

A Variable-Force Variable-Flavor Attitude Verb in Koryak*

Maša Močnik and Rafael Abramovitz

Massachusetts Institute of Technology
{mocnik, rafabr}@mit.edu

Abstract

We enrich the typology of modal expressions with the attitude verb *ivək* from Koryak, which shows a wide range of flavors (doxastic, bouletic, assertive, directive) and is the first documented variable-force attitude verb. Variation in both domains goes against the universal that modal items can't vary in both force and flavor (Nauze 2008). We use the existential-universal doxastic-assertive variation to argue against this generalization. For the bouletic flavor, we show that it is triggered by the material in the embedded clause; we propose a new technical way of composing the bouletic flavor at LF.

1 Introduction

Research on understudied languages has uncovered modal systems that carve up the space of modal meaning differently from the English modals.¹ For example, St'át'imcets *k'a* has a fixed epistemic flavor but varies in force (possibility, necessity) (Rullmann et al. 2008, henceforth RMD). Nauze (2008) suggests that there is limited variability along these two dimensions²:

- (1) Modal elements [...] either vary on the [flavor] axis and thus are polyfunctional in the original sense of expressing different types of modality or they vary on the [force] axis and can express possibility and necessity, but they cannot vary on both axes. (p. 222)

English attitude verbs have traditionally been treated as modal items with a (lexically) fixed force and flavor (e.g. *think*: necessity force, doxastic flavor). Recent work on understudied languages has shown some variability within this class of expressions, too. Navajo *nízin* (Bogal-Allbritten 2016), for example, at least on the surface appears to vary in flavor: it has doxastic ('think') and bouletic ('want', 'hope') uses.

This paper puts forth a counterexample to (1) with an attitude verb from the Chawchuvén dialect of Koryak³, henceforth 'Koryak'. *Ivək*, typically translated out of the blue as 'say' (**assertive**), is also used as a **doxastic** ('think', 'allow for the possibility'), **bouletic** ('hope', 'fear', 'wish'), and **directive** ('tell/order', 'propose/suggest') attitude. The directive flavor requires transitive agreement and we set it aside here.⁴ Consider (2)–(3).

*Special thanks to Kai von Fintel and Roger Schwarzschild for commenting on earlier drafts. Thanks also to Elizabeth Bogal-Allbritten, Jonathan Bobaljik, Luka Crnić, Ksenia Ershova, Sabine Iatridou, and the LFRG audience. We are deeply grateful to our Koryak teachers: O. K. Aleksejeva, L. A. Aslapova, L. J. Avilova, E. I. Dedyk, L. P. Kiseljova, N. S. Kuznetsova, S. N. Moisejeva, T. I. Nutelxut, A. E. Urkachan, G. N. Xarjutkina, and especially V. R. Dedyk. R. Abramovitz is partially supported by an NSF GRF under grant no. 1122374.

¹Matthewson et al. 2005, Rullmann et al. 2008, Vander Klok 2008, Deal 2011, Bochnak 2015a,b, a.o.

²See Bochnak (2015a,b) for a Washo modal verb counterexample.

³Koryak is a highly endangered Chukotko-Kamchatkan language spoken in northern Kamchatka (Russia). Our transcription uses the IPA, except that we use *č* for the voiceless alveolo-palatal affricate.

⁴The directive flavor is essentially contributed by the obligatory infinitive or imperative.

- (a) tikwi {jənnəmatək / qənnəmatyən} təllətəl
ivək.1SG>2SG.PST {close.INF / close.2SG>3SG.IMP} door
'I told you to close the door.' [translation from Russian to Koryak]

- (2) *meλλo kivəŋ, (əno) kumuqetəŋ*
 Melljo *ivək*.3SG.PRS that rain.3SG.PRS
 ‘Melljo {says, thinks, allows, hopes, fears, *knows, *imagines, *wishes} that it’s raining.’
- (3) *meλλo kivəŋ, (iwke) nəʔəmuqetən*
 Melljo *ivək*.3SG.PRS if.only rain.3SG.CF
 ‘Melljo wishes it would rain.’

The assertive, doxastic, and some bouletic readings of *ivək* are available without special marking in the embedded clause, see (2). Example (2) also indicates that *ivək* is not a completely underspecified attitude verb – there are certain meanings, e.g. ‘imagine’, that are not available. For the bouletic ‘wish’, the embedded clause needs the counterfactual prefix *ʔ-*, see (3).⁵

We analyze *ivək* as an attitude verb whose domain of possible-worlds quantification is underspecified for the doxastic-assertive distinction (modeled with a modal-base-like variable) and whose quantificational force varies due to a restriction on an underlying universal quantifier (in the spirit of RMD). By contrast, we argue that the bouletic flavor is not one of the flavors of *ivək* and is instead triggered by the material in the embedded clause (overt for ‘wish’ and covert for ‘hope’ and ‘fear’). While this has been proposed for the Navajo *nizín* (Bogal-Allbritten 2016), our innovation is to show that the bouletic meaning can be split at LF into a matrix-clause *doxastic quantifier* and an embedded-clause preference item.

After a comment on methodology (§1.1), we turn to each of the three components in turn: the doxastic flavor and its force variability (§2), the assertive flavor and its underspecification with respect to the doxastic one (§3), and the bouletic flavor with its origins in the embedded clause (§4). Each section presents the empirical argument, followed by the analysis.

1.1 Elicitation Methodology

We employ an elicitation technique that we call a “matching task”.⁶ We provide a context (typically in Russian) and two sentences: a Koryak one and a Russian one. The speakers are first asked to provide a contextual felicity judgment on the Koryak sentence, and then are asked whether it can express the same ‘thought’ (Rus. *mysl’*) as the Russian one in the given context.⁷

The motivation for using this new elicitation technique is that the existing ones have proven to be inadequate for eliciting our data in Koryak. We will briefly describe the issues we encountered and provide motivation for using this technique in fieldwork more generally.

The second author’s previous work with our Koryak consultants showed that they are prone to ignoring salient features of the context, whether it is provided verbally or pictorially. Therefore, eliciting a purely contextual felicity judgment is not sufficient. Asking the speaker to explain how they understood the Koryak sentence (in order to check to what extent the context was ignored) is also not sufficient because the speakers import features of Koryak into Russian, producing infelicitous Russian sentences.⁸ For example, the speakers use ‘think if only’ to translate sentences like (3), even though this is not the locution for expressing wishes in Russian. By contrast, when asked to translate *želat’* (‘wish’) into Koryak, the speakers had no trouble using *ivək*. We thus found that the best elicitation technique was to use a matching

⁵Many speakers prefer to add *iwke* ‘if only’ to the embedded clause, whereas others merely tolerate it.

⁶Unless otherwise indicated, the examples provided in this paper were obtained in this manner.

⁷Using *mysl’* worked well, unlike ‘meaning’ (Rus. *značeniye*), which triggered a word-for-word translation.

⁸Interestingly, RMD (fn. 32) note a similar issue for “*k’a p & k’a -p*”, for which the consultant offered an infelicitous English translation.

task, where the context was aided by the Russian sentence. In this task we found consistent results. Importantly, this technique allowed us to also obtain infelicity judgments.

To illustrate the effect of the matching task, let us consider a concrete example. The speaker was provided with (4), where the context and the target sentences were all in Koryak. The speaker at first rejected it, expressing confusion as to how Hewngyto could think two incompatible things. When the speaker was explicitly asked whether *ivək* could mean *dopuskat* ‘allow for the possibility’ in this discourse, the speaker readily confirmed this and changed her judgment about the coherence of the discourse. We observed similar effects when the speakers had been previously exposed to *dopuskat* during the elicitation session. In the absence of previous exposure or a matching task, the judgments across speakers were not stable enough to warrant further inquiry, for example to test whether a piece of information can bias the weak meaning of *ivək*.

2 Variable-force doxastic flavor

Doxastic attitudes are attested not just in the necessity force (*think, believe*) but also in the possibility force (see Močnik (2019a,b) on Slovenian *dopusčati* ‘allow for the possibility’). While the necessity force of *ivək* is the default (speakers have a preference for the ‘say’ translation), the possibility force reading is felicitous too, as shown in (4).

- (4) Hewngyto is walking down the street. Melljo sees him and asks: ‘Where is your wife? Is she making jam at home?’ He replies:

qoo. təkivəŋ əno kotavareŋjaŋəŋ jajak.
dunno *ivək*.1SG.PRS that make.jam.3SG.PRS at.home

‘I don’t know. I allow for the possibility that she’s making jam at home.’

He continues walking. Qechghylqot sees him and asks: ‘Where is your wife? Is she picking berries in the forest?’ Hewngyto replies:

qoo. təkivəŋ əno keluŋ umkək.
dunno *ivək*.1SG.PRS that pick.berries.3SG.PRS in.forest

‘I don’t know. I allow for the possibility that she’s in the forest picking berries.’

Importantly, force variability does not arise with all attitude verbs in Koryak. For example, *əmalavək* (‘believe’) is infelicitous on a possibility reading in (5), in contrast to *ivək* in (6). This argues against a general, covert variable-force item in the Koryak embedded clause.

- (5) #ʔewŋəto kolmalavəŋ əno kumuqetəŋ, ʔam ʔopta kolmalavəŋ əno uŋje emuqetke.
H. believe.3SG.PRS that rain.PRS but also believe.3SG.PRS that NEG rain

‘Hewngyto allows that it is raining but also allows that it is not raining.’ (intended)

- (6) ʔewŋəto kivəŋ əno kumuqetəŋ, ʔam ʔopta kivəŋ əno uŋje emuqetke.
H. *ivək*.3SG.PRS that rain.3SG.PRS but also *ivək*.3SG.PRS that NEG rain

‘Hewngyto allows that it is raining but also allows that it is not raining.’

In downward entailing contexts, the strong assertive interpretation (‘say’) of *ivək* remains the default one. As shown in (7), the possibility reading is accepted in a matching task though.

- (7) We’re walking down the street and there are many people with raincoats. Melljo says:

əməŋ ʔujemtewilʔu mekiw ewləj əno jemuqetiki nejetən muqeicʔən
all people who *ivək*.3PL.PRS that rain.FUT.IPFV bring.3PL>3SG.PST raincoat

‘Everybody who said that it will rain brought a raincoat.’ [volunteered]

‘Everybody who allowed that it will rain brought a raincoat.’ [accepted]

Under negation, there are two readings. Consider first a conjunction of two *ivək* statements without syntactic negation, as in (8a). The necessity interpretation of *ivək* (the speaker believes the ball to be both white and black) is infelicitous, while the possibility interpretation is acceptable (the ball could be white or black). The judgment for (8b) is that it expresses the same thought as (8a), felicitous in this context, but that it also expresses another thought that is infelicitous in this context (namely, the one where the ball is half white and half black).⁹

(8) Two balls are in a box: one white, one black. I pull out one and do not show it to you.

a. təkivəŋ əno əŋŋin qapəl nilyəqin to təkivəŋ əno əno luqin
ivək.1SG.PRS that that ball white and *ivək*.1SG.PRS that it black
 ‘I allow that the ball is white and I allow that it is black.’

b. uŋje iwke təkiteŋ əno əŋŋin qapəl nilyəqin to uŋje iwke təkiteŋ əno
 NEG *ivək* AUX.1SG.PRS that that ball white and NEG *ivək* AUX.1SG.PRS that
 əno luqin
 it black

‘I don’t think that the ball is white and I don’t think that it is black.’

The felicitous interpretation of (8b) could be obtained via: (i) negated necessity or (ii) possibility with neg-raising. Similarly, the infelicitous (half-white-half-black) interpretation could be obtained through (i’) necessity with neg-raising or (ii’) negated possibility. Thus, the felicitous and the infelicitous reading of (8b) are consistent with assigning a single force to *ivək* and using neg-raising to obtain the other reading. The English translation, for example, seems to have the infelicitous reading too, though it is much dispreferred (to force it, it helps to insert an overt ‘only’ in the embedded clause). Notice that resorting to neg-raising would not be sufficient to account for the double reading in (7) since there is no negation in that example.¹⁰

We conclude the empirical portion of this section with a brief note on the role of epistemic adverbials. Recall that *ivək* needs no embedded material to be felicitous on most readings, as shown in (2). Nevertheless, the embedded clause may contain epistemic adverbials to facilitate the weaker reading. We illustrate with *amu* (‘might’; used to form *wh*-indefinites).

(9) a. yəmmo təkivəŋ, amu jemuqeju?əŋ
 I *ivək*.1SG.PRS might begin.to.rain.3SG.FUT

‘I allow for the possibility that it will rain.’ [trans to Koryak]

b. ɣewŋəto kivəŋ, əno (amu) qəjəwjeɣəpəlʔo və?əjək jəpkejɣəŋ ənəkənəmənəmetəŋ
 H. *ivək*.3SG.PRS that might herders soon arrive.3PL.FUT to.his.village

‘Hewngyto hopes that the reindeer herders will soon arrive to his village.’

Speakers have occasionally insisted on using *amu*, though no generalization as to when it is obligatory is forthcoming. We suspect that the weaker reading is simply harder to access, and that adverbs like *amu* facilitate it.¹¹

⁹Note that the non-future negated form of the verb *ivək* is *iwke*, which is formed by combining the default agreement/negative circumfix *e-ke* with the root *iv-* and applying the normal phonological rules of the language. We take this form’s homophony with the particle *iwke* ‘if only’ (3) to be a synchronic accident.

¹⁰We have been unable to confirm the existence of existential versions of ‘say’, ‘wish’ and ‘hope/fear’.

¹¹This may be related to RMD’s observation that St’át’imcets *sxək* (‘maybe’) is frequently used in clauses with variable-force modals when the possibility reading is intended.

RMD develop an analysis of the St'át'imcets epistemic modal *k'a* as a universal quantifier whose modal force is modulated by a “modal choice function” f in (10a) (cf. Lewis 1974, Stalnaker 1975). Since f in (10a) selects a set of possible worlds (rather than a world), we'll refer to it as a “subset selection function” (cf. von Stechow 1999b).

- (10) a. $f_{(st)st}$ is a function s.t. for any non-empty set of worlds W : $f(W) \subseteq W$ and $f(W) \neq \emptyset$
 b. $[[\text{modal}]]^{c,w}$ is only defined if c provides a modal base B .
 $[[\text{modal}]]^{c,w} = \lambda f_{(st)st} \lambda p_{st} . \forall w' [w' \in f(B(w)) \rightarrow p(w')] \quad (\text{RMD 2008, pp. 337–338})$

The authors provide the example *t'cum k'a kw s-John* (‘John must/may have won’) in a situation where the speaker knows that John played bingo and that he is spending a lot of money today. If f is the identity function (assumed to be the default, hence the preference for a necessity interpretation), there is no effect on the modal base, so the strong reading obtains (‘John must have won’). Alternatively, f can pick out a proper subset of the modal base, for instance, by restricting it to those worlds in which John is unemployed.¹² Proper subset selection yields the weak reading ‘John may have won’.¹³

Since *ivak* parallels *k'a* in its preference for a necessity interpretation, we adopt the idea that *ivak* denotes a universal quantifier whose force is restricted by a subset selection function. There are two differences between our data and those of RMD: (i) unlike the epistemic *k'a*, which always outscopes negation, *ivak* has two readings in the presence of a negation in the same clause, see (8b), and (ii) to ensure consistent results, *ivak* needed to be paired up with a translation in a matching task, cf. §1.1. This means that it would not have been reliable to test the felicity of *ivak* in a situation where a piece of evidence, such as John being unemployed, was salient and would therefore trigger the weak reading of *ivak*.

Instead of combining *ivak* with a subset selection function as a sister node at LF, as in (10b), we follow a suggestion by Roger Schwarzschild (p.c.) to encode existential quantification over the subset selection function in the denotation of *ivak* and restrict its choices to either the identity function (default) or to the space of all subset selection functions (that apply). We will incorporate this suggestion as in (11), with an object language variable that is presuppositionally constrained to these two options. We write the restrictions on C in set notation for simplicity.

- (11) Denotation of *ivak* (to be amended for flavor)
 $[[ivak]]^{c,g,w} = \lambda C \lambda p \lambda x : C = \{f \mid f(\mathcal{B}_w^x) = \mathcal{B}_w^x\} \vee C = \{f \mid f(\mathcal{B}_w^x) \subseteq \mathcal{B}_w^x \wedge f(\mathcal{B}_w^x) \neq \emptyset, \exists f \in C [\forall w' \in f(\mathcal{B}_w^x) [p(w') = 1]]\}$, where \mathcal{B}_w^x is the set of worlds compatible with x 's beliefs at w and C is a cover that limits the choice of $f_{(st)st}$ (so that f is either the identity function or some subset selection function on \mathcal{B}_w^x)

Examples like (4) and (6) would be contradictory if the domain of quantification were constant across the two *ivak* statements (cf. universal quantification over non-disjoint sets). Take (6). Let's use \mathcal{C}_{id} (Option 1; assumed to be the default strategy) and \mathcal{C}_{all} (Option 2) for the two resolutions of C under g . Option 1 yields a contradiction, while Option 2 yields a felicitous interpretation (there needs to be one f for which it is raining in all the worlds in its output and one f for which it is not).¹⁴

- (12) $[[(6)]]^{c,g,w} = 1$ iff $\exists f \in g(C) [\forall w' \in f(\mathcal{B}_w^h) [r(w')]] \wedge \exists f \in g(C) [\forall w' \in f(\mathcal{B}_w^h) [\neg r(w')]]$
 Option 1 (infelicitous): $\forall w' \in \mathcal{B}_w^h [r(w')] \wedge \forall w' \in \mathcal{B}_w^h [\neg r(w')]$
 Option 2 (felicitous): $\exists f \in \mathcal{C}_{all} \forall w' \in f(\mathcal{B}_w^h) [r(w')] \wedge \exists f \in \mathcal{C}_{all} \forall w' \in f(\mathcal{B}_w^h) [\neg r(w')]$

¹²Note that the speaker cannot *know* that John is unemployed, otherwise ‘John is unemployed’ would be true throughout the modal base, so f would not be selecting a proper subset

¹³They set aside ordering sources and their relationship to the function in (10a).

¹⁴In RMD, see ex. (58)–(59), the function is simply existentially closed in each conjunct.

Consider now (8b). The felicitous reading is obtained via Option 1.¹⁵

- (13) $[[\text{(8b)}]]^{c,g,w} = 1$ iff $\neg\exists f \in g(C)[\forall w' \in f(\mathcal{B}_w^h)[b(w')]]$ and $\neg\exists f \in g(C)[\forall w' \in f(\mathcal{B}_w^h)[\neg b(w')]]$
 That is, $\forall f \in g(C)[\exists w' \in f(\mathcal{B}_w^h)[\neg b(w')]]$ and $\forall f \in g(C)[\exists w' \in f(\mathcal{B}_w^h)[b(w')]]$
 Option 1 (felic): $\exists w' \in \mathcal{B}_w^h[\neg b(w')] \wedge \exists w' \in \mathcal{B}_w^h[b(w')]$
 Option 2 (infelic): $\forall f \in \mathcal{C}_{all}[\exists w' \in f(\mathcal{B}_w^h)[\neg b(w')]] \wedge \forall f \in \mathcal{C}_{all}[\exists w' \in f(\mathcal{B}_w^h)[b(w')]]$

Option 2 is felicitous only if both balls are half white and half black (\mathcal{C}_{all} contains functions that yield singleton sets, for example).¹⁶

3 Underspecified assertive flavor

What is the relationship between the doxastic and the assertive flavor of *ivək*? By contrast to the bouletic flavor (see §4), we have no evidence to suppose that this distinction is triggered by something other than *ivək*. There are two basic options then: (i) there is a single lexical entry or (ii) there are two: *ivək*₁ ‘think’ and *ivək*₂ ‘say’ (polysemy). The generalization in (1) could in principle address a theoretical choice between these two.

The formal semantics tradition follows Kratzer (1977, 1981, 1991) in adopting a version of (i) for modal verbs, whereby a modal-base variable receives different values in different contexts. Arguments against this view and in favor of (ii) have been offered though, see Viebahn and Vetter (2016) in particular. Nauze (2008) also argues for a polysemous account of modals. We will take it then that the debate between (i) and (ii) is not what (1) is about.

For English, Kratzer (1991) has noted that adverbial expressions like *according to the law* can be used to *specify* the flavor. We observe that in Koryak adverbial markers of manner (‘openly’, ‘with words’, ‘secretly’, ‘to self’) seem to play a similar role, as shown in (14).

- (14) A teacher is always complaining to his wife about how bad his students are. One day, the principal asks him about his students, and he tells him that they are great.
- a. inenyəjulevəčʔən ivi əno ənɪnew jejyučewŋəʔɪu meʔʔaŋ kojajɣočawŋəʔəŋ ʔam
 teacher *ivək*.3SG.PST that his students well study.3PL.PRS but
 #(čɪnɪn) ivi əno əčču qekwaŋ kojajɣočawŋəʔəŋ.
 self *ivək*.3SG.PST that they badly study.3PL.PRS
 ‘The teacher said that his students studied well but thought to himself that they studied badly.’
- b. inenyəjulevəčʔən ivi əno ənɪnew jejyučewŋəʔɪu qekwaŋ kojajɣočawŋəʔəŋ ʔam
 teacher *ivək*.3SG.PST that his students badly study.3PL.PRS but
 #(?ojaŋ) ivi əno əčču meʔʔaŋ kojajɣočawŋəʔəŋ
 openly *ivək*.3SG.PST that they well study.3PL.PRS
 ‘The teacher thought that his students studied badly but openly said that they studied well.’

Formally, we will model the flavor variation of *ivək* as a version of (i).¹⁷ We use a free (modal-base-like) variable *i* that gives a set of possible words for an agent *x* and a world *w*, as

¹⁵RMD would derive this with a clause-level existential closure.

¹⁶In the system of RMD, Option 2 could be obtained by applying the existential closure below negation.

¹⁷Roger Schwarzschild (p.c.) points out that negation could be used to rule out a disjunctive fleshing-out of option (i). We indeed observe that the example below is infelicitous. If *ivək* denoted ‘The teacher thought or said that the students studied badly’, then negating the disjunction would rule out both thinking and saying, which would be inconsistent with the continuation that the teacher believed that the students studied badly.

(a) Context: The school principal goes into the classroom of a teacher whose students are doing poorly in

in (15).¹⁸ The flavor restriction comes in as a presupposition on the variable, following RMD and others, so that for *ivək* it is either the set of *x*'s belief worlds at *w* (\mathcal{B}_w^x) or the set of *x*'s sayings at *w* (\mathcal{S}_w^x). The rest of the notation is as in (11).

- (15) Denotation of *ivək* (final): $\llbracket ivək \rrbracket^{c,g,w} = \lambda i \lambda C \lambda p \lambda x: (i(x)(w) = \mathcal{B}_w^x \vee i(x)(w) = \mathcal{S}_w^x) \wedge (C = \{f \mid f(i(x)(w)) = i(x)(w)\} \vee C = \{f \mid f(i(x)(w)) \subseteq i(x)(w) \wedge f(i(x)(w)) \neq \emptyset\})$.
 $\exists f \in C [\forall w' \in f(i(x)(w)) [p(w') = 1]]$

4 Bouletic flavor via the embedded clause

This section makes an empirical and a theoretical point. Empirically, we show that the apparent bouletic flavor of *ivək* ('hope', 'fear', 'wish') is in fact due to the semantics of *ivək* in combination with material in the embedded clause. This has been previously argued also for the Navajo *nizín* (Bogal-Allbritten 2016), and it gives support for the idea (Heim 1992, von Fintel 1999a) that bouletic verbs like *hope* or *wish* encode a doxastic component, contra Anand and Hacquard (2013) for 'wish'. The technical contribution of this section is to show that we can arrive at the bouletic meaning at LF even if the doxastic quantifier (*ivək* on the doxastic interpretation) is not a clause-mate with the preference component. In this respect we differ from Bogal-Allbritten, who takes *nizín* to be a predicate over situations (and not a quantifier).

Consider the difference between *γajmatək* ('want/wish') and *ivək* in (16). The bouletic meaning of the former but not the latter is found in nominalizations.

- (16) a. *γajmat-γəjɲən* (*γajmat*-NMLZ.ABS.SG) 'wish/desire'
 b. *ek-wəjɲən* (*ivək*-NMLZ.ABS.SG) 'utterance, thought, sth. allowed, *hope, *fear, *wish'

Furthermore, when *ivək* embeds two clauses, as below, these two clauses can differ with respect to the presence or absence of the bouletic meaning, showing that the bouletic meaning is contributed to by the embedded clause – see Bogal-Allbritten (2016, pp. 149–151) for argumentation (including a discussion of gapping) and the use of this test with English.

- (17) *təkivəŋ* [əno tatjana kotvaŋ novosibirskək] to [əno ečyi kukəčviŋletəŋ]
ivək.1SG.PRS that Tatiana be.3SG.PRS in.Novosibirsk and that today happy.3SG.PRS
 'I think that Tatiana is in Novosibirsk and I hope that she is happy today.'
- (18) Hewngyto and Qechghylqot are competing in a race, and I want Hewngyto to win.
təkivəŋ [əno ʔewŋəto jenalvatəŋ] ʔam [əno ewənčam qečɣəlqot jenalvatəŋ]
ivək.1SG.PRS that H. win.3SG.FUT but that nonetheless Q. win.3SG.FUT
 'I hope that Hewngyto will win, but I allow that nonetheless Qechghylqot will win.'
- (19) ʔewŋəto kivəŋ [əno mełlo mitʔajin] to [iwke nəʔəŋawtəŋən ənək]
 Hewngyto *ivək*.3SG.PRS that Melljo beautiful and if.only marry.3SG.CF her
 'Hewngyto thinks that Melljo is beautiful and wishes he would marry her.'

class, and asks the teacher how the students are doing. The teacher doesn't want to disappoint him, so he says, 'The students are doing well'.

inenɣəjulevəčʔən uŋɣe iwke itti, əno ənnew jejyucəwŋəlʔu qekwaŋ kojajyočawŋələŋ, ʔam ŋanko
 teacher NEG *ivək* AUX.3SG.PST that his students badly study.3PL.PRS but then
 ləmalave, əno qekwaŋ kojajyočawŋələŋ.
 believe.3SG.PST that badly study.3PL.PRS

'The teacher did not say that his students studied badly, but he believed then that they studied badly.'

¹⁸Adopting this for attitude verbs is not new, see von Fintel (1999a).

For the doxastic-assertive reading of the conjuncts, however, preliminary results in (20) show the opposite behavior.¹⁹ This is consistent with our proposal since we do not take the doxastic-assertive distinction to be contributed to by the embedded clause.

- (20) A principal enters the classroom of a teacher whose students are doing poorly in class and asks him how the students are doing. The teacher doesn't want to disappoint the principal, so he says 'The students are doing well'.

#inenyǝjulevǝǝʔǝn ivi ǝno ǝnnew jejyufǝewǝlʔu metʔǝj kojajyǝǝawǝlǝj ʔam ǝno
 teacher *ivǝk*.3SG.PST that his students well study.3PL.PRS but that
 qekwǝj kojajyǝǝawǝlǝj
 badly study.3PL.PRS
 'The teacher said that his students are studying well but thought that they were studying badly.' (intended)

We do not have the space to discuss the distinction between 'hope' and 'fear'.²⁰ Note, however, that (21) shows that the orientation of the preference is not specified in the covert item that we end up placing in the embedded clause.²¹ This test is also based on Bogal-Allbritten (2016).

- (21) Hewngyto and Vanja are in a race. Qotaw and I have bet money on the winner: I bet money on Hewngyto, and Qotaw bet on Vanja.

muji qotaw mǝtkivǝj [amu ʔewǝǝto jenalvatǝj ʔijek]
 we.two Qotaw *ivǝk*.1DU.PRS might Hewngyto win.3SG.FUT in.the.race
 'I hope and Qotaw fears that Hewngyto will win the race.'

We propose that the bouletic meaning arises from the material in the embedded clause. For 'wish' we will simply encode it into the semantics of the counterfactual mood while for 'hope' we will attribute it to a covert item.²²

Our technical contribution is to unpack the semantics many have proposed for verbs like *wish* and distribute it between *ivǝk*, since it can be a doxastic quantifier, and an item in the embedded clause that encodes a preference for the prejacent. The challenge is that it is standardly assumed that preferences are not evaluated in the belief worlds, see $>_w^x$ in (22), which means that the item that we propose for the embedded clause needs access to the matrix world of evaluation.

- (22) If defined, $\llbracket \text{wish} \rrbracket^{g,c}(\geq, p, x, w) = 1$ iff $\forall w' \in \mathcal{B}_w^x : \text{SIM}(w', \text{rev}_p(\mathcal{B}_w^x) \cap p) >_w^x w'$ (Crnič 2011, p. 75) (based on Heim 1992, p. 204)

¹⁹This is perhaps unsurprising given that adverbial help was needed when we had two *ivǝk*'s, in (14).

²⁰We also note briefly here that various epistemic adverbials can express a speaker-oriented desire reading in matrix clauses (e.g. 'I hope it'll be hot' is translated to Koryak as *amu jatyǝlpǝj* (might be.hot.3SG.FUT)).

²¹The example contains the adverb *amu*, which facilitates the possibility reading. There are also adverbs that specify the direction of the preference, e.g. *wǝjǝnvan* 'fortunately', which is only acceptable with the 'hope' reading: (a) *tǝkivǝj wǝjǝnvan mitiw tǝjǝpǝtǝkujǝn wuǝǝin vetyǝjǝjǝn* (*ivǝk*.1SG.PRS fortunately tomorrow finish.1SG>3SG.FUT this work) 'I hope that I will finish this work tomorrow' versus (b) *tǝkivǝj (#wǝjǝnvan) mitiw qǝjǝm mǝpǝtǝkun wuǝǝin vetyǝjǝjǝn* (*ivǝk*.1SG.PRS fortunately tomorrow NEG.FUT finish.1SG>3SG this work) 'I fear that I will not finish this work tomorrow' (intended).

²²A more precise analysis would build the meaning of 'wish' from the counterfactual mood and 'want', see Iatridou (2000). Since *ivǝk* does not mean 'want', we will not encode a connection between the 'hope' reading and the 'wish' reading, but will provide two separate lexical entries. Furthermore, we have not yet uncovered a fear-version of 'wish' (possibly due to the lack of a suitable matching item in Russian, see §1.1), where 'I *ivǝk* that I was happy' would presuppose that I am not happy and assert that being happy is dispreferable.

To solve this, we build on Yalcin’s (2007) idea that the index of evaluation contains (in addition to the world of evaluation) an information state (a set of worlds) and that attitude verbs shift this parameter (e.g. to the set of belief worlds). Instead of $\llbracket \cdot \rrbracket^{g,w}$ (where g is the assignment function), Yalcin proposes $\llbracket \cdot \rrbracket^{g,\langle w,s \rangle}$ where s is an information state. The information state is contextually determined in the matrix and is shifted by a verb like *believe* to, say, \mathcal{B}_w^x (the set of x ’s beliefs at w). The modification we propose is to replace this notion of an information state (a set of worlds) with the triple that produces it $\llbracket \cdot \rrbracket^{g,\langle w,\langle a,v,I \rangle \rangle}$: the information state holder (a), the world from which the state is generated (v), and the way in which it is generated (I of type *esst*). That is, replace \mathcal{B}_w^x with $\langle x,w,\mathcal{B} \rangle$. Since we use subset selection functions like f , we replace $f(\mathcal{B}_w^x)$ with $\langle x,w,\lambda y\lambda v.f(\mathcal{B}_v^y) \rangle$. This allows the counterfactual mood to access the matrix world of evaluation, as in (23). The denotation of *ivək*, in (24), changes only in that the information state gets updated.²³

$$(23) \quad \text{If defined, } \llbracket \text{CF} \rrbracket^{c,g,\langle w',\langle a,v,I \rangle \rangle}(p) = 1 \text{ iff } \text{SIM}(w', \text{rev}_p(\mathcal{I}_v^a) \cap p) >_v^a w'$$

$$(24) \quad \llbracket \text{ivək} \rrbracket^{c,g,\langle w',\langle a,v,I \rangle \rangle}(i)(C)(p)(x) \text{ is defined only if } i(x)(w) = \mathcal{B}_w^x \text{ or } i(x)(w) = \mathcal{S}_w^x, \text{ and } \\ C = \{f \mid f(i(x)(w)) = i(x)(w)\} \text{ or } C = \{f \mid f(i(x)(w)) \subseteq i(x)(w) \wedge f(i(x)(w)) \neq \emptyset\} \text{ and,} \\ \text{if defined, is true iff } \exists f \in C [\forall w' \in f(i(x)(w)) [p(\langle w', \langle x,w,\lambda y\lambda v''.f(i(y)(w'')) \rangle) \rangle] = 1]]$$

By contrast, the ‘hope’ and ‘fear’ readings of *ivək* have no obligatory overt reflex in the embedded clause, recall (2). We postulate a covert item DES in the embedded clause that plays the analogous role to the counterfactual mood (cf. fn. 22).

$$(25) \quad \text{If defined, } \llbracket \text{hope} \rrbracket^{g,c}(\geq, p, x, w) = 1 \text{ iff } \forall w' \in \mathcal{B}_w^x : \text{SIM}(w', \mathcal{B}_w^x \cap p) >_w^x \text{SIM}(w', \mathcal{B}_w^x \setminus p) \\ (\text{Crnić 2011, p. 76}); \text{ (roughly, for any belief world } w': x \text{ prefers } p \text{ at } w')$$

$$(26) \quad \text{If defined, } \llbracket \text{DES} \rrbracket^{c,g,\langle w',\langle a,v,I \rangle \rangle}(p) = 1 \text{ iff} \\ [\text{SIM}(w', \mathcal{I}_v^a \cap p) >_v^a \text{SIM}(w', \mathcal{I}_v^a \setminus p)] \vee [\text{SIM}(w', \mathcal{I}_v^a \setminus p) >_v^a \text{SIM}(w', \mathcal{I}_v^a \cap p)] \\ \text{(roughly, } a \text{ prefers } p \text{ at } w' \text{ or } a \text{ disprefers } p \text{ at } w', \text{ where } a \text{'s preference is set at } v)$$

The disjunction in (26) is one way of encoding the idea that *ivək* seems to be unspecified for the direction of the preference (that is, between ‘hope’ vs ‘fear’), see (21). We do not know whether *ivək* also has a ‘mixed-feelings’ reading. This reading would be one where in some some doxastic worlds p is preferred and in others $\neg p$ is preferred. If this reading turns out to not be available, one can place a homogeneity condition (as a definedness condition) on the preference ($>$) relation.

5 Conclusion

We have documented a variable-force (existential, universal) variable-flavor (doxastic, assertive) attitude verb *ivək* from Koryak. *Ivək* joins the Washo variable-force variable-flavor modal *e?* (Bochnak 2015a) in counterexemplifying a proposed universal on modal items that bans variation in both force and flavor. What is new is that we have shown that this generalization does not hold for attitude verbs. *Ivək* also joins the Navajo *nízin* (Bogal-Allbritten 2016) in

²³We use intensional FA. Example: If defined, $\llbracket \text{John} [\llbracket \text{ivək } i \rrbracket C] [\text{that CF it's raining}] \rrbracket^{c,g,w,\langle a,v,I \rangle} = 1$ iff $\llbracket \text{ivək} \rrbracket^{c,g,w,\langle a,v,I \rangle}(g(i))(g(C))(\llbracket \text{that CF it's raining} \rrbracket_e^{c,g})(\text{John}) = 1$ iff $\exists f \in g(C) \forall w' \in f(g(i)(\text{John})(w)) : \llbracket \text{that CF it's raining} \rrbracket_e^{c,g}(w', \langle \text{John}, w, \lambda x\lambda v.f((g(i)(x)(v))) \rangle) = 1$ iff $\exists f \in g(C) \forall w' \in f(g(i)(\text{John})(w)) : \llbracket \text{that CF it's raining} \rrbracket^{c,g,\langle w',\langle \text{John},w,\lambda x\lambda v.g(C)((g(i)(x)(v))) \rangle \rangle} = 1$ iff $\exists f \in g(C) \forall w' \in f(g(i)(\text{John})(w)) : \text{SIM}(w', \text{rev}_\varphi(f(g(i)(\text{John})(w))) \cap \varphi) >_w^{\text{John}} w'$ (φ is λw .it’s raining at w) (If $g(C) = C_{id}$, $g(i) = \mathcal{B}$, it amounts to: $\forall w' \in \mathcal{B}(\text{John})(w) : \text{SIM}(w', \text{rev}_\varphi(\mathcal{B}(\text{John})(w))) \cap \varphi >_w^{\text{John}} w'$)

showing that there are languages that split the bouletic flavor at LF, with a separate doxastic component (this gives support to the analyzes that base the bouletic meaning on a doxastic component). What is new is that we proposed a very different technical implementation of this interaction since, as we argued, the quantificational force comes from *ivək*.

References

- Pranav Anand and Valentine Hacquard. Epistemics and attitudes. *Semantics and Pragmatics*, 6:1–59, 2013.
- Ryan Bochnak. Variable force modality in Washo. In Thuy Bui and Deniz Özyıldız, editors, *Proceedings of NELS 45*, pages 105–114, 2015a.
- Ryan Bochnak. Underspecified modality in Washo. In Natalie Weber and Sihwei Chen, editors, *Proceedings of Workshop on the Structure and Constituency of Languages of the Americas (WSCLA) 18*, pages 3–17, 2015b.
- Elizabeth Bogal-Allbritten. *Building Meaning in Navajo*. PhD thesis, UMass Amherst, 2016.
- Luka Crnić. *Getting Even*. PhD thesis, Massachusetts Institute of Technology, 2011.
- Amy Rose Deal. Modals without scales. *Language*, 87:559–585, 2011.
- Kai von Fintel. NPI licensing, Strawson entailment, and context dependency. *Journal of Semantics*, 16:97–148, 1999a.
- Kai von Fintel. Quantifier domain selection and pseudo-scope. Handout from a talk at the Cornell Conference on Theories of Context Dependency (<http://mit.edu/fintel/fintel-1999-cornell-context.pdf>), 1999b.
- Irene Heim. Presupposition projection and the semantics of attitude verbs. *Journal of Semantics*, 9(3):183–221, 1992.
- Sabine Iatridou. The grammatical ingredients of counterfactuality. *Linguistic Inquiry*, 31(2):231–270, 2000.
- Angelika Kratzer. What ‘must’ and ‘can’ must and can mean. *Linguistics and Philosophy*, 1:337–355, 1977.
- Angelika Kratzer. The notional category of modality. In Hans-Jürgen Eikmeyer and Hannes Rieser, editors, *Words, Worlds, and Contexts: New Approaches in Word Semantics*, pages 38–74. de Gruyter, Berlin, 1981.
- Angelika Kratzer. Modality. In Arnim von Stechow and Dieter Wunderlich, editors, *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung*, pages 639–650. de Gruyter, Berlin, 1991.
- David Lewis. Semantic analyses for dyadic deontic logic. In Sören Stenlund, editor, *Logical Theory and Semantic Analysis: Essays Dedicated to Stig Kanger on His Fiftieth Birthday*, pages 1–14. Reidel, 1974.
- Lisa Matthewson, Hotze Rullmann, and Henry Davis. Modality in St’át’imcets. In *40th international conference on Salish and neighbouring languages*, pages 93–112, 2005.
- Maša Močnik. Slovenian ‘dopuščati’ and the semantics of epistemic modals. In *Formal Approaches to Slavic Linguistics (FASL) 27*, Ann Arbor, 2019a. Michigan Slavic Publications.
- Maša Močnik. Embedded epistemic modals pragmatically. In M.Teresa Espinal, Elena Castroviejo, Manuel Leonetti, Louise McNally, and Cristina Real-Puigdollers, editors, *Proceedings of Sinn und Bedeutung 23*, volume 2, pages 197–206, Universitat Autònoma de Barcelona, Bellaterra (Cerdanyola del Vallès), 2019b.
- Fabrice Nauze. *Modality in typological perspective*. PhD thesis, University of Amsterdam, 2008.
- Hotze Rullmann, Lisa Matthewson, and Henry Davis. Modals as distributive indefinites. *Natural Language Semantics*, 16:317–357, 2008.
- Robert Stalnaker. Indicative conditionals. *Philosophia*, 5(3):269–286, 1975.
- Jozina Vander Klok. Javanese modals. In *Proceedings of the 2008 Annual Conference of the CLA*, 2008.
- Emanuel Viebahn and Barbara Vetter. How many meanings for ‘may’? The case for modal polysemy. *Philosophers’ Imprint*, 16(10), 2016.
- Seth Yalcin. Epistemic modals. *Mind*, 116:983–1026, 2007.