC.POS    AV-buy=2S.ABS    LOC    even    what    like-LV=1S.ERG*

'You will be able to buy whatever you like (if you have a job).'

(FUTURE TP, FUTURE TO)

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<sup>20</sup> The proposed analysis that there is a null (past/present) tense projection under epistemic modals and above aspects not only predicts past TO without overt tense marking and with progressive aspect (as in (130) and (132) above), but also predicts the combination of past/present tense and prospective aspect, which would give rise to future TO with the event time either after the utterance time or after some earlier time. We expect both readings to exist, although we have so far demonstrated the first reading only (see (129) above). We leave this issue for further research, and we thank an anonymous reviewer for raising the question.

Finally, the same explanation for the absence of Reading C can be extended to Blackfoot *aahkama'p-*, although at this time there is no independent evidence that *aahkama'p-* differs syntactically from other modals in the language. We leave this for further research. What is clear is that while the null hypothesis holds generally, there are still syntactic/lexical restrictions on specific modals within languages.

## 12.5 Conclusion

Condoravdi's (2002) influential analysis of English possibility modals has inspired much subsequent research, but has so far not been systematically subjected to cross-linguistic testing. In this paper we tested a generalized version of Condoravdi's proposal in 12 languages from seven families. Our results significantly expand the available empirical coverage in the area of modal-temporal interactions.

We advanced the hypothesis that a modal's temporal perspective is given by tense, and its temporal orientation is given by aspect. We provided evidence for this hypothesis from Dutch, German, Gitksan, St'át'imcets, Javanese, Mandarin and Ktunaxa. In section 12.3, we showed that Blackfoot, Atayal, SENĆOTEN and Hul'q'umi'num' appear to diverge from our null hypothesis in some respects; however, as we argued in section 12.4, these can be accounted for under a less restrictive version of the null hypothesis – i.e., that temporal operators scoping above a modal give its temporal perspective, and temporal operators scoping below a modal give its temporal orientation.

This is in fact exactly what we expect in a fully compositional account of modal-temporal interactions: a temporal operator that scopes below a modal, but above the modal's prejacent, binds the temporal argument introduced by the modal's prejacent, giving the prejacent's run-time; a temporal operator that scopes above a modal binds the temporal argument introduced by the modal,

giving the temporal perspective. While in most cases the temporal operators scoping above a modal are tenses, and the temporal operators scoping below a modal are aspects, as per the formulation of our original null hypothesis, this is not necessarily the case. Temporal operators that cannot scope below other elements will be bound by the discourse context and appear to have deictic semantics. They will thus be categorized as tenses. Temporal operators that can scope below modals and deictic temporal operators, on the other hand, are more likely to be categorized as aspects. Languages that can use the same temporal operators for both tense and aspect (i.e., for indicating both deictic and non-deictic temporal relations), however, should allow their temporal operators to encode either temporal perspective when they scope above a modal, or temporal orientation when they scope below a modal. Modal-temporal interactions are driven by the principle of compositionality: by the meaning of the temporal operators, and the way they combine with the modal, not by whether the temporal operators have been categorized as tenses or aspects.

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## Appendix

*Gitksan* data are given in the orthography developed by Hindle and Rigsby (1973). *St'át'imcets* data are given in the orthography developed by Jan van Eijk; see van Eijk and Williams (1981).

*SENĆOŦEN* data are given in the community orthography and the Americanist Phonetic Alphabet.

*Hul'q'umi'num'* data are given in the APA.

We follow the Leipzig Glossing Rules where possible. Other morpheme glosses are as follows.

I/II/III = series I/II/III pronoun, ACT = active intransitive, ADD = additive particle, ATT = attributive, AV = Actor Voice, AX = A (transitive subject) extraction, C=control, CF = counterfactual morphology, CIRC=circumstantial, CN = common noun connective, CNTR = contrastive, CONJ = conjunction, CONTR = contrastive conjunction, COUNTER = counter to expectations, DETR = detransitive, DIR = directive transitivizer, DISC = discourse particle, DM = determinate, DTP = distinct third person pronoun, EPIS = epistemic, EVID = evidential, EXIS = assertion of existence, GNRL = general, HYP = hypothetical, IMPERS = impersonal, INAN = inanimate nominal, INCEP = inceptive, INCH = inchoative, INTS = intensifier, NTS = intensifier, LV = locative voice, MED = medial, MID = middle, NC = non-control, ND = non-deictic, NECESS = necessity, NONAFF = non-affirmative verbal clitic, PART = particle, PN = proper noun, POS = possibility, PRED = predicative, PRON = pronoun, PROSP = prospective, PROX = proximal, PTCP = participle, PV = patient voice, REDUP = reduplication, REM = remote, REPORT = reportative, SPT = spatio-temporal, SUB = subordinate, T = 'T' suffix, UNR = unreal clause-type, VAI = animate (subject) intransitive verb, VII = inanimate (subject) intransitive verb, VTI = animate (subject) inanimate (object) verb, VTA = animate (subject) animate (object) verb, X>Y = X acting on Y theme marker (where X,Y = {1,2,3,3',0} for 1st, 2nd, 3rd person proximate, 3rd person obviative and inanimate entities respectively), YNQ = yes-no question.