# Building Modifier Questions from Anaphors in Ktunaxa[1]

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**Abstract.** Ktunaxa—a language isolate spoken in parts of British Columbia and Montana—asks questions about manners, locations, and times using two distinct grammatical elements in different positions: a particle that is structurally high and signals that a modifier question is being asked (the '*wh* kernel') and a preverb that is low and signals the type of the modifier question (the 'descriptive content marker', or DCM). DCMs have an independent distribution as anaphors for properties of events. In questions, the *wh* kernel binds this variable and yields an alternative set. Ktunaxa's two-part strategy for expressing modifier questions—one word dedicated to forming the question and one word dedicated to defining the question type—puts a new spin on the Japanese-style architecture of *wh* questions, with the second element an anaphor rather than an indefinite. That sheds light on the building blocks of questions more broadly.

**Keywords:** questions, wh words, modifier questions, binding, Ktunaxa, constituent questions

## 1. Introduction

English has a rich inventory of modifier *wh* words: *when*, *where*, *how*, *why*, and *which*. That's the case for the best-known languages more generally. But a radically different strategy is conceivable, one in which most of *wh* modifiers could be conceived of as cousins, all essentially asking for additional information about an event or individual, and unite their interpretations under a single all-purpose *wh* word. Of course, simplifying the *wh* inventory in this way—though an intriguing state of affairs—does potentially come at the cost of folding together a variety of question types that it can be useful to distinguish. For that purpose, an optional set of disambiguating expressions would prove useful.

This, we will argue, is the state of affairs in Ktunaxa, a language isolate spoken in eastern British Columbia, Canada, and in northern Idaho and Montana, in the United States. It's an interesting system in principle, but it's also interesting in view of how it fits into the typology of questions crosslinguistically.

There are of course numerous strategies languages employ to express constituent questions. The best-known strategy is one in which a constituent question word raises and binds its trace, as in English:

(1)    What$_i$ did Floyd eat $t_i$?

In Hindi, it remains in situ:

(2)  kitaab  <u>kis</u>=ne    dekh-ii
     book.F.SG who.OBL=ERG see-PFV.F.SG
     'Who saw the book?'                          *(Hindi; Manetta, 2013)*

Some languages do a bit of both of these strategies. Another parameter of variation is whether the *wh* content is expressed as a single lexical item or whether it must co-occur with an in-situ element to yield a constituent question meaning. For example, Japanese forms constituent questions with an high question particle (*ka*) and a lower in-situ indefinite, traditionally called an indeterminate pronoun (Kratzer and Shimoyama, 2002; Hengeveld et al., 2022):

(3)  <u>Dare</u>      ga sūpu o  tabemashita <u>ka</u>?
     INDEF.PRON NOM soup ACC eat          Q
     'Who ate the soup?'

These indeterminate pronouns are sometimes glossed as *wh* words, but they also occur in non-interrogative contexts as indefinites and universals:

(4)  <u>Dare</u>-ka      ga sūpu o   tabemashita.
     INDEF.PRON-KA NOM soup ACC eat
     'Someone ate the soup.'

Ktunaxa's modifier questions represent a different type of two-part strategy, in which the in-situ element is very different.

Ktunaxa actually has two strategies for asking *wh* questions. For argument questions, the situation is not too different from English—a high *wh* element binds a trace (McClay, 2017):[2]

(5)  <u>Qała</u> k-hawasxumik
     WH   COMP-sing
     'Who sang?'

However, in how it asks modifier questions (e.g. *how*, *when*, *where*), Ktunaxa better resembles Japanese. It employs a two part strategy. First, there is a structurally high *wh* element (henceforth 'WH PARTICLE'). Second, there is often a lower in-situ element. Unlike Japanese, though, in Ktunaxa this element is both optional and definite, one of a battery of modificational anaphors. We call these elements 'DESCRIPTIVE CONTENT MARKERS', or DCMs.

The *wh* particle signals that a modifier question is being asked, while the DCM indicates the subtype of the question—manner, time, or location. For example, in (6) the *wh* particle *kas* occurs high in the clause while the DCM *ʔaqał* is in a preverbal position and specifies that a manner/method (i.e. *how*) question is being asked:

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[2]The following data comes from our own primary fieldwork with Ktunaxa speakers Violet Birdstone, Dorothy Alpine, and Laura Birdstone. The working language for conducting interviews was English, and the primary elicitation strategies used were translation tasks and acceptability judgment tasks (Bochnak and Matthewson, 2015). The following abbreviations are used in morpheme glosses: I = 1st person, 3 = 3rd person, AGR = agreement, CAUS = causative, IND = indicative marker, OBV = obviative marker, PRVB = preverb marker, SUBJ = subject, NP = noun phrase, VP = verb phrase, MOD = modal, DEM = demonstrative, VAL = valency, COMP = complementizer, RFLX = reflexive. Characters in Ktunaxa orthography not conforming to their typical International Phonetic Alphabet values are as follows: ł = [ɬ], ¢ = [t͡s].

(6)    Ka-s              k    Ɂa-qa-ł        hawasxumik Mału
       WH.PARTICLE-OBV COMP MANNER.DCM sing         Mary
       'How did Mary sing?'

This invites manner answers such as 'well', 'badly', or 'loudly'.

Section 2 further articulates the overall empirical picture of Ktunaxa *wh* questions. Section 3 examines the internal structure of DCMs in more detail. Section 4 introduces an intellectual antecedent. Section 5 proposes that DCMs denote event description anaphors, which can find their reference in principle in preceding discourse, but that in *wh* questions are bound by the *wh* element, whose role is to achieve a question denotation from an event description source. Section 6 extends the analysis to a related non-modifier form of question. Section 7 concludes with open issues and a brief discussion of *wh* questions across languages.

## 2. Empirical background
2.1. The Ktunaxa language
Ktunaxa (alternatively Kootenai, Kootenay, or Kutenai; ISO 639-3: kut) is a language isolate, spoken by the Ktunaxa people in British Columbia in Canada, and Montana and Idaho in the United States. In Canada it is spoken by 18 fluent speakers across four communities (Gessner et al., 2022). There are seven bands of the Ktunaxa Nation, two located in the United States and five located in British Columbia. Our Ktunaxa consultants are from two of these, Ɂaq̇am and Ɂakisq̇nuk. The language data presented in this paper comes from fieldwork conducted with one speaker in Vancouver, BC and two speakers in the Ɂaq̇am First Nation near Cranbrook, BC.

2.2. Ktunaxa questions
In Ktunaxa, polar questions are marked with 'subordinate marker' *k-* (Morgan, 1991), which we will gloss as a complementizer. Compare the declarative sentence in (7a) and its polar question counterpart in (7b):

(7)    a. hawasxumik Mału
          sing          Mary
          'Mary sang.'

       b. k-hawasxumik Mału
          COMP-sing      Mary
          'Did Mary sing?'

Constituent questions in Ktunaxa require an additional element. They retain the complementizer *k-* with a *wh*-word at the left periphery:

(8)    Qała k-hawasxumik
       WH   COMP-sing
       'Who sang?'

Argument *wh* words—the words for 'who' and 'what'—can be interpreted as *wh* indefinites, "quexistentials" in the terminology of Hengeveld et al. (2022). Thus the inanimate *wh* word *qapsin* generally corresponds to 'what', but can also convey the meaning of 'something':

(9)  a.  Q̲a̲p̲s̲i̲n̲ k-hu        ʔik
         WH    COMP-I.SUBJ eat
         'What did I eat?'

     b.  Hu      ʔik-ni q̲a̲p̲s̲i̲n̲
         I.SUBJ eat-ind WH
         'I ate something.'

Similarly, the animate *wh* word *qała* 'who' can also be used to express the meaning of 'someone':

(10)  a.  Q̲a̲ł̲a̲ k-hu         ¢łakił
         WH   COMP-I.SUBJ like
         'Who do I like?'

     b.  Hu      ¢łakił-ni q̲a̲ł̲a̲
         I.SUBJ like-ind  WH
         'I like someone.'

Our focus is modifier constituent questions, specifically those inquiring about manners, locations, and times. Unlike argument constituent questions, which rely on a single *wh* word, modifier questions exhibit a bipartite structure, composed of a *wh* particle *kas* at the left periphery and a lower element that specifies the semantic category of the question. That lower element is a PREVERB, an adverb-like element that occupies a fixed position in Ktunaxa clause structure (Dryer 2002). The term is borrowed from Algonquian linguistics.

There are (at least) three classes of modifier questions in Ktunaxa. The first of these questions manners broadly construed. This can include manners in a more restricted sense, but also the method or means by which an event takes place and the instrument used to carry it out. These questions are composed of the usual *wh* particle *kas* and the manner DCM *ʔaqał*:

(11)  **Manner question**
      K̲a̲-s               k      ʔa-qa-ł̲           hawasxumik Małi
      WH.PARTICLE-OBV COMP MANNER.DCM sing          Mary
       'How did Mary sing?'                          *(answerable with 'badly', 'loudly')*

Locative and temporal questions use their own dedicated DCMs:

(12)  **Locative question**
      K̲a̲-s               k      ʔa-qa-wxa-ł̲        hawasxumik La·t?
      WH.PARTICLE-OBV COMP LOCATION.DCM sing       La·t
      'Where did La·t sing?'                       *(answerable with 'at the concert', 'in the park')*

(13)  **Temporal question**
      K̲a̲-s               k      ʔa-qa-su·sa-ł̲ hawasxumik La·t?
      WH.PARTICLE-OBV COMP TIME.DCM   sing          La·t
      'When did La·t sing?                         *(answerable with 'last night', 'Tuesday')*

The *wh* particle and the corresponding DCM needn't be in the same clause:

(14)  Ka-s      ma-k     ʔa·qak-i Kate ¢   ʔa-qa-su·sa-ł           wa·m?
      WH-OBV PST-COMP say-IND  Kate FUT AGR-WAY-TEMP-PRVB come
      'When did Kate say she would come?' or, more precisely,
      'What is the time $t$ such that Kate said it is at $t$ that she will come?'

To really establish convincingly that there is no syntactic movement involved in these questions, it would be helpful to be able to show that the *wh* particle can be separated from the DCM by an island boundary. Determining this has proved methodologically challenging, and we are still working on the question. In principle, though, the question of whether there is movement in these constructions is orthogonal to our description of the essential facts here.

In all these examples, we have indicated morpheme boundaries within DCMs without glossing each morpheme individually. But of course, this is important, so we now turn to the question of how DCMs are assembled.

## 3. Breaking down modifier questions

The DCM for manner questions, *ʔa-qa-ł*, can be decomposed into two components, with the second component itself being bimorphemic:

- *ʔa*: somewhat mysterious agreement morpheme
- *qa-ł*: manner anaphor
    - *qa*: something like 'way' (as in 'that way'), the core DCM morpheme
    - *-ł*: preverb marker analogous to the English adverbial suffix *-ly*

We are not entirely sure how to characterize *ʔa* more precisely, but hypothesize that it expresses agreement with the *wh* particle *kas* itself. Here again is the full manner question, now with this more detailed glossing:

(15)  Ka-s     k       ʔa-qa-ł           hawasxumik Małi
      WH-OBV COMP AGR-way-PRVB sing         Mary
      'How did Mary sing?'

What most distinguishes Ktunaxa modifier questions is the fact that, setting aside the inflectional agreement morphology, DCMs are all anaphoric expressions across the corresponding ontological domains. Thus the manner anaphor *qa-ł* can robustly be used to mean 'that way':

(16)  **Manner anaphora**

   a. Suk-wasxumik Ana ¢   ʔa·ki qa-ł        hawasxumik Małi.
      good-sing        Ana and also  way-PRVB sing          Mary
      'Ana sang well and Mary sang that way too.'

   b. Qa-ł        ʔałisxuł-ni.
      way-PRVB cut-IND
      'They cut it that way.'

One might expect that the temporal and locative uses would be similar, and broadly they are. But there is one important additional detail worth highlighting.

It's that the spaciotemporal uses—the temporal and locative ones—are both built on top of what we've described as manner uses. Thus the temporal DCM *ʔaqawxał* decomposes into four parts:

- *ʔa*: somewhat mysterious agreement morpheme
- *qa-su·sa-ɬ*: temporal anaphor
    - *qa*: something like 'way' (as in 'that way'), the core DCM morpheme
    - *su·sa*: temporal morpheme
    - *-ɬ*: preverb marker analogous to the English adverbial suffix *-ly*

And, without the inflectional morphology, it too serves as a temporal anaphor:

(17)   **Temporal anaphora**
ʔuɬumi ʔat  qa-su·sa-ɬ        ʔitakɬiʔ-ni q̓api qapsin
May    HAB way-TEMP-PRVB grow-IND  all   what
'Everything starts growing at that time, May.'

The locative DCM is analogous:

- *ʔa*: somewhat mysterious agreement morpheme
- *qa-wxa-ɬ*: locative anaphor
    - *qa*: something like 'way' (as in 'that way'), the core DCM morpheme
    - *wxa*: locative morpheme
    - *-ɬ*: preverb marker analogous to the English adverbial suffix *-ly*

(18)   **Locative anaphora**
Qa-wxa·ɬ      ʔik-ni qu-s       k-xa·¢a-s       yuwat̓-s
way-LOC-PRVB eat-IND DIST.DEM-OBV COMP-four-OBV bee-OBV
'He ate at that place, Four Bees.'

In this way, Ktunaxa modifier questions conveniently wear their morphological structure on their sleeve. They simply add the all-purpose modifier question *wh* particle *kas* at the left edge of the sentence, building on the independent morphological complexity of the DCM.

**4. Another bipartite strategy: Ktunaxa and Japanese**
Perhaps the most widely-known analysis of a language with a bipartite question strategy is Kratzer and Shimoyama (2002)'s theory of Japanese questions. Because Ktunaxa modifier questions also employ a bipartite strategy—or in any case, an at least bipartite strategy, with further internal structure—it makes sense to build on this precedent. As it turns out, however, a simpler analysis will turn out to suffice for Ktunaxa modifier questions. In fact, perhaps surprisingly, it might be Ktunaxa argument questions that more closely parallel Japanese. The crucial issue will be the nature of the non-*wh* component of the system.

First, a few words about the Japanese facts, which we previewed in the introduction. Japanese forms *wh* questions from the question particle *ka*, which occurs high in the clause (at the right periphery, in Japanese, it being head-final) and a separate in-situ element called an indeterminate pronoun. Thus the who-question in (19) relies on the animate indeterminate pronoun *dare*:

(19)   a.  Dare       ga  sūpu o   tabemashita ka?
           INDEF.PRON NOM soup ACC eat          Q
           'Who ate the soup?'

    b. Taro-wa <u>dare</u>-ga  katta  mochi-o     tabemasita <u>ka</u>?
       Taro-TOP WH-NOM bought rice.cake-ACC ate      Q
       'Who is the *x* such that Taro ate rice cakes that *x* bought?'

The key difference from Ktunaxa is in the indeterminate pronoun. Outside of questions, it can be interpreted as an indefinite, a property shared with many languages. An example mentioned in the introduction is repeated here:

(20)    <u>Dare</u>-ka      ga  sūpu o  tabemashita.
       INDEF.PRON-KA NOM soup ACC eat
       'Someone ate the soup.'

But in the presence of the universal quantifying morpheme *-mo*, it can also receive a universal reading:[3]

(21)    [[Dono hon-o    yonda] kodomo] -mo  yoku nemutta.
       which book-ACC read    child    UNIV well  slept
       'For every book *x*, the child who read *x* slept well.'

The similarity to Ktunaxa is chiefly just in this being a bipartite system with a higher question morpheme and a lower in-situ element, and in that the lower element signals the question type—in Japanese, animate or inanimate, in Ktunaxa, manner versus temporal versus locative.

One of the principal challenges in Japanese is to separate the quantificational force from the indeterminate pronoun. To achieve this, Kratzer and Shimoyama represent the contribution of the indeterminate pronoun as a set of Hamblin alternatives (Hamblin). For example, the indefinite *dare* is an alternative set of individuals:

(22)    $[\![\mathit{dare}]\!] = \{\mathbf{Floyd}, \mathbf{Clyde}, \mathbf{Bertha}, \ldots\}$

When *dare* occurs in a sentence, each alternative composes with the content of the sentence to yield a set of alternatives as the sentence denotation (now representing the sentence schematically):

(23)    $[\![\textit{'Taro ate rice cakes with' dare}]\!] = \left\{ \begin{array}{l} \lambda w . \textbf{ate-rice-cakes-with}_w(\mathbf{Taro}, \mathbf{Floyd}), \\ \lambda w . \textbf{ate-rice-cakes-with}_w(\mathbf{Taro}, \mathbf{Clyde}), \\ \lambda w . \textbf{ate-rice-cakes-with}_w(\mathbf{Taro}, \mathbf{Bertha}), \\ \qquad\qquad\qquad \vdots \end{array} \right\}$

From this representation, various additional morphemes can achieve various meanings. A universal quantifier simply universally quantifies over these alternatives, and the existential and question readings work similarly.

But in Ktunaxa, there are really only two options. One is that the DCM occurs alone, in which case it receives an anaphoric reading, which isn't among the options available in Japanese. Indeed, it is quite different, being definite rather than indefinite or inherently quantificational.

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[3]These examples unfortunately do not constitute a minimal pair/minimal triple. We reproduce them as they are in Kratzer and Shimoyama (2002).

The other option is that the DCM occurs under the scope of the *wh* particle, in which case it receives a question denotation. To achieve this, the system of composing Hamblin alternatives is not necessary.

One might, in the light of Japanese, wonder whether DCMs in Ktunaxa are really definite after all. But they do seem to be. Outside of adjunct questions, DCM anaphors require a unique referent that is identifiable from context:

(24)  a. ***Context:*** *You see a fisherman cutting fish straight down the middle. You explain to your friend that this is the way your parents cut fish as well.*

   Qa-ł        ʔałisxuł-ni.
   way-PRVB cut-IND
   'They cut it that way.'

   b. ***Context 2:*** *You explain to your friend that your parents use a strategy to cut fish, but you don't know what it is.*

   Qa-ł        ʔałisxuł-ni.
   way-PRVB cut-IND
   #'They cut it somehow/some way.'

The upshot, then, is that DCMs really are definite anaphors, and in this way Ktunaxa modifier questions constitute a genuinely different strategy for forming *wh* questions.

## 5. Analysis
### 5.1. DCMs as property anaphors
We begin with the assumption that *qa* expresses anaphora to a property of events whose value can be supplied by context or by binding. For this reason we will take it to bear a referential index representing this contextually supplied value, like a referential index on a pronoun. The denotation of the DCM will be the value of that argument.

The DCM *qał* also bears the suffix *-ł*, which we take to be semantically vacuous. We will therefore represent the DCM *qa-ł* as a property of events whose denotation is supplied by its implicit argument:[4]

(25)  $[\![ qa_P\text{-}ł \ \text{'way-PRVB'} ]\!] = \lambda e \lambda w . P(e)(w)$

This can be interpreted intersectively with the VP it adjoins to. For example, we represent *qał hawasxumik* 'sang that way' as in (26):

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[4]Strictly, of course, the value of the index in the syntax should be provided by the assignment function, but we will use the simpler representation for convenience. Because the implicit argument is itself a function of type $\langle e,st \rangle$, we could have written the denotation in (25) as just $[\![ qa_P\text{-}ł \ \text{'way-PRVB'} ]\!] = P$.

(26)

$\langle v, st \rangle$

$\langle v, st \rangle$      $\langle v, st \rangle$

$\langle v, st \rangle$   -ł      hawasxumik

   -PRVB      sing

qa$_P$

way

(27)     $[\![ qa_P\text{-}ł\ hawasxumik\ \text{'sang that way'} ]\!] = \lambda e \lambda w\, .\, P(e)(w) \wedge \mathbf{sing}(e)(w)$

This denotes a property of singing events that also satisfy the property $P$. The subject can then be introduced externally (Kratzer, 1996)—not a crucial assumption here, but a useful one—and the resulting event description can be existentially closed:

(28)     $[\![ \exists\ qa_P\text{-}ł\ hawasxumik\ Mał i\ \text{'Mary sang that way'} ]\!]$
       $= \lambda w\, .\, \exists e[P(e)(w) \wedge \mathbf{sing}(e)(w) \wedge \mathbf{agent}(e) = \mathbf{Mary}]$

The precise mechanism of existential closure over events is not crucial, so we will represent it as simply a node in the tree.

This alone explains much of the meaning of the manner anaphoric DCMs, but it leaves out one crucial ingredient. Why are temporal and locative uses not possible? We will return to this issue in section 5.4.

5.2. The *wh* particle and binding the DCM
In modifier questions, it is the *wh* particle *ka-s*, we propose, that binds the property variable. We will represent the binding with an overt lambda in the syntax:

(29)

$\langle st, t \rangle$

$\langle \langle \langle v, st \rangle, st \rangle, \langle st, t \rangle \rangle$      $\langle \langle v, st \rangle, st \rangle$

Ka-s
WH-OBV

$\lambda P_{\langle v, st \rangle}$      $\langle s, t \rangle$

k      $\langle s, t \rangle$
COMP

$\exists$      $\langle v, st \rangle$

Ɂa-qa$_P$-ł hawasxumik Mał i

In binding $qa_P$ this way, *ka-s* yields a question denotation that invites the interlocutor to provide an appropriate value for $P$—or, somewhat more precisely, it yields an alternative set of propositions of the form 'Mary sang in a $P$ way'. This might result in answer sets such as (30):

(30)
$$\left\{ \begin{array}{l} \lambda w \, . \, \exists e[\mathbf{bad}(e)(w)] \wedge \mathbf{sing}(e)(w) \wedge \mathbf{agent}(e) = \mathbf{Mary}], \\ \lambda w \, . \, \exists e[\mathbf{good}(e)(w)] \wedge \mathbf{sing}(e)(w) \wedge \mathbf{agent}(e) = \mathbf{Mary}], \\ \lambda w \, . \, \exists e[\mathbf{loud}(e)(w)] \wedge \mathbf{sing}(e)(w) \wedge \mathbf{agent}(e) = \mathbf{Mary}], \\ \vdots \end{array} \right\}$$

To build this compositionally, we will need for the *wh* particle to apply to a function from event descriptions (properties of type $\langle v, st \rangle$) to propositions (type $\langle s, t \rangle$). It will need to yield a question denotation, that is, an alternative set of propositions (type $\langle st, t \rangle$). To generate an alternative set that varies with respect to the property it binds, it has to existentially quantify over such properties:

(31)  $[\![ ka\text{-}s \ \text{`wh-OBV'} ]\!] = \lambda f_{\langle \langle v, st \rangle, st \rangle} \, . \, \{ p \, : \, \exists P_{\langle v, st \rangle} [p = f(P)] \}$

The next task is to use this denotation to build up question meanings like those in (30). We will first need to set aside the contributions of two elements, the agreement marker *ʔa* and the complementizer *k*. This is not entirely innocent. The agreement marker remains slightly mysterious to us, and we are not sure that even this vague characterization is quite right. With these assumptions in place, though, the denotation of the prejacent of the *wh* element will be as in (32):

(32)  $[\![ k \, \exists \, \textit{ʔa-qa}_P\text{-}ł \ \textit{hawasxumik Małi} \ \text{`Mary sang that way'} ]\!]$
        $= \lambda w \, . \, \exists e[P(e)(w) \wedge \mathbf{sing}(e)(w) \wedge \mathbf{agent}(e) = \mathbf{Mary}]$

In order to combine with the *wh* element, the implicit argument *P* will first need to be bound:

(33)  $\left[\!\!\left[ \begin{array}{l} \lambda P_{\langle v, st \rangle} \ k \, \exists \, \textit{ʔa-qa}_P\text{-}ł \ \textit{hawasxumik Małi} \\ \qquad \text{`Mary sang that}_P \text{ way'} \end{array} \right]\!\!\right]$
        $= \lambda P_{\langle v, st \rangle} \lambda w \, . \, \exists e[\, \mathbf{sing}(e)(w) \wedge \mathbf{agent}(e) = \mathbf{Mary} \wedge P(e)(w) \,]$

Combining this with the *wh* element yields the right semantics:

(34)  $[\![ ka\text{-}s \ \text{`wh-OBV'} ]\!] \, ( [\![ \lambda P_{\langle v, st \rangle} k \exists \, \textit{ʔa-qa}_P\text{-}ł \ \textit{hawasxumik Małi} ]\!] )$
        $= \{ p \, : \, \exists P_{\langle v, st \rangle} [p = \exists e[\, \mathbf{sing}(e)(w) \wedge \mathbf{agent}(e) = \mathbf{Mary} \wedge P(e)(w) \,]] \}$

The result is an alternative set of propositions that all denote singing events by Mary but vary with respect to the value of the event description *P*, i.e. a way in which she sang.

## 5.3. Locative and temporal question semantics

Locative questions like the one in (35) function similarly to questions that ask for manners, with one additional ingredient—the locative morpheme *wxa*:

(35)  Ka-s      k      ʔa-qa-**wxa**-ł          hawasxumik La·t?
        WH-OBV COMP AGR-way-LOC-PRVB sing              La·t
        'Where did La·t sing?'

We have already provided a semantics for DCMs on which they involve questioning an arbitrary property of an event. What is special about this case is that that property has to be constrained

to provide information about where the event took place. Of course, this is just a proper subset of the set of properties the event has. What we need here is to constrain the properties that serve as possible answers to locative properties, that is, to ones that locate the event in space. We treat this as a presupposition in (36), representing it in the Heim and Kratzer (1998) style:

(36)     $[\![\,qa_P\text{-}wxa\text{-}ɬ\ \text{'way-}\textsc{locative-prvb}\,'\,]\!] = \lambda e \lambda w : \textbf{locative}(P) \, . \, P(e)(w)$

The contribution of the locative morpheme itself, then, is just to impose this additional presupposition. Apart from that, it simply denotes the identity function:

(37)     $[\![\,wxa\ \text{'}\textsc{locative}\,'\,]\!] = \lambda P_{\langle v,st \rangle} : \textbf{locative}(P) \, . \, P$

Of course, this requires defining explicitly what counts as a locative property. Here, we will have to make a small digression into the semantics of locatives. It departs from the special grammatical challenges of Ktunaxa, but it's potentially interesting.

To start, let's assume that a property counts as locative iff any two events that have it are located in the same place, where **location** is Link (1998)'s spatial trace function, one that yields the maximal region occupied by an event:

(38)     $\textbf{locative}(P) \stackrel{\text{def}}{=} \forall w \forall e \forall e' \left[ \begin{array}{l} P(e)(w) \wedge P(e')(w) \leftrightarrow \\ \textbf{location}(e)(w) = \textbf{location}(e')(w) \end{array} \right]$     *(tentative)*

This gets at the basic intuition that locative properties are ones that necessarily entail being located in a particular way, but it's too strong. The property of being located in Canada is certainly a locative property, but it's not the case that any two events that are in Canada have the same location. Indeed, it's not entirely clear that one should think of the location of an event as a function. A single event can be said to have many locations at different levels of description. To accommodate the fact that locations have part structure—indeed, they have many of the mereological features that define the domain of mass individuals, as conceptualized by Link (1983)—and it is possible to be simultaneously in Vancouver, in Canada, and in North America, it will be necessary to weaken (38). One way to do so is in (39), where $r$ is a variable over regions of space, $\sqsubseteq$ is the locative part-of relation:

(39)     $\textbf{locative}(P) \stackrel{\text{def}}{=} \exists r \forall w \forall e \forall e' \left[ \begin{array}{l} P(e)(w) \wedge P(e')(w) \leftrightarrow \\ \textbf{location}(e)(w) \sqsubseteq r \wedge \textbf{location}(e')(w) \sqsubseteq r \end{array} \right]$
*(less tentative)*

This requires that for a property to be locative, there must be a specific region that, across all possible worlds, contains the locations of any two events that share that property. Here there is a risk of having rendered the definition too weak, because one can always find a region that contains any two locations. But maybe that's not so bad. The property of being located somewhere—anywhere—in space is, after all, also a locative property. The crucial thing is only that the property have the same spatial entailments *necessarily* rather than incidentally. There is more to be said about this topic, but we will leave things there, because Ktunaxa requires only that there be some way of identifying a property as locative. Although there are interesting empirical issues here (for example, can a property such as being located underwater count as

locative?), as far as we can tell, the Ktunaxa facts don't require a particular way of formalizing what it means to be locative.

The temporal case is analogous, but with the temporal morpheme *su·sa* restricting the value of the event description anaphor to temporal properties:

(40)   a.  $[\![\,su\text{·}sa\ \text{'TEMPORAL'}\,]\!] = \lambda P_{\langle v,st\rangle} : \textbf{temporal}(P) \,.\, P$

   b.  $[\![\,qa_P\text{-}su\text{·}sa\text{-}ł\ \text{'way-TEMPORAL-PRVB'}\,]\!] = \lambda e \lambda w : \textbf{temporal}(P) \,.\, P(e)(w)$

Defining what a temporal property is raises the same issues as defining a locative property just did, but for the sake of explicitness, let's adopt a temporal version of the weaker formulation in (39) ($\tau$ is the running time function, Link's temporal trace function):

(41)   $\textbf{temporal}(P) \stackrel{\text{def}}{=} \exists t \forall w \forall e \forall e' \left[ \begin{array}{l} P(e)(w) \wedge P(e')(w) \leftrightarrow \\ \tau(e)(w) \sqsubseteq t \wedge \tau(e')(w) \sqsubseteq t \end{array} \right]$        *(tentative)*

Together, these denotations provide the building blocks of forming unambiguous when and where questions.

5.4. Manners as an elsewhere case

Having now spelled out how the locative and temporal DCMs work, we are in a better position to return to the question we asked earlier: why is the manner DCM morphologically unmarked? Why are the locative and temporal uses built on top of it rather than, say, vice versa?

The manner reading of *qa-ł*, we suggest, is not imposed as a presupposition in parallel to the temporal and locative presuppositions. Rather, it arises as an elsewhere case in the absence of the locative and temporal morphemes. Its basic semantics supports such readings. However, Heim (1991)'s principle of Maximize Presupposition independently predicts manner readings. Maximize Presupposition requires that, when two linguistic expressions are both compatible with a particular state of affairs and one of them imposes an additional presupposition, the form with the additional presupposition must be used. Thus one can't generally use *all* to quantify over a two-membered set because *both* could be used instead, and it has an additional presupposition.

This straightforwardly requires that when asking a when question, the form that imposes a temporal presupposition must be used, and when asking a where question, the form that imposes a locative presupposition must be used. That leaves manner questions as an elsewhere case. They are associated with the DCM that is morphologically simpler only because it is they that are neither temporal nor locative.

Notably, we have treated manners as a natural class here, and that may be ill-advised. It's common to refer to a broader family of readings that also include means, method, and manner readings (Zhou (prep)), and those would go under the same rubric here by virtue of being neither temporal nor locative. But if this approach is on the right track, one might in principle expect certain other non-manner uses of *qa-ł* too—including in why questions—which we return to in section 7.3.

5.5. Manners, times, and locations as objects in the model

On the approach we are pursuing, there is no need to assume that manners, times, and locations (or spatial regions) are objects in the model as a matter of natural language metaphysics, corresponding to atomic types. Of course, it is uncontroversial to assume that times are an atomic type, and barely more so to assume that regions are. Manners are a different matter, but assuming that they are a type of some description—if not necessarily a primitive one—is not unheard of (Szabolcsi and Zwarts 1993; Landman and Morzycki 2003; Rett 2013; Anderson and Morzycki 2015 among others).

But confining ourselves to treating manner, temporal, and locative modifiers equally as simply denoting properties of events does present some difficulties. Chief among them is that it may not be straightforward to define what precisely makes a property locative or temporal. One advantage of this approach here, though, is that it allows us to build spaciotemporal readings 'on top of' manner readings. It's less clear how to do that if we were to treat manners, times, and regions as separate types. One possibility might be to take the *qa-* morpheme to denote a type-polymorphic pronoun that can denote a manner, time, or region. The additional locative and temporal morphemes could then be viewed as imposing conditions on its value, in something like the way that animacy morphology on a pronoun might impose an animacy presupposition. The drawback is that this would rely on stipulating such an underspecified pronoun.

5.6. Movement

The analysis as presented here assumes no syntactic *wh* movement. There doesn't seem to be any data at this stage that supports such an analysis of modifier questions, though the facts about this are hazy and we continue to explore them. If clear evidence could be found in favor of movement, the analysis as so far provided could be supplemented in a variety of ways. We could stipulate that in modifier questions the *wh* particle is born as a sister to the DCM it binds, and moves from there. Plausibly, it could leave behind a property-denoting trace that could be interpreted intersectively with the other components of the DCM. Indeed, if assuming movement proves to be warranted, it might make sense to view the mysterious agreement particle as an overt expression of the *wh* particle's trace.

## 6. Property *how*

In English, *how* has uses beyond manner questions:

(42)  a. How was the book?
      b. How is the weather?
      c. How is your cat?

Jaworski (2009) calls this 'property how'. In Ktunaxa, these questions function quite similarly to manner, time, and location questions. As with modifier questions, there is a *wh* particle and a DCM. However, the DCM, instead of containing the preverb suffix *-ł* has the stative suffix *qa*, which is often used to generate predicates of individuals (Morgan, 1991):

(43)  K̲a-s            k      ʔa-qa-qa      ʔin        kituq̓łiłqał
      WH.PARTICLE-OBV COMP AGR-WAY-STV DEM.NEUT book
      'How was the book?'

Like the modifier DCMs we have seen thus far, the property how DCM without the agreement marker *ʔa* also has an anaphoric reading in non-question contexts. For example, it's possible to describe one's cat as *suʔk* 'good' and then use DCM *qa-qa* to indicate that one's dog has this property as well:[5]

(44)  Ka      pus suʔk-ni  ȼ      ʔa·ki ka    xaɬȼin **qa-qa**-ni
      I.POSS cat good-IND COORD also I.POSS dog  way-STV-IND
      'My cat is nice and my dog is that way too.'

With some small but not entirely innocent modifications, our analysis can also capture their behavior. The property anaphor *qa* can be extended to cover not just events but arbitrary eventualities, including states. Then the stative marker *qa* will add the presupposition that the eventuality it applies to is a state:

(45)  a.  $[\![qa_P \ 'way']\!] = \lambda e \lambda w \, . \, P(e)(w)$
      b.  $[\![qa_P\text{-}qa \ 'way'\text{-}\text{STV}]\!] = \lambda s : \mathbf{state}(s) \, . \, \lambda w \, . \, P(s)(w)$

If we make the additional and controversial assumption that holders of states should be introduced in the way that Kratzer (1996) introduces agents, the resulting state description can then be existentially closed:

(46)  $[\![\exists \ qa_P\text{-}qa \ ʔin \ kituq̓tiɬqaɬ \ 'The \ book \ is \ that \ way.']\!]$
      $= \lambda w \, . \, \exists e[P(e)(w) \wedge \mathbf{holder}(e) = \mathbf{the \ book}]$

Then, as with our analysis of modifier questions, the state property can be bound by the *wh* particle *kas* and turned into an alternative set question denotation:

(47)  $[\![ka\text{-}s \ 'wh\text{-}\text{OBV}']\!] \, ([\![\lambda P_{\langle v,st \rangle} k \ \exists \ ʔa\text{-}qa_P\text{-}qa \ ʔin \ kituq̓tiɬqaɬ]\!])$
      $= \left\{ p \, : \, \exists P_{\langle v,st \rangle} \left[ p = \exists e \begin{bmatrix} \mathbf{holder}(e) = \mathbf{the \ book} \wedge \\ P(e)(w) \end{bmatrix} \right] \right\}$

It's worth acknowledging that extending the analysis to these property 'how' uses complicates our characterization of which questions use the bipartite strategy. The question in (47) is not a modifier question. It may well be that the relevant distinction among questions is not about arguments versus modifiers, but instead about types, with property questions on the one hand using the bipartite strategy and individual questions using the other strategy.

## 7. Final remarks
### 7.1. Summary
We have shown that Ktunaxa modifier questions differ interestingly from argument questions. As in Japanese, they use a two part strategy involving a high *wh* element and a low DCM. However, Ktunaxa also differs from Japanese in that its DCM is an anaphor, not an indefinite or indeterminate pronoun. The organization of readings is also different: modifier questions all share a single *wh* particle, and are potentially further disambiguated with DCMs, whose morphological structure is interesting and revealing. We take the *wh* particle to create question

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[5]It has not escaped us that the two crucially distinct elements we are discussing are homophonous. This is unfortunate.

denotations by binding the DCM. This intricate system for asking modifier questions expands the typology of two-part strategies for asking constituent questions.

### 7.2. The mysterious agreement marker

DCMs in *wh* questions are prefixed with the morpheme *ʔa-*, which we have characterized as a marker of agreement with the *wh* particle *ka-s*. We haven't yet seen evidence of it having any independent contribution. Some preliminary data suggests it might have one. DCMs with *ʔa-* also surface in the antecedent of unconditionals (Rawlins, 2008), exemplified in Ktunaxa in (48):

(48)  a.  Nin  hin  **ʔa**-qa-su·sa-ł        qałwiy, k-hu-¢            qsamunałis, hu-¢
          dem 2.SUBJ AGR-way-TEMP-PRVB need    COMP-I.SUBJ-FUT help          I.SG-FUT
          łaxax-i.
          come-IND
          'Whenever you need my help, I'll be here.'

      b.  Nin  hin  **ʔa**-qa-ł         hawasxumik, hu-¢        ¢łakił-ni.
          dem 2.SUBJ AGR-way-PRVB sing,           I.SUBJ-FUT like-IND
          'However you sing, I will like it.'

Like *wh* questions, unconditionals have been analyzed using alternative sets (Rawlins, 2008), and such phrases are expressed with *wh* morphology in English. Perhaps *ʔa-* within a DCM is not agreement with the *wh* particle *kas* but rather an indication of the presence of propositional alternatives.

### 7.3. Why questions and DCMs

In 5 we analyzed *qa-ł* as simply denoting a property of events. *Qa-ł* as a DCM is then receives a manner interpretation due to Maximize Presupposition—it lacks the additional morphology that would indicate a locative or temporal reading. This predicts the possible existence of non-manner readings of *qał*.

We find exactly this in some *why* questions. Questions that ask for reasons and causes in Ktunaxa can also use a two part strategy. The *wh* particle used for these is *qapsin*, not *kas*. However, *ʔaqał* still occurs in these questions just as it does for manner questions. For example, the question in (49) asks for a reason for Vi not being here:

(49)  Qapsin-s k-si-ł         ʔa-qa-ł         łu    Vi?
      WH-OBV  COMP-PROG-PRVB AGR-way-PRVB absent Vi
      'Why is Vi not here?'

While it is unclear thus far whether *qapsins* in this context can be analyzed similarly to *kas*, this example at least demonstrates that the morpheme *qa* has some uses that aren't transparently manner-like.

This connection between *why* and *how* questions is also a far more general phenomenon, with counterparts in e.g. Mandarin, English, and elsewhere (Tsai, 2008; Jaworski, 2009; Pak, 2017; Sandoval and Morzycki, pear; Nederveen and Rullmann, prep). For example, (50a) can be asked to question *how it is the case* that the addressee still uses Microsoft Word, which invites

similar answers to the why question counterpart in (50b):

(50)    a.  How are you still using Microsoft Word?
         b.  Why are you still using Microsoft Word?

The DCM *ʔaqaɬ* may therefore reflect not just that *qa* is an under-specified event modifier, but also the deeper conceptual connection between manners and reasons.

7.4.  The cross-linguistic picture

Ktunaxa reflects a grammatical strategy for asking modifier questions that doesn't appear to have previously been described. But in some respects, it's reminiscent of more familiar facts. While English primarily makes use of its wide *wh* word inventory to ask modifier questions, it can also employ what might be regarded as its own bipartite strategy:

(51)    a.  In what way is Floyd nice?
         b.  What place did you go to?
         c.  What time is the sunset?

Though *way*, *place*, and *time* are of course not anaphors, they share with Ktunaxa the use of a *wh* element working in tandem with an expression that isn't inherently interrogative. More generally, in many languages there are correspondences between *wh* modifiers and related anaphors. That includes English minimal pairs such as *what/that*, *when/then*, and *where/there*. Ktunaxa modifier questions are interesting in part because they make this connection so overtly and compositionally.

**References**

Anderson, C. and M. Morzycki (2015). Degrees as kinds. *Natural Language and Linguistic Theory 33*(3), 791–828.

Bochnak, M. R. and L. Matthewson (Eds.) (2015). *Methodologies in Semantic Fieldwork.* Oxford: Oxford University Press.

Dryer, M. (2002). A comparison of preverbs in Kutenai and Algonquian. In D. H. Pentland (Ed.), *Proceedings of the Twenty-Ninth Algonquian Conference*, pp. 63–94.

Gessner, S., T. Herbert, and A. Parker (2022). The report on the status of B.C. First Nations languages 2022.

Hamblin, C. L. (1971). Mathematical models of dialogue. *Theoria 37*, 130–155.

Heim, I. (1991). Artikel und definitheit [articles and definiteness]. In A. von Stechow and D. Wunderlich (Eds.), *Semantik: Ein internationales handbuch der zeitgenössischen forschung (Semantics: An International Handbook of Contemporary Research)*, pp. 487–535. Berlin: Walter de Gruyter.

Heim, I. and A. Kratzer (1998). *Semantics in Generative Grammar*. Oxford: Blackwell Publishing.

Hengeveld, K., S. Iatridou, and F. Roelofsen (2022). Quexistentials and focus. *Linguistic Inquiry 54*(3), 1–54.

Jaworski, W. (2009). The logic of how-questions. *Synthese 166*(1), 133–155.

Kratzer, A. (1996). Severing the external argument from its verb. In J. Rooryck and L. Zaring (Eds.), *Phrase Structure and the Lexicon*. Dordrecht: Kluwer Academic.

Kratzer, A. and J. Shimoyama (2002). Indeterminate pronouns: The view from Japanese. Paper presented at the 3rd Tokyo Conference on Psycholinguistics.

Landman, M. and M. Morzycki (2003). Event-kinds and the representation of manner. In N. M. Antrim, G. Goodall, M. Schulte-Nafeh, and V. Samiian (Eds.), *Proceedings of the Western Conference on Linguistics (WECOL) 2002*, Volume 14, Fresno, pp. 136–147. California State University.

Link, G. (1983). The logical analysis of plurals and mass terms: A lattice-theoretical approach. In R. Bäuerle, C. Schwarze, and A. von Stechow (Eds.), *Meaning, Use, and Interpretation of Language*, pp. 302–323. Berlin: Walter de Gruyter.

Link, G. (1998). *Algebraic semantics*. Stanford: CSLI Publications.

Manetta, E. (2013). Copy theory in wh-in-situ languages: Sluicing in Hindi-Urdu. *Journal of South Asian Linguistics 6*, 3—24.

McClay, E. K. (2017). *Focus in Ktunaxa: word order and prosody*. Ph. D. thesis, University of British Columbia.

Morgan, L. (1991). *A description of the Kutenai language*. Ph. D. thesis, University of California Berkeley.

Nederveen, S. and H. Rullmann (In prep.). Dutch hoezo. Ms., UBC.

Pak, M. (2017). Propositional 'how' questions and negation. In *Proceedings of the West Coast Conference on Formal Linguistics (WCCFL) 34*, pp. 423–430. Somerville, MA: Cascadilla Press.

Rawlins, K. (2008). *(Un)conditionals: an investigation in the syntax and semantics of conditional structures*. Ph. D. thesis, UC Santa Cruz.

Rett, J. (2013). Similatives and the argument structure of verbs. *Natural Language and Linguistic Theory 31*(4), 1101–1137.

Sandoval, S. and M. Morzycki (to appear). A modal analysis of propositional 'how'. In *Proceedings from WCCFL 41*. Cascadilla Proceedings Project.

Szabolcsi, A. and F. Zwarts (1993). Weak islands and an algebraic semantics for scope taking. *Natural Language Semantics 1*(3), 235–284.

Tsai, W.-T. D. (2008). Left periphery and how-why alternations. *Journal of East Asian Linguistics 17*(2), 83–115.

Zhou, K. Y. (In prep). Dissertation, University of British Columbia.