# Variable-Force Variable-Flavor Attitude Verb in Koryak

Research on understudied languages has uncovered modal systems that carve up the space of modal meaning differently from English (Matthewson et al. 2005; Deal 2011; a.o.). While *must* has a fixed force (necessity) but varies in flavor (epistemic, root), St'át'imcets *k'a* (Rullmann et al. 2008) has a fixed flavor (epistemic) but varies in force (possibility, necessity), while Javanese modals are specified for both flavor and force (Vander Klok 2008). Nauze (2008, 222) proposes the universal:

(1) *Modal elements* can only have more than one meaning along a unique axis of the semantic space: they either vary on the [flavor] axis…or …the [force] axis…but [not] on *both* axes.

English attitude verbs have 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 *nizín* (Bogal-Allbritten 2016) varies in flavor, at least descriptively: it has doxastic ('think') and bouletic ('want', 'hope') readings.

We enrich the typology of modal expressions with the attitude verb *iv-* from Koryak (Chukotko-Kamchatkan). *Iv-* has a wider range of flavors than any reported attitude verb (doxastic, bouletic, assertive, directive), and it is the first documented variable-force attitude verb. Variation in both domains goes against the universal on modal items in (1). We analyse *iv-* as underlyingly a doxastic-assertive attitude verb and adopt the choice-functional analysis of Rullmann et al. (2008) to model its variability in force. For the bouletic flavor, we propose a new way of composing it at LF from *iv-*'s doxastic quantification and the semantics of (c)overt material in the embedded clause.

**Data.** *Iv-* is typically translated out of the blue as 'say' (assertive), but is also a doxastic ('think', 'allow for the possibility') and a bouletic attitude ('hope', 'fear', 'wish'). With transitive agreement and an embedded infinitive/imperative, *iv-* also has a directive flavor ('order', 'suggest'), which we set aside. While 'wish' requires the counterfactual *ʔ-* in the embedded clause, (3), other flavors appear without special marking, (2). (2) also shows that not all attitude flavors are available.

(2) meʎʎo kivəŋ, (əno) kumuqetəŋ
Melljo *iv*.3.SG.PRS that rain.3.SG.PRS
'Melljo says/thinks/allows/hopes/fears/*knows/*imagines that it's raining.'

(3) meʎʎo kivəŋ, (iwke) nəʔəmuqetən
Melljo *iv*.3.SG.PRS if.only rain.3SG.CF
'Melljo wishes it would rain.'

Doxastic attitudes are attested not just in the necessity force (*think*, *believe*) but also in the possibility force (Močnik 2019 on Slovenian *dopuščati* 'allow for the possibility'). While the necessity force of *iv-* is default (even in downward entailing environments), the possibility force reading is felicitous:

(4) Hewngyto says: ujŋe liɣi elŋəke metke kupiŋatəŋ ('I don't know whether it's snowing').
ʔewŋəto kivəŋ əno ujŋe apiŋatka kitəŋ. ʔewŋəto ʔopta kivəŋ əno kupiŋatəŋ.
Hewngyto *iv*.3SG.PRS that not snow is Hewngyto also *iv*.3SG.PRS that snows
'Hewngyto allows that it's not snowing. Hewngyto also allows that it's snowing.'

*Iv-* is not ambiguous between the doxastic and the bouletic flavor. This is evidenced by (i) a mood-marked clause for 'wish' in (3), (ii) the bouletic flavor not being preserved in (5), (iii) a single matrix *iv-* being able to produce different interpretations across the two embedded conjuncts in (6) (see Bogal-Allbritten 2016). This all points to the bouletic flavor coming from elsewhere than just the lexical meaning of *iv-*, so this is not yet a counterexample to (1).

(5) ek-wəjŋən (*iv*-NMLZ) 'something that is said/thought/allowed/*hoped/*feared/*wished'

(6) We're talking about our mutual friend Tatiana, who lives in Novosibirsk.
təkivəŋ [əno tatjana kotvaŋ novosibirskək] to [əno eʧɕɣi kukəʧɕviʎʔetəŋ]
*iv*.1SG.PRS that Tatiana is in.Novosibirsk and that today is.happy
'I think that Tatiana is in Novosibirsk and I hope that she is happy today.'

By contrast to (ii), the doxastic and the assertive flavor are both preserved under nominalization, (5), which contains just *iv-* and the nominalizing suffix. Further evidence shows that this distinction is

not encoded with the help of the embedded clause. We propose that *iv-* varies in flavor between 'say' and 'think' like the English *must* varies between epistemic and root (analysing it as underspecified rather than lexically ambiguous). Just as *in view of what we know* can specify the epistemic flavor for *must*, adverbs of manner ('openly', 'with words', 'secretly', 'to self') do this job for *iv-*.

**Methodology.** We used "matching" tasks: a context with a Koryak and a target Russian sentence. The speakers' task was to say if the Koryak sentence was acceptable in the context and, if so, if it could express the same thought as the Russian one. We will provide arguments for the inappropriateness of more standard methodology employing only contextual felicity judgments.

**Proposal.** • Not all attitude verbs in Koryak display variability in force, so we take this property to be encoded in the lexical semantics of *iv-*. Following Rullmann et al. (2008), *iv-* is a universal quantifier over a set that is restricted by a selection function $f_{(st)st}$ such that "for any set of worlds W, f(W)$\subseteq$ W and f(W)$\neq \emptyset$" (2008, pp. 337–338). Space limitations preclude us from elaborating on the details, but we adopt this mechanism wholesale since *iv-* behaves like the authors' epistemic modal *k'a* in terms of force-variability. • We model the difference between the doxastic ($\mathcal{B}$) and the assertive ($\mathcal{S}$) flavor with a free modal base variable ($i$ below). • The denotation of bouletic attitudes contains a doxastic component (Heim 1992; von Fintel 1999), contra Anand and Hacquard (2013) for 'wish'. Our innovation is to split the labor between a doxastic quantifier in the matrix (*iv-* on the 'think' specification) and an embedded desiderative item (covert with 'hope/fear' and realized as CF mood with 'wish'; a more detailed analysis could build the second from the first, see Iatridou (2000)). This move (=composing the bouletic meaning at LF at a distance) needs a technical innovation, because preferences (now in the embedded clause) are not evaluated in the belief worlds (the contribution of *iv-*) but in the matrix world of evaluation (according to the analyses of bouletic attitudes). 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). For example, instead of $[\![\cdot]\!]^{g,w}$ (where $g$ is the assignment function), Yalcin proposes $[\![\cdot]\!]^{g,w,s}$ 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, $\mathcal{B}^x_w$ (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 $[\![\cdot]\!]^{g,w,\langle a,v,\mathcal{I}\rangle}$: the information state holder ($a$), the world from which the state is generated ($v$), and the way in which it is generated ($\mathcal{I}$ of type *esst*). The idea is to replace $\mathcal{B}^x_w$ with $\langle x, w, \mathcal{B}\rangle$. More precisely, instead of writing $f(\mathcal{B}^x_w)$ (where $f$ is Rullmann et al.'s selection function) we would write $\langle x, w, \lambda y\lambda v.f(\mathcal{B}^y_v)\rangle$. The truth-conditions are in (7) and the computation itself assumes intensional functional application over the new index.

(7) $[\![John\ [\ iv\text{ə}k\ if]\ p]\!]^{g,w,\langle a,v,\mathcal{I}\rangle}$ is defined iff $g(i)(J)(w) = \mathcal{B}^J_w$ or $g(i)(J)(w) = \mathcal{S}^J_w$ and, if defined, is true iff $\forall w' \in g(f)(g(i)(J)(w)) : [\![p]\!]^{w',\langle J,w,\lambda y\lambda v.g(f)(g(i)(y)(v))\rangle} = 1$

For concreteness, we adopt the Heimian (comparative-similarity) analysis of bouletics, borrowing the entries from Crnič (2011, p. 75–76). The point is that (8b) is just (8a) without the doxastic bit.

(8) a. If defined, $[\![\text{wish}]\!]^{g,c}(\geq, p, x, w)$=1 iff $\forall w' \in \mathcal{B}^x_w : \text{SIM}(w', rev(\mathcal{B}^x_w) \cap p) >^x_w w'$ (2011, p.75)

b. If defined, $[\![\text{CF}]\!]^{g,w',\langle a,v,\mathcal{I}\rangle}(p) = 1$ iff $\text{SIM}(w', rev(\mathcal{I}^a_v) \cap p) >^a_v w'$ [counterfactual in (3)]

**Discussion.** We have not been able to confirm or disconfirm whether there exist existential versions of 'say', 'wish', 'hope', or 'fear'. We have argued though that the Koryak attitude verb varies in force ('think', 'allow') and flavor ('think', 'say'), contra (1), which is also challenged by the Washo modal verb *-e?* (Bochnak 2015); we second the challenge and also show that (1) does not hold specifically for attitude verbs either. Finally, we give empirical support for encoding a doxastic component in the semantics of verbs like *wish* and show how to divorce the doxastic quantification from the bouletic flavor, offering an alternative to the mechanism in Bogal-Allbritten (2016).

Selected references: Močnik, M. (2019) Embedded epistemic modals pragmatically (*Proceedings of SuB 23*, pp. 197–206); Nauze, F. (2008) *Modality in typological perspective* (PhD thesis, UvA).