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>
<thead>
<tr>
<th>reading</th>
<th>conversational background</th>
<th>temporal perspective (TP)</th>
<th>TP given by</th>
<th>temporal orientation (TO)</th>
<th>TO given by</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>epistemic</td>
<td>present</td>
<td>present tense</td>
<td>past</td>
<td>low <em>have</em></td>
</tr>
<tr>
<td>B</td>
<td>circumstantial</td>
<td>past</td>
<td>raised <em>have</em></td>
<td>future</td>
<td><em>might</em></td>
</tr>
</tbody>
</table>

(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>
<thead>
<tr>
<th>Reading</th>
<th>Conversational Background</th>
<th>Temporal Perspective</th>
<th>Temporal Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-past</td>
<td>epistemic</td>
<td>past</td>
<td>past</td>
</tr>
<tr>
<td>C-present</td>
<td>epistemic</td>
<td>past</td>
<td>present</td>
</tr>
<tr>
<td>C-future</td>
<td>epistemic</td>
<td>past</td>
<td>future</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>language</th>
<th>family</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Germanic (Indo-European)</td>
</tr>
<tr>
<td>Dutch</td>
<td>Germanic (Indo-European)</td>
</tr>
<tr>
<td>German</td>
<td>Germanic (Indo-European)</td>
</tr>
<tr>
<td>Mandarin</td>
<td>Sino-Tibetan</td>
</tr>
<tr>
<td>St’ai’imcets</td>
<td>Northern Interior Salish</td>
</tr>
<tr>
<td>Northern Straits Salish</td>
<td>Central Salish</td>
</tr>
<tr>
<td>Halkomelem</td>
<td>Central Salish</td>
</tr>
<tr>
<td>Gitksan</td>
<td>Tsimshianic</td>
</tr>
<tr>
<td>Blackfoot</td>
<td>Alqonquian</td>
</tr>
<tr>
<td>Ktunaxa</td>
<td>Isolate</td>
</tr>
<tr>
<td>Atayal</td>
<td>Austronesian (Formosan area)</td>
</tr>
<tr>
<td>Javanese</td>
<td>Western Malayo-Polynesian (Austronesian)</td>
</tr>
</tbody>
</table>

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.\footnote{Thomas (2014) argues that Diversity Condition effects extend to non-priority circumstantial modals more generally.} 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
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’ímcets (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’ímcets dialect (Carl Alexander, the late Beverley Frank, the late Gertrude Ned, and the late Rose Agnes Whitley) and the Lower St’át’ímcets 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).

*SENĆOTEN* 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. SENĆOTEN 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;
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).² 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):

\[
[[ N ]] = \lambda_{t<\cdot, \lambda_{p<\cdot}}. \exists t'[(t' < t) & p(t')] = \lambda_{t<\cdot, \lambda_{p<\cdot}}. \exists t'[t' \geq t & p(t')]
\]

\[
[[ P ]] = \lambda_{t<\cdot, \lambda_{p<\cdot}}. \exists t'[(t' < t) & p(t')]
\]

² 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, 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):

\[
\begin{align*}
(8) & \quad [[\text{IPFV}]] = \lambda t_{\varphi}. \lambda p_{\varphi,\varphi}. \exists e \left[ p(e) \land \tau(e) \subseteq t \right] \\
(9) & \quad [[\text{PFV}]] = \lambda t_{\varphi}. \lambda p_{\varphi,\varphi}. \exists e \left[ p(e) \land \tau(e) \supseteq t \right]
\end{align*}
\]

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

---

3 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 FC Chelsea 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
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):⁴

\[
(14) \quad \text{De sleutel-s hadd-en in de la kunn-en ligg-en} \quad \text{(Dutch)}
\]
\[
\text{the key-PL have-PST.PL in the drawer can-INF lie-INF}
\]
\[
\text{‘The keys might have been in the drawer.’} \quad \text{(PAST TP, PRESENT TO)}
\]

(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:

\[
(15) \quad \text{Context for (14)}:
\]

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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⁴ 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).

\[
\begin{align*}
(16) & \quad [<<x,t>,\lambda w [<<y,t>,\lambda t [<<v,t>,\{PFV/IPFV\} t \} [<<v,t>,\lambda e ... w,e ]]]]
\end{align*}
\]

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):

\[
(17) \quad \text{Als je thuis-kom-t, kann-en de sleutel-s in de la ligg-en}
\]

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).\(^5\)

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

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

\(^5\) \(21\) 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.
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:

   
   your son have.SUBJ.PST.SG DISC somebody shot.PST.PTCP have-INF can-INF (German)

b. Uw zoon had immer 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 könnt 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. \( \text{bax}=t \) Yoko
     \( \text{run} =\text{DM} \) Yoko
     ‘Yoko ran’ / ‘Yoko is running.’
     (Jóhannsdóttir and Matthewson 2007)

  b. \( \text{siipxw}=t \) James
     \( \text{sick} =\text{DM} \) James
     ‘James was sick’ / ‘James is sick.’

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

(26)  *(\text{dim}) \) ha'w=t James t’aahlakw
     *(\text{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).6

(28)  [[ NON-FUT; ]]\textsuperscript{\text{g,c}} is only defined if no part of g(i) is after t_c.
     If defined, [[ NON-FUT; ]]\textsuperscript{\text{g,c}} = 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).

6 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.
‘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=ima/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=ima=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’akhlw 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’akhw #(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’akhw 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’)

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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 \( \textit{dim} \), and this is what we find, as shown in (33-34) for epistemic \( \textit{ima(')}a \). The \( \textit{dim} \)-less version is only acceptable in contexts which support a past or present TO, and the version with \( \textit{dim} \) is only acceptable with future TO.

(33) \[ \text{yugw=} \textit{ima'=hl} \quad \text{siipxw-t} \]
\[ \text{IPFV=} \textit{EPIS=} \text{CN} \quad \text{sick-3SG.II} \]

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

\textbf{Contexts:}

\( \checkmark \) Why wasn’t Joe at the meeting yesterday? \quad \text{(PAST TO)}

\( \checkmark \) Why isn’t Joe here? \quad \text{(PRESENT TO)}

\# He’s wearing no coat in the rain, he might get sick. \quad \text{(FUTURE TO)}

(34) \[ \text{yugw=} \textit{ima'=hl} \quad \textit{dim} \quad \text{siipxw-t} \]
\[ \text{IPFV=} \textit{EPIS=} \text{CN} \quad \textit{PROSP} \quad \text{sick-3SG.II} \]

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

\textbf{Contexts:}

\# Why wasn’t Joe at the meeting yesterday? \quad \text{(PAST TO)}

\# Why isn’t Joe here? \quad \text{(PRESENT TO)}

\( \checkmark \) He’s wearing no coat in the rain, he might get sick. \quad \text{(FUTURE TO)}

(\text{Matthewson 2013})

With the circumstantial modal \( \textit{da'akhlxw} \), 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)  
\[
\begin{array}{cccc}
  da'akh\text{hlxw-}i-s & \text{Henry} & #(\text{dim}) & \text{jam-t} \\
  CIRC.POS-TRA-PN & \text{Henry} & #(\text{PROSP}) & \text{cook-3SG.II} \\
\end{array}
\]

‘Henry is able to cook.’ / ‘Henry was able to cook.’  
(Matthewson 2013)

The obligatoriness of *dim* with *da'akh\text{hlxw,* 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)  
\[
\begin{array}{c}
k'\acute{\text{c}}-\text{an'=lhkan} \\
\text{dry-DIR=1SG.SU} \\
\end{array}
\]

‘I dried it / I am drying it / ≠ I will dry it.’
(37) * k’ac-an’-lhkan nacw / zânucwem

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 kúkwpi7=kelh
know-DIR-3ERG NMLZ=Julianne [DET-IPFV-3POSS chief=PROSP

ta=skúza7=s=a] i=kwis=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 Stʼátʼimcets allows Reading C, as the epistemic modal here has a past temporal perspective.

(40) a. wa7=k’a sêna7 qwenûxw
IPFV=EPIS COUNTER sick
‘He may be sick.’ (Context: Maybe thatʼs why heʼs not here.)

(Rullmann et al. 2008:321)

b. **Context:** The Canucks were playing last night. You werenʼt 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-tsunami’-cal=llkán-a=t’u7
sick=1SG.SU when.PST=day=3SGV 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=wi=k’a skánas, cw7aoz kw=s=áts’ex-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 te’úm=kelh=tu7 i=telh-álw-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).

\[(44)\] \[plan=lhkan t'cum\]
\[PRF=1SG.SU win\]

‘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.

\[(45)\] \[lán=lhkacw=ka áts’x-en ti=kwtámts-sw=a\]
\[PRF=2SG.SU=CIRC see-DIR DET=husband-2SG.POSS=EXIS\]

‘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 circumstentials 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 Guarani). 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 1st. 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:

\[
\text{Paleng (wes) mari udan} \\
\text{EPIS.POS (already) finish rain}
\]

‘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).

\[
\text{Surabaya Muda paleng sing (wes) menang (tapi aku durung weroh)} \\
\text{Surabaya Muda EPIS.POS REL (already) win (but 1SG not.yet know)}
\]

‘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, ...

\[
\text{Paleng Tomo pengen dadi wong miang.} \\
\text{EPIS.POS Tomo want become person fisher}
\]

‘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 jīnzhāng.
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 dā-pò bēizī.
    3SG PROG break cup
    Intended: ‘He is breaking cups.’

b. tā dā-pò(-le) bēizī.
   3SG break(-PFV) cup
   ‘He broke cups.’

Future reference relies on the prospective aspect hui, as shown in (61).\(^8\) (62) shows that hui can also order the future relative to a past reference time.

\(^8\) Hui 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 hui here.
(61) a. tāmen *(hui) hěn máng.
   3PL *(PROSP) very busy
   ‘They will be very busy.’

b. tāmen *(hui) chàng gē.
   3PL *(PROSP) sing song
   ‘They will sing songs.’

(62) zhāngsān shuō tā hui hěn máng.
   Zhangsan say 3SG PROSP very busy
   ‘Zhangsan said that he would be busy.’

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 *hui 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 *kénéng, 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  kèyǐ   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  kèyǐ   dādào  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 kèyǐ, the epistemic modal kēnēng 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 kēnèng dā-yìng-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 41st St., but you didn’t see him at the appointed time. The 7-11 clerk told you there’s another 7-11 on 41st 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 zěnme zhīdào! nǐ kēnèng qù-le lingwài 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 zěnme zhīdào! nǐ yǎng-de kēnèng 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 41st 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 44th St. for an hour!’ You reply:

rúguò wǒ zǒu-le, nǐ kěnéng huī 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 huī is required to give futurity in unembedded sentences. We predict that huī under modals yields future orientation, and the absence of huī yields only present or past orientation, with predictable aspectual restriction. This is straightforwardly upheld for the epistemic modal kěnéng. Huī 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 *(huī) kü.
3SG EPIS.POS *(PROSP) cry

‘She might cry.’

In the absence of huī, 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 prejacent requires the perfective aspect -le, as in (72).

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

tāmen kěněng 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 kěněng 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 kěněng dāpò*(-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 kěyī is restricted due to the Diversity Condition. Unlike the epistemic modal, circumstantial kěyī 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 prejcents with kěyī.
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. (Krater 1991:646)

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, ȼxaɬ and ɿ, which are compatible with modal meanings (see Laturnus 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. xaqwɪɬ- ni ḋan
dance-IND John

‘John danced’ / ‘John is dancing’ / *‘John will dance.’
b. *(ɛxal / ɛ) xaqwɪl-ni kanmiyit-s ɛan

*(PROSP / PROSP) dance-IND tomorrow-OBV John

‘John will dance tomorrow.’

This pattern of temporal interpretation can be accounted for by proposing a phonologically null non-future tense, following Matthewson (2006) for St’át’imcets, and Jóhannsdóttir and Matthewson (2007), Matthewson (2012, 2013) for Gitksan.

12.2.6.2 Temporal perspective given by tense, and availability of Reading C

Ktunaxa lexically distinguishes between epistemic and circumstantial modality. We restrict ourselves here to the unambiguously epistemic modal, ɨin, and an unambiguously circumstantial modal, ɨal, both of which have variable modal force.

As predicted by our null hypothesis, the TP of Ktunaxa epistemic modals can be present or past without any overt tense marking; this is shown in (75). (75a) has a present TP, while the TPs in (75b-d) are past. The data in (75b-d) show that Readings C-past, -present and -future are available in Ktunaxa.

(75)  a. **Context:** Mary wasn’t looking well yesterday and now she’s not in class.

ɨin sanɨłxuʔ-ni mali

EPIS sick-IND Mary

‘Mary might be sick.’ (PRESENT TP, PRESENT TO)

b. **Context:** My brother blew up a pipe bomb in our mailbox one morning. The neighbour called the cops. Later, my extremely embarrassed mother asked the neighbour why he called the police. He had thought someone had been shot.
qa-la  ḍin  mitx-il!
someone  EPIS  shoot-PASS

‘Someone might have been shot!’  (PAST TP, PAST TO)

c.  **Context:** Your neighbour doesn’t show up for work and you know there’s been a flu going around. You send your son to bring her hot soup. She actually took the day off because her apartment flooded, so she asks why you sent her soup in the middle of the day.

                                               ḍin  hin  saniłxuʔ-ni
                                               EPIS  2  sick-IND

‘You might have been sick.’  (PAST TP, PRESENT TO)

d.  **Context:** Why did you salt the driveway?

                                               ḍin  ma  éxał  wałink’alaʔ-ni
                                               EPIS  PFV  PROSP  snow-IND

‘It might have been going to snow.’  (PAST TP, FUTURE TO)

Circumstantial modals may also have a present or past TP, as in (76a-b).

(76)  a.  Hu  qa  tał  činax-i

                                               1  NEG  CIRC  go-IND

‘I can’t go out.’  (TFS 2011, ‘Chore Girl’)  (PRESENT TP, PRESENT TO)

b.  Qa  tał  klinq’uyumu-ni  wat’qum-s

                                               NEG  CIRC  play-IND  ball-OBV

‘She was not able to play ball.’  (TFS 2011, ‘Sick Girl’)  (PAST TP, PRESENT TO)

---

9 The perfective marker *ma* is necessary in past-future contexts to mark anteriority.
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 ɬin. Without ɛxat, (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).

ɬin 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.

ɬin ɛxaɬ 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.
\[(79) \quad tal \quad q’umniʔ-ni \quad ən\]

\[\text{CIRC} \quad \text{sleep-IND} \quad \text{John}\]

‘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).\(^{10}\)

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

\(^{10}\) 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
Matthewson 2007), the temporal interpretation of non-modal Blackfoot claims is semi-predictable given the aspectual properties of the predicate. Reis Silva and Matthewson (2007) observe that stative predicates (or predicates “stativized” by means of an imperfective or perfect) can be interpreted as either past or present, with no additional morphology, but eventive predicates can only be interpreted as past (unless first “stativized” by the aforementioned aspectual morphology).

These generalizations are exemplified by the following data. (80a) shows that an aspectually unmarked stative predicate can have either a past or present interpretation; (80b) shows that an aspectually unmarked eventive predicate, in contrast, is only compatible with a past interpretation.

(80)  a. anna mai'stoo-wa isttsso'kini-wa
      DEM raven-3PROX be.hungry.VAI-3
      ‘Mai'stoo is hungry’ OR ‘Mai'stoo was hungry.’  STATIVE

b. anna mai'stoo-wa ihpiyi-wa
      DEM raven-3PROX dance.VAI-3
      ‘Mai'stoo danced.’(≠ Mai'stoo is dancing)  EVENTIVE

(81) shows that predicates temporally “stativized” by the imperfective á- are compatible with either a past or present interpretation. Past interpretations are generally only accepted, however, if additional context makes such a reading salient. The facts are summarized in Table 12.4.

(81)  anna mai'stoo-wa á-ihpiyi-wa
      DEM raven-3PROX IPFV-dance.VAI -3
      ‘Mai'stoo is/was dancing.’
Table 12.4: Temporal interpretation of Blackfoot non-modal predicates

<table>
<thead>
<tr>
<th>temporal interpretation</th>
<th>eventive predicate</th>
<th>stative predicate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PFV</td>
<td>IPFV</td>
</tr>
<tr>
<td>past</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>present</td>
<td>X</td>
<td>√</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>A. Tenses:</th>
<th>B. Aspects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø_{PRESENT}</td>
<td>a_{IPFV}</td>
</tr>
<tr>
<td>Ø_{PAST}</td>
<td>ikaa- ~ akaa_{PRF}</td>
</tr>
<tr>
<td></td>
<td>Ø_{PFV}</td>
</tr>
</tbody>
</table>
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 aahkam-ikamosat-yii-wa annisk sinááksin
yesterday EPIS-steal.VTA-3>3'-DEM painting
‘Yesterday she might have stolen that painting.’

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.
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.”

\[
\text{o}ma \text{ nín}a \quad \text{a}ahkam-\text{ikamo}'\text{tsat-yii-wa} \quad \text{annisk} \text{ sinááksin}
\]

\[
\text{DEM} \quad \text{man} \quad \text{EPIS-steal.VTA-3>3}'\text{3} \quad \text{DEM} \quad \text{painting}
\]

‘That man might have stolen that one painting.’  

\[(\text{PRESENT TP, PAST TO})\]
(86) **Context:** I don’t see my dad around anywhere, but I notice his running shoes are missing.

*aahkam-á-mpi-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.’

The ‘might’ modal aakhama’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.

\(88\)  

\textbf{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.

aakhama’p-iikska-ihpiyi

\textit{might-INTS-INTS-dance.VAI}

‘She might dance a lot.’

\(\text{(PRESENT TP, FUTURE TO)}\)

\footnote{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’tsaa-kiaa-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

<table>
<thead>
<tr>
<th>temporal interpretation</th>
<th>ohkott- ‘can/able’</th>
<th>aahkama’p- ‘might’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PFV</td>
<td>IPFV</td>
</tr>
<tr>
<td>past perspective</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>present perspective</td>
<td>X</td>
<td>√</td>
</tr>
</tbody>
</table>

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.\(^\text{12}\)

\(^{12}\) 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. 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).14

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13 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).

14 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)*

 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 prejacents, are interpreted as circumstantial, and present orientations, which arise with stative prejacents, are interpreted as epistemic. 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 prejacents 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 prejacents 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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15 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.
instant (present) or interval (past). Louie (2015) proposes that Blackfoot epistemic modals are uniformly interpreted with a past-extended interval as their temporal perspective, where tense, rather than giving the temporal perspective, gives the rightmost-bound of this past-extended interval. This modification allows the data in (83) and (85) to be analyzed with perfective/past temporal orientation, where the runtime of the event is contained within the (past-extended) temporal perspective time, as predicted by our null hypothesis.

Another area where Blackfoot modals behave in ways unexpected given our null hypothesis is that the epistemic readings of aahkama'p- cannot take past temporal perspectives, in contrast to aahkam- as discussed above. In other words, aahkama'p- fails to display Reading C. The following data show that aahkama'p- is infelicitous in contexts where the prejacent is only compatible with a previous epistemic state, but not the current epistemic state.\(^\text{16}\)

(90) **Context:** The weather seems like it's been normal, and the U-Pick Berry Farms opened last week. I figure the berries must be ripe, so I plan a trip. When we get there, though, none of the berries are ripe. Afterwards, I shrug and say: “They're not ripe yet, but they might have been ripe.”

# máát-omaa-i'tsii-waištāa ki aahkama'p-ikaa-i'tsii-yi-aawa

NEG-yet-ripe.VII-NONAFF.PL.INAN CONJ might-PRF-ripe.VII-3PL-DTP

‘They’re not ripe yet, but they might have been ripe.’ (\textsc{Past TP, Present TO})

**Consultant:** You can’t put those together - when you say aahkama'pikai'tsiiyaa, you don’t know if they’re ripe or not, you’re just guessing.

\(^{16}\) Recall that aahkama'p- can only receive epistemic-like readings with stative or stativized prejacents. The previous data in (88) thus does not constitute an epistemic reading with a past TP.
(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-wapatamsstsinimaa-waatsiksi ki aahkama’p-wapatampsstsinimaa-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-ssta aahkama’p-wapatampsstsinimaa-wa ki

1-used_to-think.VAI might-be_chinese.VAI-3 CONJ

máát-wapatamsstsinimaa-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 SENĆOTEN and Hul’q’umi’num’

In this section, we show that SENĆOTEN 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 SENĆOTEN and Hul’q’umi’num’ is encoded by two second position clitics: *ləʔ/əɬ* 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).\(^\text{17}\) 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 SENĆOTEN.

\(^{17}\) 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 SENĆOTEN cognate.
(93) **Context:** You see that the ground is wet, so you know that it was raining this morning.

O  ŁEMEW  ŁO

?a  łəmɔxʷ=loʔ

oh  rain=PST

‘Oh, it rained some.’

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

O  ŁEMEW  SE

?a  łəmɔxʷ=səʔ

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) ŁEM,W  TFE  SAKEL

łəmɔxʷ  tθə  sɛqəɬ

rain[IPFV]  GNRL.DET  outside

‘It’s raining outside.’

In SENĆOŦEN, 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).
‘It rained a lot in the spring.’

‘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 SENĆOTEN (Kiyota 2008; Turner 2011) and locative auxiliaries in Hul’q’umi’num’ (Suttles 2004: 36), but neither of these obligatorily restricts reference time. Thus, SENĆOTEN and Hul’q’umi’num’ exhibit superficial tenselessness, since past, present or future reference times are all available without overt tense.

SENĆOTEN 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 \( wəl \) 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 \( x̌ə̃m/ǩə̃m \). Tense does not provide temporal perspective for the epistemic modal \( w̌ə̇wə/w̌ə̇wəʔ \); 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:

\[
\begin{align*}
\text{good} & \quad \text{DET}=2\text{SG.POSS=NM.LZ} & \quad \text{NEG} & \quad \text{AUX}-2\text{SG.SUB.SBJ} & \quad \text{climb} & \quad \text{OBL} & \quad \text{GNRL.DET} \\
\text{q̓aḥə̱xəʔən} & \quad \text{CIRC}=\text{PST}=2\text{SG.SBJ} & \quad \text{COM} & \quad \text{fall}
\end{align*}
\]
‘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.

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 սար is optional.

(100)  

SENĆOFEN:

In (99-100), ևարm 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) ʃKEN SEN SE  I  ŠTEN.

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) ʃENČOTEN:

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 circumstantial s

With respect to the temporal orientation of circumstantial modals, SENĆOŦEN 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’*:

*mí nów-əś t̕ə pipə, xʷəm ?iʔ laməxʷ qə tənə 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 SENĆOŦEN and Hul’q’umi’num’ modals do not fit the null hypothesis

There are three ways in which SENĆOŦEN 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 *ʔiʔwəʔ/wəʔaʔ*. 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 *ʔiʔwəʔ/wəʔaʔ* always scopes higher than tense; i.e., there is no tense node above the modal.

First, SENĆOŦEN 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 šie:əwən ‘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:

\[
\begin{align*}
\text{ʔi=} & \text{cən} & \text{šte:əwən’} & \text{wəw’a?} & \text{nɪ=} & \text{cən} \\
\text{AUX=} & \text{1SG.SBJ} & \text{think} & \text{EPIS} & \text{AUX=} & \text{1SG.SBJ} \\
\end{align*}
\]

\[
\begin{align*}
\text{ʔiʔel} & \text{nəw’-əš} & \text{ʔə} & \text{tə} & \text{ščey’l.’əl’s.} \\
\text{expected} & \text{go.in-TR} & \text{OBL} & \text{GNRL.DET} & \text{fridge} \\
\end{align*}
\]

‘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 šie:əwən ‘think’ (or the SENCOTEN equivalent).

(105) Hul’q’umi’num’:

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

\[
\begin{align*}
\text{ʔi=} & \text{cən} & \text{šte:əwən’} & \text{wəw’a?} & \text{ʔə} & \text{sqʷəmey kʷθə} & \text{Fluffy.} & \text{ʔəwəte?} \\
\text{AUX=} & \text{1SG.SBJ} & \text{think} & \text{EPIS} & \text{indeed} & \text{dog} & \text{REM.DET} & \text{Fluffy not.any} \\
\text{nə} & \text{š-tə-təl-stəxʷ} & \text{ʔəw’} & \text{stem-əs} & \text{kʷθə} & \text{Fluffy.} \\
\text{1SG.POSS NMLZ-IPFV~know-CAUS CONTR what-3SUB.SBJ REM.DET Fluffy} \\
\end{align*}
\]
‘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.18

(106) *Hul’q’umí’num*:

```
nil kʷθə Oliver niʔ kʷənət Ɋən̓ə sləpəs. ʔii:t=ən
3EMPH DET Oliver AUX take-C.TR DEM slippers AUX:PST=1SG.SBJ

štə:wən̓ kʷ=s nil=s kʷθə nəʔaʔ sqʷəmeʔy
think DET=NMLZ 3EMPH=NMLZ DET one dog

niʔkʷənət Ɋən̓ə sləpəs. ʔəwə nil-əs  kʷθə Oliver.
AUX take-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.

---

18 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.

\[
\text{wəwə? sqʷəmey kʷθə Fluffy. ?əwətə? nə}
\]

\[
\text{EPIS dog REM.DET Fluffy not.any 1SG.POSS}
\]

\[
\text{š-ta-təl-stəxʷ ?əw’ ste̓m-əs.}
\]

\[
\text{NMLZ-IPFV~know-CAUS CONTR what-3SUB.SBJ}
\]

‘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: xʷənəkʷen ‘think’.

(108) *SENĆOTEN:*

\[
\text{QENNEW SEN TTE SNOUES E TI,Á ĆEĆIL.}
\]

\[
k’ʷən-nəxʷ=sən tə snəwəs ?ə tə tə kʷəčil}
\]

\[
\text{see-NC.TR=1SG.SBJ GNRL.DET clouds OBL PROX.DEM morning}
\]

\[
\text{XENEĆÁN SEN LEMEW SE.}
\]

\[
xʷənəkʷen=sən ləməxʷ=sə?
\]

\[
\text{think=1SG.SBJ rain=FUT}
\]

\[
ĆIL TTE ŠKEKEL I EWENE SŁEMEW.
\]

\[
kʷil tə sqʷəpʷəl ?iʔ ?əwənə s-ləməxʷ
\]

\[
\text{appear GNRL.DET sun COM not.any NMLZ-rain}
\]

‘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 ᵇʔwawə/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 ᵇʔwawə/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...*

```
ʔi̞ ʔi̞ wəwə? ʔi: ləməxʷʔə ʔə kʷənə netəł,
EPIS AUX; PST rain[IPFV] OBL REM.DEM morning
ʔi=ctwaʔ ləqʷ tə̓ə səxʷəl.
AUX=EVID wet GNRL.DET grass

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

(110) *SENĆOTEN*:

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

```
I Wowe Ján SE U Ėk LEMEW ENÁ,E.
ʔiʔ wəwə ʔə̓n̓=əʔə? ʔuʔ ʔəq ləməxʷʔə one<ʔə>
EPIS really=FUT 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 *SENĆOTEN* 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) **SENĆOTEN:**

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

```
I WOWE NIL TE Claire NOT TFE cherries
ʔiʔ wawə nil ʔə Claire ȵa-t tə cherries
EPIS 3PRED F.DET Claire eat-C.TR GNRL.DET cherries
```

‘Maybe it was Claire that ate the cherries.’

(112) **Hul’q’uminum’**:

```
ʔə'y  kʷə=ʔn=s ʔiɬqəłs ʔə kʷθə
good DET=2SG.POSS=NMLZ buy OBL REM.DET
xətə-st-oʔm lotterytickets, wəʔəʔa? ƛxʷəənəq=č
say[IPFV]-CAUS-PASS lottery.tickets EPIS win=2SG.SBJ
```

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

We have shown that tense indicates temporal orientation in SENĆOTEN and Hul’q’umi’num’ modal claims containing ʔiʔwawə/wəʔa?. 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.  

\((PRES.PV-)*\)rain

‘It will rain.’

b. *(t-)*thaygal-an ni tali’ laqi’ qasa.  

\((PRES.-)*\)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).¹⁹ 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.’

¹⁹ Zeitoun et al. (1996) claim that the unmarked eventives in Squilq (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.
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)  

\text{baq-un=nya’ mha musa’ h\langle m\rangle swa’ m-qyanux m-aki’ qsa\text{huy na hlahuy.}}  
\text{know-PV=3S.ERG COMP PROSP how\langle AV \rangle AV-live AV-be inner GEN forest}  
\text{‘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)  
\text{Context: You visit your friend and talk to the extent that you forget the time. Your friend offers:}  
\text{\textit{blaq} m-’abi=su’ sqa.}  
\text{\textit{CIRC.POS AV-sleep=2S.ABS} here}  
\text{‘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.

*błaq* 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, *błaq* 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 *błaq*.

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 *błaq* cannot co-occur with the other overt aspects; both progressive and perfective markers are incompatible with *błaq*.

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

*(musa’)* błaq 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 *błaq* 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 SENĆOTEN/Hul’q’umi’nun’ above, and with Stát’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 SENĆOTEN/Hul’q’umi’nun’ 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)

\[
\text{ki’a p-qwalax ??(maha=saku’).}
\]

\[
\text{EPIS.POS PROSP-rain ??(say=1S.ABS)}
\]

‘I thought it might rain.’

(127) **Context:** When you sat in the office earlier today, your 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)

\[
\text{ki’a cyux m-qwalax tanux la ??(maha=saku’).}
\]

\[
\text{EPIS.POS PROG.DIST AV-rain outside PART ??(say=1S.ABS)}
\]

‘I thought it might be raining.’
(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)

\[ ki’a=\text{su’ wal} \quad \text{m-nbu’} \quad ?(\text{maha}=\text{saku’}). \]

\[ \text{EPIS.POS}=1\text{S.ABS} \quad \text{PFV} \quad \text{AV-sick} \quad ?(\text{say}=1\text{S.ABS}) \]

‘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. \( ki’a \quad \text{musa’ m-s’ang.} \)

\[ \text{EPIS.POS} \quad \text{PROSP} \quad \text{AV-scold} \]

‘He might scold / ≠ He might be scolding / ≠ He might have scolded.’

b. \( ki’a \quad p-\text{ks’ang.} \)

\[ \text{EPIS.POS} \quad \text{PROSP.AV-scold} \]

‘He might scold / ≠ He might be scolding / ≠ He might have scolded.’
In the absence of the prospective, an aspectually unmarked eventive prejacent allows for past TO, as shown in (130). While present TO requires the progressive aspect, a progressive-marked prejacent is also compatible with a past TO, as shown in (131-132).

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

\[ \text{EPIS.POS AV-rain today.earlier/?now/*today.later} \]

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

\( \text{(PRESENT TP, PAST TO)} \)

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

\( ki'a \) cyux m-qwalax.

\[ \text{EPIS.POS PROG.DIST AV-rain} \]

‘It might be raining.’

\( \text{(PRESENT TP, PRESENT TO)} \)

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

\( m\text{-wah}=saku' shira' ga, \) \( ki'a \) cyux m-’abi qu tali’.

\[ \text{AV-come=1S.ABS yesterday TOP EPIS.POS PROG.DIST AV-sleep ABS Tali'} \]

‘When I came yesterday, Tali’ might have been sleeping.’

\( \text{(PRESENT TP, PAST TO)} \)

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.

‘They might have gotten married last year.

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 aspevtual 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’ *xʷəm/šəm* 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 *kěyī*, and Ktunaxa *tał*.

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. SENCOTEN ʔiʔawə, Hul’q’umi’num’ wə̓qwəʔ, and Atayal ki’a further pattern together in that their prejacent’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 SENCOTEN 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 xʷəŋ/xʷəm. Recall that the tense markers in SENCOTEN 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 xʷəŋ/xʷəm are auxiliaries, and so the second position clitics, including past and future tense, cliticize to them.

(134) Hul’q’umi’num’:

...xʷəm=əl=č  ?iʔ  hiləm.

...CIRC-PST=2SG.SBJ  COM  fall

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

xʷəŋ/xʷəm are thus similar to Dutch kunnen (discussed in section 12.2) in that they are directly in the scope of tense.
The epistemic modals ʔiʔwəwə/wəwaʔ 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) **SENĆOTEN:**

… wəwəʔlaməxʷ=ceʔ ?ə to̱nə snet

… EPIS rain=FUT OBL PROX.DEM night

‘… it might rain tonight.’ (from (103) above)

In work on SENĆOTEN, 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 ʔiʔwəwə/wəwaʔ 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 Fintel 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 \( \tilde{\text{i}}\tilde{\text{waw}}/\text{waw} \) 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), \( \tilde{\text{i}}\tilde{\text{waw}}/\text{waw} \) always scopes over the entire clause and thus always scopes above tense. This means that tense will always indicate temporal orientation for \( \tilde{\text{i}}\tilde{\text{waw}}/\text{waw} \). The temporal perspective of \( \tilde{\text{i}}\tilde{\text{waw}}/\text{waw} \) 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 \( \tilde{\text{i}}\tilde{\text{waw}}/\text{waw} \) 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 \( \tilde{\text{i}}\tilde{\text{waw}}/\text{waw} \), 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 \( \text{ki’}a \), which (unlike the Atayal circumstantial modal \( \text{blaq} \)) 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
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 circumstnials with future TP.

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

\[ ki’a \quad musa’ \quad l<m>aqux \quad la. \]

\[ \text{EPIS.POS PROSP} \quad \text{win}<\text{AV}> \quad \text{PART} \]

‘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.

\[ musa’ \quad blaq \quad m-bazi=su \quad sa \quad ana \quad nanu \quad sawyan=su. \]

\[ \text{PROSP CIRC.POS} \quad \text{AV-buy=2S.ABS LOC even what like-LV=1S.ERG} \]

‘You will be able to buy whatever you like (if you have a job).’ (FUTURE TP, FUTURE TO)

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20 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’ïmcets, Javanese, Mandarin and Ktunaxa. In section 12.3, we showed that
Blackfoot, Atayal, SENĆOTEN and Hul’q’umi’n̓um’ 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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References


Papers in Linguistics 34: 15-30.


van Eijk, Jan and Lorna Williams (1981). *Cuystwi Malh Ucwalmicwts: Lillooet Legends and*
Stories, Mount Currie: Ts’zil Publishing House.


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Peterson, Tyler (2010). *Epistemic Modality and Evidentiality in Gitksan at the Semantics-


dissertation, McGill University.


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’,\} for 1st, 2nd, 3rd person proximate, 3rd person obviative and inanimate entities respectively), YNQ = yes-no question.