Modality, Tense and Negation in Daakie (Ambrym, Vanuatu)

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Overview of Talk:

- Part I: DoBeS Project *Languages of Southwest Ambrym*
- Part II: A few facts about Daakie
  - Sound System
  - Basic clause pattern
  - Agreement system
  - Modal markers
- Part III: A closer look at the modal markers
- Part IV: A semantic analysis of the modal markers
- Part V: Goodies

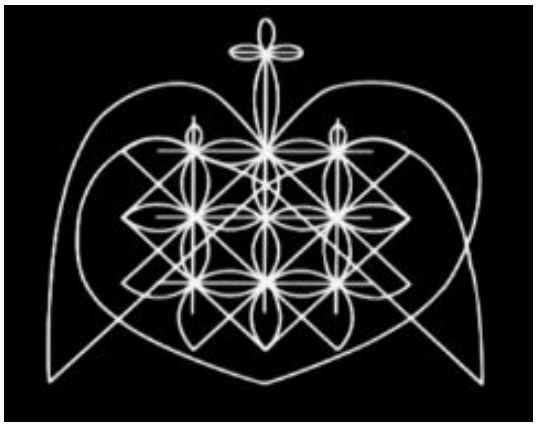
PART I:
DoBeS Project: Languages of Southwest Ambrym

About the project:

- July 2009 – December 2012, funded by VolkswagenStiftung,
  site housed at Max Planck for Psycholinguistics, http://www.mpi.nl/DOBES
- Kilu von Prince (Linguistics) – special thanks for in-depth discussion, dissertation
  Soraya Hosni (Anthropology);
  Susanne Fuchs (Phonetics), Lena Karvovskaya (Technical support).
- Three languages: **Daakaka**, **Daakie**, **Dalkalaen**;
  also, there is a project on North Ambrym (Michael Franjieh, SOAS, Rausig Found.)
- Each language ~ 1000 speakers, actively spoken, learned by children,
  but potental threats (among others, Bislama loans, volcanoes, mobile phones...).
- Tasks, among others:
  - Documentation of communication (> 12 hours of transcribed materials).
  - Grammar, dictionaries
  - Text collections
  - Orthography
  - Texts for local use, especially in schools
  - Documentation of cultural practices (e.g., sand-drawing), ~ 50 hours of video.
  - Documentation of family relationships and how this maps to the kinship system
    (about 1600 persons in database).

PART I: DoBeS Project on Southwest Ambrym, Public Appearances

www.sciencemovies.de



Exhibition Sanddrawing, Humboldtbox Berlin

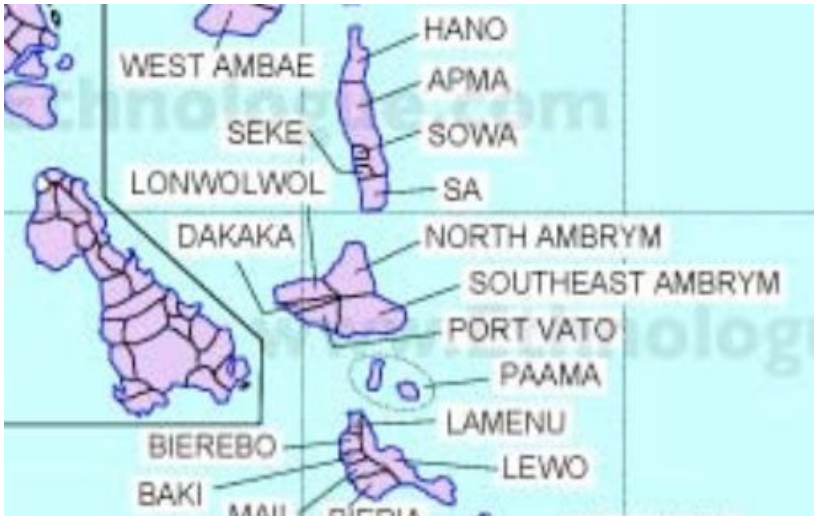
Vanuatu / Ambrym: Geography and languages

-- population: 270,000

-- up to 100 languages (Austronesian)

-- Melanesian Pidgin English (Bislama)

-- English, French



Ethnologue on Ambrym:

-- Southeast Ambrym

-- North Ambrym

-- Lonwolwol (now nearly extinct)

-- Dal kalaen (Ral kalaen)

-- Dakaka (Daakaka)

-- Port Vato (Daakie)

-- (Orkon, nearly extinct)

Ambrym: Geography and languages

Ambrym: Sand Drawing by Sam Tasso

A few facts about Daakie

- Previously known as *Port Vato* (Tryon 1976, Ethnologue).
- Spoken by about 1000 persons from Sanesup to Maranata;
  larger villages: Lonmei, Port Vato (Langievot), Lalinda.
- Contact with Daakaka and Dal kalaen to the west;
  fewer contacts to North Ambrym or Southeast Ambrym.
- Previous literature:
  - Some information in W. Paton, *Ambrym (Lonwolwol) grammar*, (1952) 1971
  - Word list in Tryon (1976)
  - Short katechism and hymn book (Presbyterian)

Part II: Sound System of Daakie

(1)

	Labial	Labiovelar	Labiodental	Alveolar	Palatal	Velar	Glottal
Voiceless	p	p^w ⟨pw⟩		t		k	
Prenasalized	^{m}b ⟨b⟩	b^w ⟨bw⟩		^{n}d ⟨d⟩		^{ŋ}g ⟨g⟩	
Nasal	m	m^w ⟨mw⟩		n		ŋ ⟨ng⟩	
Fricative			v	s			h
Trill				r			
Lateral				l			
Approximant	ʋ ⟨w⟩				j ⟨y⟩		

(3)

Short vowels		
i ⟨i⟩	[y] ⟨u⟩	u ⟨u⟩
e ⟨é⟩	[ø] ⟨ó⟩	o ⟨ó⟩
ɛ ⟨e⟩	[œ] ⟨o⟩	ɔ ⟨o⟩
($^{(j)}$æ ⟨á⟩)	a ⟨a⟩	

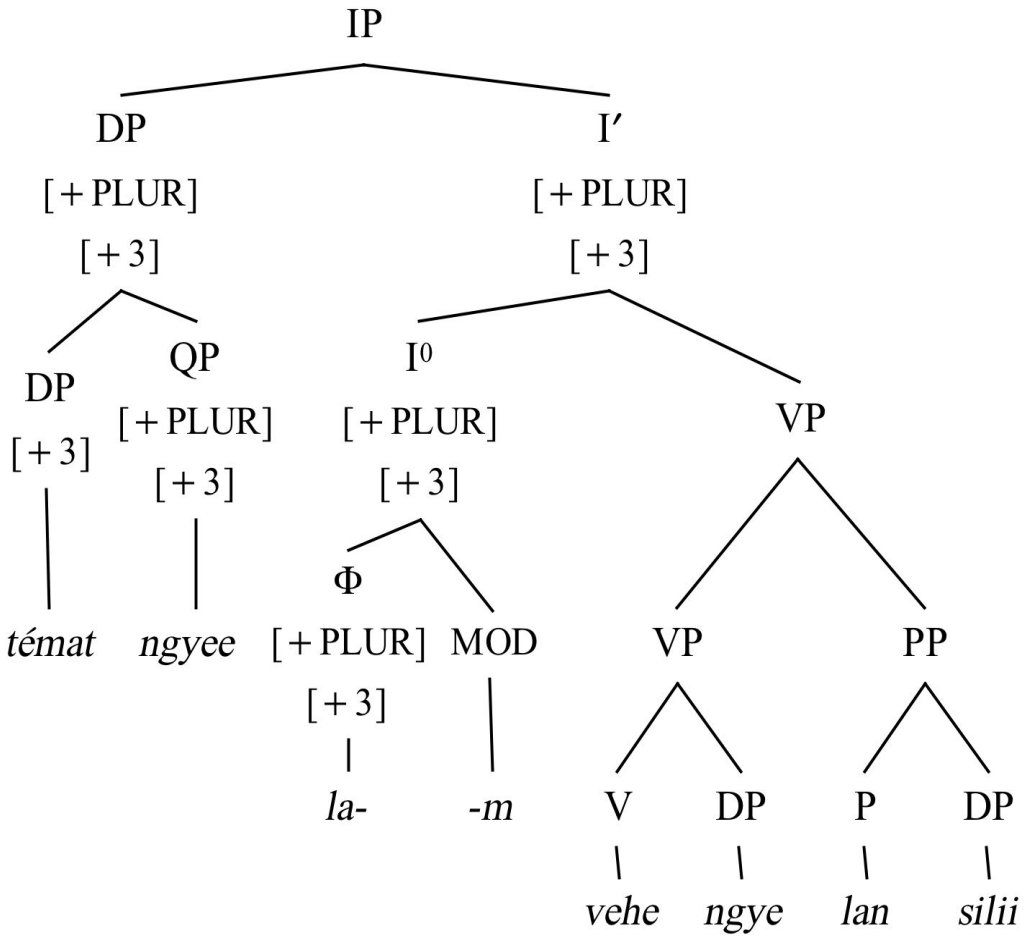
Long vowels	
iː ⟨ii⟩	uː ⟨uu⟩
ɛː ⟨ee⟩	oː ⟨óó⟩
	ɔː ⟨oo⟩
(æː ⟨áá⟩)	aː ⟨aa⟩

fronting of back vowels u, o, ɔ to y, ø, œ triggered by alveolar
(and, restricted, labial) consonants,
in open syllables and in syllables with alveolar coda.

Basic clause pattern,
Paradigm of pronouns and subject markers

(18) (Subject) SM Verb (Object) (Adjuncts), where SM: Subject+Modality marker.

(19) *temát ngyee la-m vehe ngye lan silii* Boa3.28
demon PL 3PL-RE carry PR.3SG LOC path
'The demons carried him on the path.'



Paradigm of subject markers, pronouns, and modal markers.

(20)

Person	Singular	Plural	Dual	Paucal	
1	*ngyo* *na-m*	*kemee* *keme-m*	*komoo* *komo-m*	*kememdyee* *kidye-m*	Pronoun SM
1+2		*et* *da-m*	*adoo* *do-m*	*adyee* *dye-m*	Pronoun SM
2	*ngyak* *ko-m*	*kimim* *ki-m*	*kamoo* *ka-m*	*kamdyee* *kamdye-m*	Pronoun SM
3	*ngye* *mwe, me, mwi, mi, mo, mu, ma*	*ngyee* *la-m*	*koloo* *kolo-m*	*ki(l)yee* *kiye-m*	Pronoun SM

Table of Modal markers

	Suffix (with 3rd Plural)	3rd Person
Realis	*la-m*	*mwe, me, mwi, mi, mu, ma, mo*
Irrealis	*la-p*	*bwe, be, bwi, bi, bu, ba, bo*
Distal	*la-t*	*te, ti, to*
Negation	*la-re*	*tere*
N	*la-n*	*ne, ni, no*

Part III: A closer look at the modal markers. Realis:

Ongoing events:

(26) *obwer anvu mi myuu mo do*[16] Jemis2.054
taro introduced 3SG.RE grow 3SG.RE slow
'This Fiji taro is growing slow.'

Past events:

(27) *meerin na-m mee o-ke-le na-m lehe* Bong2.027
long.time.ago 1SG-RE come LOC-COMP-PROX 1SG-RE look
'long time ago, I came here, I looked.'

Generic statements:

(28) *ko-m ko=ot*[17] *mo-nok*[18] *ko-m ta=kuu~kuu*[19] *yee mwi*[20] *ti~tisii* Jemis2.008
2SG-RE clear=grounds RE-finish 2SG-RE cut.out tree 3SG.RE fall.down.DISTR
'after you clear the grounds, you cut out the trees, they fall down '

Fictional worlds:

(29) *mwe pwet mwe sela wilin talin*[21] *bye-n* Bong2.012
3.RE PROG 3S.RE put.on skin.TR body.TR body-3SG
'he was/is putting on the skin of his (= another man's) body'

Use of modal markers: Realis in embedded clauses

Complement of factive propositional attitude verbs, complementizer: *ke*

(30) *mo longane ke timaleh kiye mwe pwet mo sóró mo-mele* Jemis3.029
3SG.RE hear COMP.RE child DEM.SG 3SG.RE PROG 3SG.RE talk RE-this.way
'He heard that the child was talking in this way.'

(31) *mo-mele mwe kiibele ke vanten mu-syoo la-m du o-ki-ye* Jemis1.012
RE-this.way 3SG.RE know COMP.RE man RE-some 3PL-RE stay LOC-COMP-DIST
'This way, he knows that some men stay there.'

Reason clauses:

(32) *na-m pwet [hospital] em ne*[23] *mese=en byen ke popat mwe te ye-k* Boa1
1SG-RE stay house TR sick-NOM because COMP.RE pig 3SG.RE cut leg-1SG 0.79
'I stayed in the hosp. because the pig bit my leg.'

Temporal clauses:

(33) *bili ke mwe saa=kuu wilin by-en me mee me timaleh man soo mu wuo* Bong2.
time COMP.RE 3SG.RE take.off skin.TR body-3SG 3SG.RE come 3SG.RE child male SG.IND 3SG.RE good 022
'When he took of his skin, he became a good-looking young man.'

Use of modal markers: Irrealis

In commissive clauses:

(34) *na-p*[25] *idi* *ok*[26] *masólo* Aila2.024
1SG-IR take POSS.FOOD.1SG fish
'I will take my fish.', 'I promise to take my fish.'

In jussive clauses:

(35) *la-m* *kie* *ka* *da-p* *van* *tyenem* Bong1.046
3PL-RE say that 12PL-IR go home
'They said, let's go home.'

In commands:

(36) *ko-p* *sengane* *de-re*[27] *mee* *na-p* *ane* Boa2.076
2SG-IR give some-DETR come 1SG-IR eat.TR
'Give me some of it and/so that I will eat it.'

Future reference with prefix *a-* to subject marker:

(37) *vanten* *desoo*[28] *a-be* *mee* *bwi* *idi* *pija* *en*[29] *dout* Jemis2.086
man NSPEC-some FUT-3SG.IR come 3SG.IR take picture of.REF probably
'Some man or other will come and/to take a picture of it (a palm tree with five branches)'

desoo: indefinite quantifier in non-realis contexts;
in realis contexts: *soo* 'one'

Use of modal markers: Irrealis in embedded clauses

Non-factive complement clauses; irrealis complementizer *ka* instead of realis *ke.*

(38) *na-m longbini ka na-p pune punen soo*[30] Andri2.002
1SG-RE want COMP.IR 1SG-IR tell story one
'I want to tell a story.'

(39) *mwe páne basee kingyee-ye mwe neknak ka bu du ba ane* Boa3.039
3SG-RE roast bird DEM.PAUC-DIST 3SG-RE ready COMP 3SG.IR stay.PL 3SG.IR eat.TR
'He roasted the birds and was ready to eat them.'

(40) *ngale la-m kiibele ka la-p kuo soo~soo* Adam1.022
then 3PL-RE know COMP.IR 3PL-IR run one-REDUP
'Then they knew/were able to run away one by one.'

Non-factive temporal clauses, cf. German *als / wenn*

(41) *a-na-p ane sówe bili ka ot bi mitmyet* JoAlvi.028
FUT-1SG-IR eat.TR what time COMP.IR place 3SG.IR dark
'What will I eat when it is dark?'

Content of thought often expressed in direct speech.

Use of modal markers: Distal modality

Indicating time at which an event happened:

(23) *yaa te van te pwet*[11] *ti piipili mwe kuoli=mee*[12] *tyenem* Ilsong2.021
sun 3SG.DST go 3SG.DST PROG 3SG.DST red 3SG-RE return-come home
'When the sun was getting red, he went back home.'

Temporal scene setters in discourse:

(44) *meerin temát la-t pwee* Boa3.025
before demon 3PL-DIST many
'In times before, there were many demons.'

Adjectival predication

(45) *ko-p bwengbang van tyenem ke to-bo* Ilson2.013
2SG-IR play go village COMP DIST-big
'You can play towards the big village.'

Content of false thoughts:

(42) *temát ngyee*[31] *mon la-m deme ka te met byen b-on mwe sek* Saelas.026
demon PL too 3PL-RE think COMP.IR 3SG.DST dead because smell-3SG 3SG.RE stink
'The demons, too, thought that he was dead, as he stank (lit. his smell was stinking)'

Modality in conditional clauses

Irrealis in protasis of "indicative" conditionals, future in apodosis.

(43) *molo ka bo longane diliri gon monok,*
incubator.bird COMP 3SG.IR feel egg.3SG EMPH finish
'The incubator bird, when it feels its egg(s) finished,

a-be mee mwe[32] *pisih pán weren kege mwe pwet mwi tivin weren*[33]
FUT-3S.IR come 3SG.RE lay.eggs under X.PLACE COMP.REL 3S.RE stay 3S.RE bury.TR X.PLACE
then it comes and lays eggs under the place where it stays and buries them.'

Distal in protasis of future-oriented conditional, future in apodosis:

(46) *Ko-p pyak ne ti-ri koloo le, vih mane vyoh.*
2SG-IR choose TR IDEF.NHUM-DETR two PROX banana with ripe.coconut
'You choose one of these two, the banana or the coconut.

Ko-t pyak soro ke tu wuo, a-ko-p idi popat desoo.
2SG.DIST choose reach COMP 3SG.DIST good FUT-2SG-IR take pig NRE.one
If you choose right, then you get take a pig.'

Distal in protasis and apodosis of counterfactual conditional:

(47) *Ka ko-t pyak ne vyoh, a-ko-t idi popat.*
COMP 2SG-DIST choose TR coconut 2SG-DIST take pig
'If you had chosen the coconut, you would have gotten the pig.'

Negation: -r and -n

Negation marker -r:

(24) *Lalinda mane Langievot, kolo-re wuwuo ne koloo*[13] Andri.005
Lalinda with Langievot 3DU-RE.N peaceful TRANS PRON.3D
'Lalinda and Langievot were not in peace with each other.'

Negation marker -n in main clauses headed by complementizer *sa ka*:

(49) *sa ka wel-em*[35] *ne nek ne ti-ri kingyee ye* Abel3.154
COMP.NEG COMP.NR skin-2SG 3SG.N afraid TR IDEF-NHUM-DETR DEM.PL LOC.DIST
'Don't be afraid of those things.'

Negation marker -n in dependent clause, negative-implying embedding verb (cf. Romance):

(48) *na-m notselaane ka na-n govene ti-ri desoo* Boa1.47
1SG-RE think.wrongly that 1SG-N make IDEF.NHUM-DETR NSPEC-SOME
'I couldn't do anything', 'I wanted to do something but I couldn't.'

Negation concord with marker -n in embedded clauses:

(25) *lisepsep tere longbini ka ne tah=tone* HG.181
lisepsep 3SG.RE.N want COMP.NR 3SG.N sit.down=for
'The lisepsep[14] did not want to wait for it.'

But: *n* marker can also express denontic necessity!

Expression of deontic necessity:

(50) a. (*ka*) *ko-n peten*
COMP.NR 2SG-N tell.truth
'You must tell the truth.'

Alternative construction, derived from Bislama *mas*, cf. English *must*

b. *ko-p mas peten*
2SG-RE must tell.truth
'You must tell the truth.'

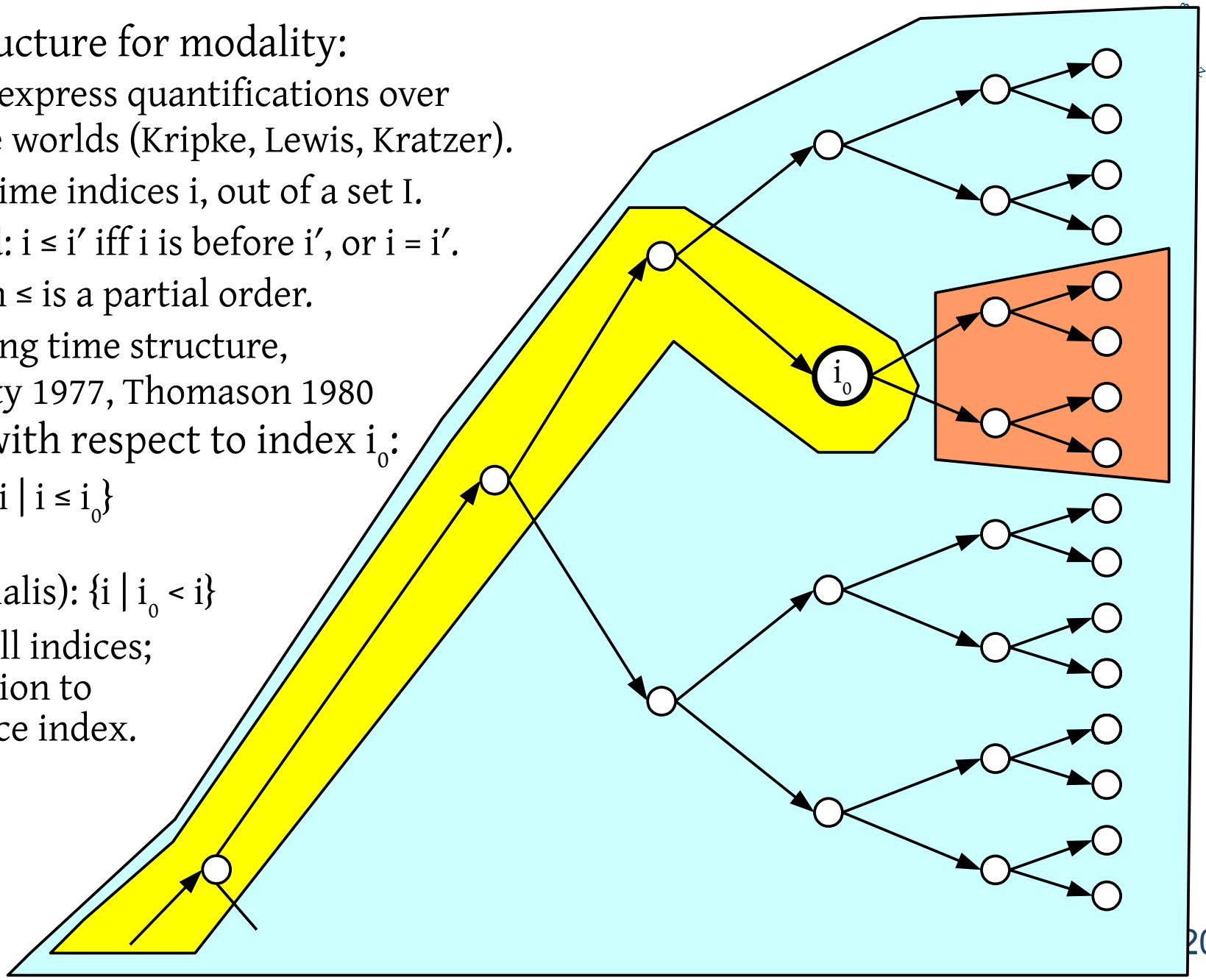
Part IV: Analysis of modals in Daakie

Model structure for modality:

- Modals express quantifications over possible worlds (Kripke, Lewis, Kratzer).
- World-time indices i, out of a set I.
- Ordered: $i \leq i'$ iff i is before i′, or $i = i'$.
- Relation ≤ is a partial order.
- Branching time structure, cf. Dowty 1977, Thomason 1980

Sections with respect to index i_0:

- Realis: $\{i \mid i \leq i_0\}$
- Irrealis (Potentialis): $\{i \mid i_0 < i\}$
- Distal: all indices; no relation to utterance index.



Interpretation format of modal markers: Realis

Input for semantic interpretation; example of sentence with syntactic structure:

(51) $[_{IP}\ Enet_{[3sg]}\ [_{I'}\ [_{I0}\ mo_{[RE][3sg]}]\ [_{VP}\ gone\ [_{NP}\ páng]]]]]$
'Enet made / is making fire.'

Reference with respect to a context index:

$[\![\alpha]\!](i_0)$ = the meaning of expression α at index i_0.

Meaning of VP at an utterance index i_0 (responsible, e.g., for deictic expressions):

$[\![[_{VP}\ gone\ páng]]\!](i_0)$

$= \lambda i \lambda x$[x makes fire at i]

Modal markers introduce second index, which stands in a relation to first index.
In Reichenbachian terms:
-- First index: Event index, i´
-- Second index: Utterance index, typically bound to utterance situation i_0

The realis marker is particularly complex:
-- VP is true at event index;
-- Event index precedes reference index;
-- requirement for realis:
there is an index $i' \leq i_0$ such that the proposition is true at that index.

(52) $[\![[_{I}\ [_{I0}\ RE]\ VP]]\!](i_0) = \lambda i \lambda i' \lambda x[i' \leq i \wedge [\![VP]\!](i_0)(i')(x) \wedge \exists i' \leq i_0 [[\![VP]\!](i_0)(i')(x)]]$

(53) $[\![[_{IP}\ Enet_{[3sG]}\ [_{I'}\ mo_{[RE][3sG]}\ [_{VP}\ gone\ páng]]]\!](i_0)$
$= \lambda i \lambda i' [i' \leq i \wedge$ E. makes fire at $i' \wedge \exists i' \leq i_0$ [E. makes fire at i']]

Realis (continued)

... from last slide:

(52) $[\![[_{I}\ [_{I0}\ \text{RE}]\ \text{VP}]]\!](i_0) = \lambda i \lambda i' \lambda x[i' \leq i \wedge [\![\text{VP}]\!](i_0)(i')(x) \wedge \exists i' \leq i_0[[\![\text{VP}]\!](i_0)(i')(x)]]$

(53) $[\![[_{IP}\ \textit{Enet}_{[3SG]}\ [_{I'}\ \textit{mo}_{[RE][3SG]}\ [_{VP}\ \textit{gone páng}]]]\!](i_0)$
$= \lambda i \lambda i'[i' \leq i \wedge$ E. makes fire at i' $\wedge \exists i' \leq i_0$ [E. makes fire at i']]

Existential closure of event index at level of CP:

(54) $[\![[_{CP}\ [_{C0}\ \exists]\ \text{IP}]]\!](i_0) = \lambda i \exists i'[[\![\text{IP}]\!](i_0)(i')]$

(55) $[\![[_{CP}\ \exists\ [_{IP}\ \textit{Enet}_{[3SG]}\ [\textit{mo}_{[RE][3sg]}\ [_{VP}\ \textit{gone páng}]]]]\!](i_0)$
$= \lambda i \exists i'[i' \leq i \wedge$ E. makes fire at i' $\wedge$ $\underline{\exists i' \leq i_0[\text{E. makes fire at i'}]}]$

A proposition that

-- applies to indices i for which it holds that they are later or equal to an index i'
at which the proposition λi'[E. makes fire at i'] is true;

-- **provided that** this proposition is true at some index i'
before or equal to the index of interpretation i_0 (contribution of realis mood)

-- This proviso is a **precondition**: If not satisfied, proposition is necessarily false.

Application to index of interpretation i_0 at the level of ForceP (Assertion):

(56) $[\![[_{\text{ForceP}}\ [_{\text{Force0}}\ \text{ASSERT}]\ \text{CP}]]\!](i_0) = [\![\text{CP}]\!](i_0)(i_0)$

(57) $[\![[_{\text{ForceP}}\ \text{ASSERT}\ [_{CP}\ \exists\ [_{IP}\ \textit{Enet}_{[3SG]}\ [\textit{mo}_{[RE][3SG]}\ [_{VP}\ \textit{gone páng}]]]]\!](i_0)(i_0)$
$= \exists i'[i' \leq i_0 \wedge$ E. makes fire at i' $\wedge$ $\underline{\exists i' < i_0[\text{E. makes fire at i'}]}]$

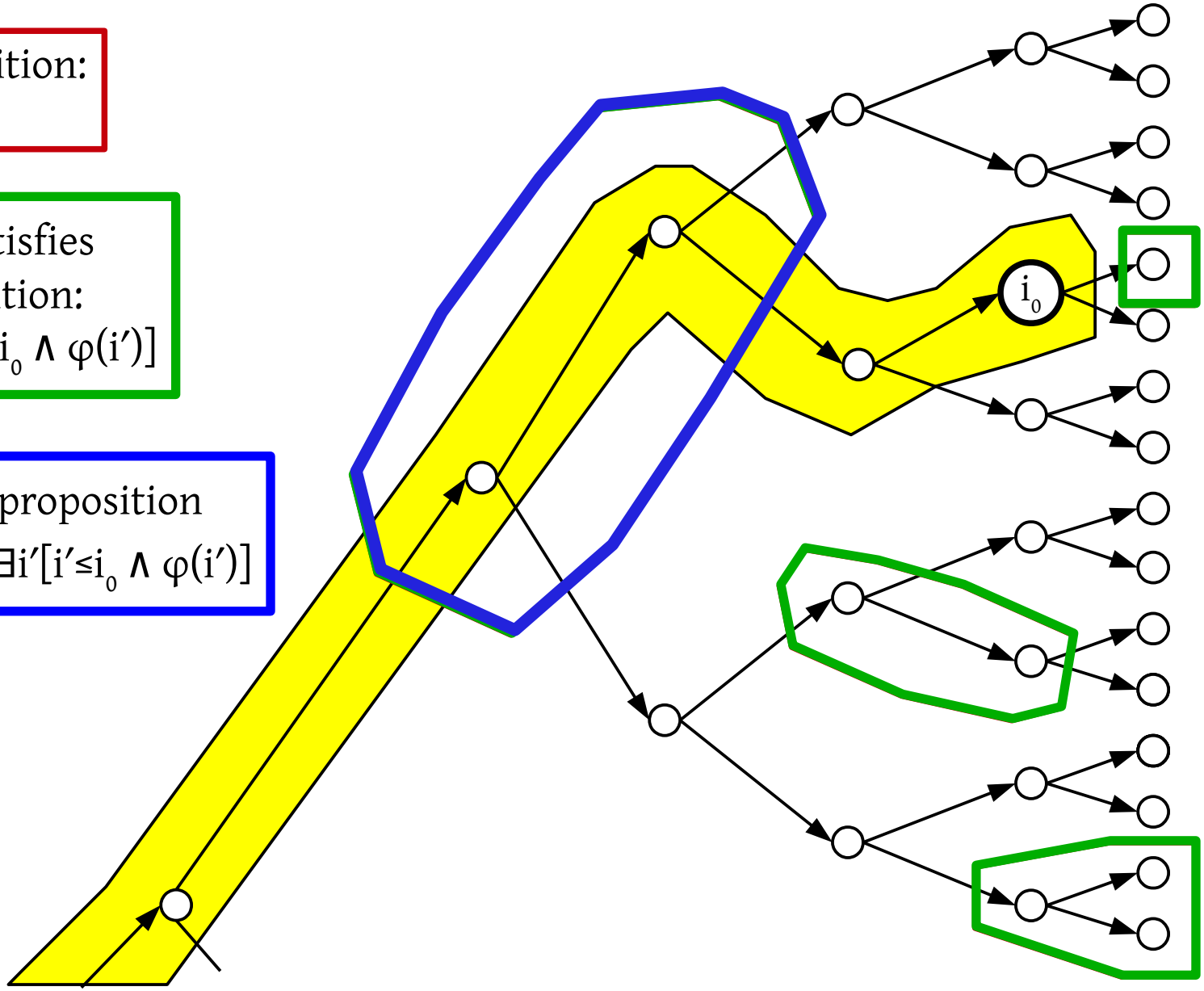
Notice: This proposition is informative, as realis expresses a precondition, not a presupposition:
True if there is a i'≤i_0 such that Enet makes fire at i', false if there is no such i'.

Realis modality

simple proposition:
$\lambda i[\varphi(i)]$

proposition satisfies realis precondition:
$\lambda i[\varphi(i) \wedge \exists i'[i' \leq i_0 \wedge \varphi(i')]$

asserted realis proposition
$\lambda i[i \leq i_0 \wedge \varphi(i) \wedge \exists i'[i' \leq i_0 \wedge \varphi(i')]$



Realis modality

simple proposition:
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proposition satisfies realis precondition:
$\lambda i[\varphi(i) \wedge \exists i'[i' \leq i_0 \wedge \varphi(i')]$:
empty

asserted realis proposition
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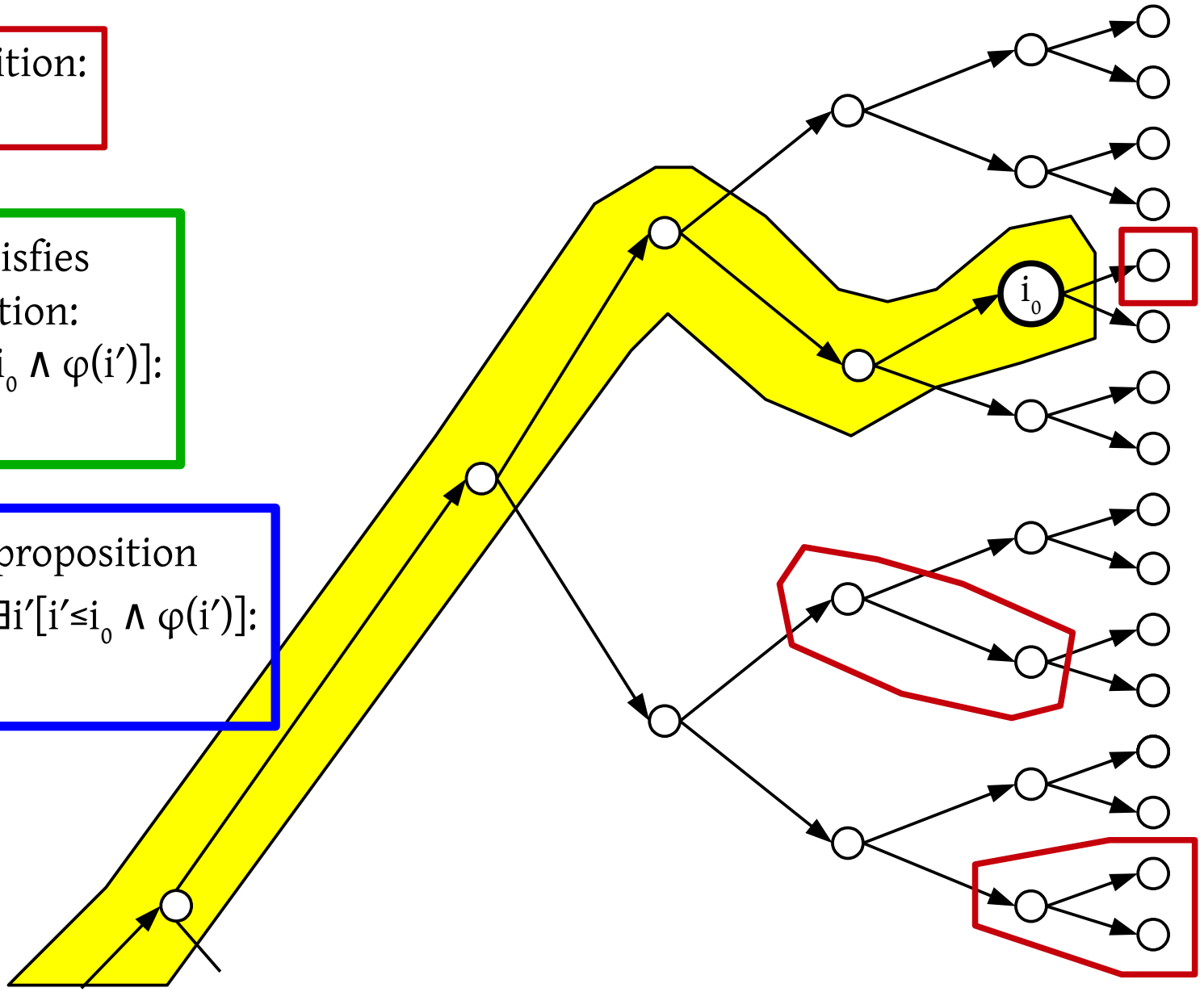
empty



Realis in embedded clauses

Realis complementizer *ke*, assmption of a category cP:
[$_{VP}$ *kiibele* [$_{cP}$ *ke* [$_{IP}$ *Enet mo gone páng*]]]
think CP.RE Enet 3SG.RE make f re
'know that Enet made / makes f re'

Complementizer *ke* expresses a modal notion:
-- Universal quantification over the set of indices that stand in accessibility relation R
-- Realis precondition (underlined)

(58) $[\![[_{cP}\,[_{cP0}\,ke]\ CP]]\!](i_0) = \lambda i \lambda R[\forall i''[R(i)(i'') \rightarrow [\![CP]\!](i_0)(i'')] \wedge \underline{[\![CP]\!](i_0)(i_0)}]$

Application to realis CP is possible, as the two realis preconditions match:

(59) $[\![[_{cP}\ ke\ [_{CP}\ \exists\ [_{IP}\ Enet_{[3SG]}\ [_{I'}\ mo_{[RE][3SG]}\ [_{VP}\ gone\ páng]]]]]]\!](i_0)$
$= \lambda i \lambda R[\forall i''[R(i)(i'') \rightarrow \exists i' \leq i''[\text{E. makes fire at i} \wedge \underline{\exists i' \leq i_0[\text{E. makes fire at i'}]}$
$\wedge \underline{\exists i' \leq i_0[\text{E. makes fire at i'} \wedge \exists i' \leq i_0[\text{E. makes fire at i'}]]}]$

The embedding verb specifies the accessibility condition:

(60) a. $[\![[_{VP}\ kiibele\ [_{cP}\ ke\ Enet\ mo\ gone\ páng]]]\!](i_0)$
$= \lambda i \lambda x[\forall i''[EPIST(i)(i'')(x) \rightarrow \exists i' \leq i''[\text{E. makes fire at i'} \wedge \underline{\text{precond.1}}]] \wedge \underline{\text{precond.2}}]$

Resulting meaning of sentence:
-- For all indices i″ that are/were epistemically accessible to Lissing,
-- there is an index i′ ≤ i″ s.th. Enet made fire at i′, under the precondition that E. indeed made fire (to know is to believe something that is true)
-- under the precondition that all of the above is indeed the case (realis marker of main clause).

b. $[\![[_{ForceP}\ ASSERT\ [_{CP}\ \exists\ [_{IP}\ Lising_{[3SG]}\ [_{I'}\ mwe_{[RE][3SG]}\ [_{VP}\ kiibele\ ke\ Enet\ mo\ gone\ páng]]]]]]\!](i_0)$
$= \exists i \leq i_0[\forall i''[EPIST(i)(i'')(L.) \rightarrow \exists i' \leq i''[\text{E. makes fire at i'} \wedge \underline{\text{precond.1}}]] \wedge \underline{\text{precond.2}}$
$\wedge \underline{\exists i \leq i_0[\forall i''[EPIST(i)(i'')(L.) \rightarrow \exists i' \leq i''[\text{E. m. fire at i'} \wedge \text{precond.1}]] \wedge \text{precond.2}]}$

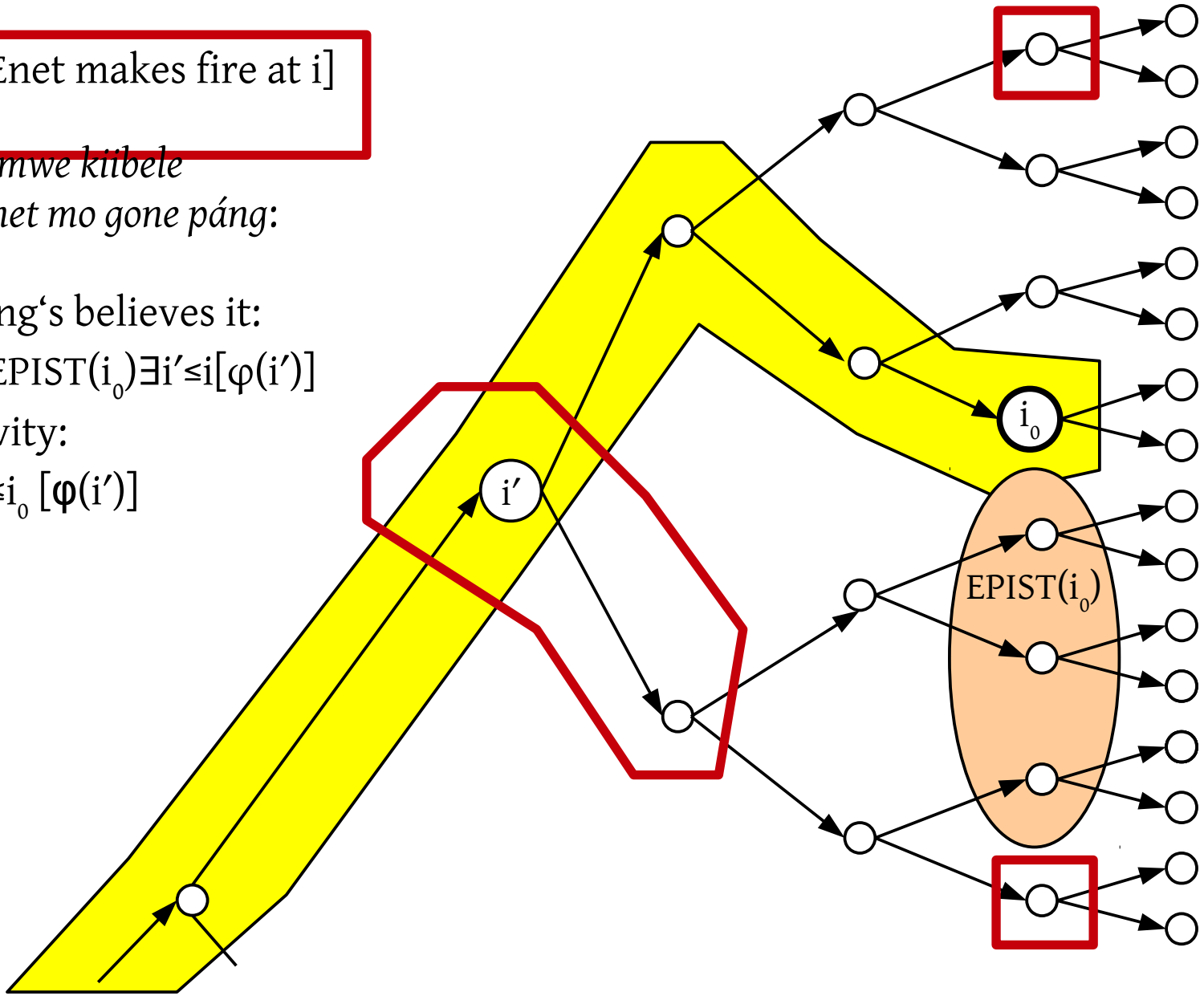
Example of embedded realis clause

λi[Enet makes fire at i]
= φ

Lissing mwe kibele
ke Enet mo gone páng:
true:

– Lissing's believes it:
$\forall i \in EPIST(i_0) \exists i' \leq i[\varphi(i')]$

- factivity:
$\exists i' \leq i_0 [\varphi(i')]$



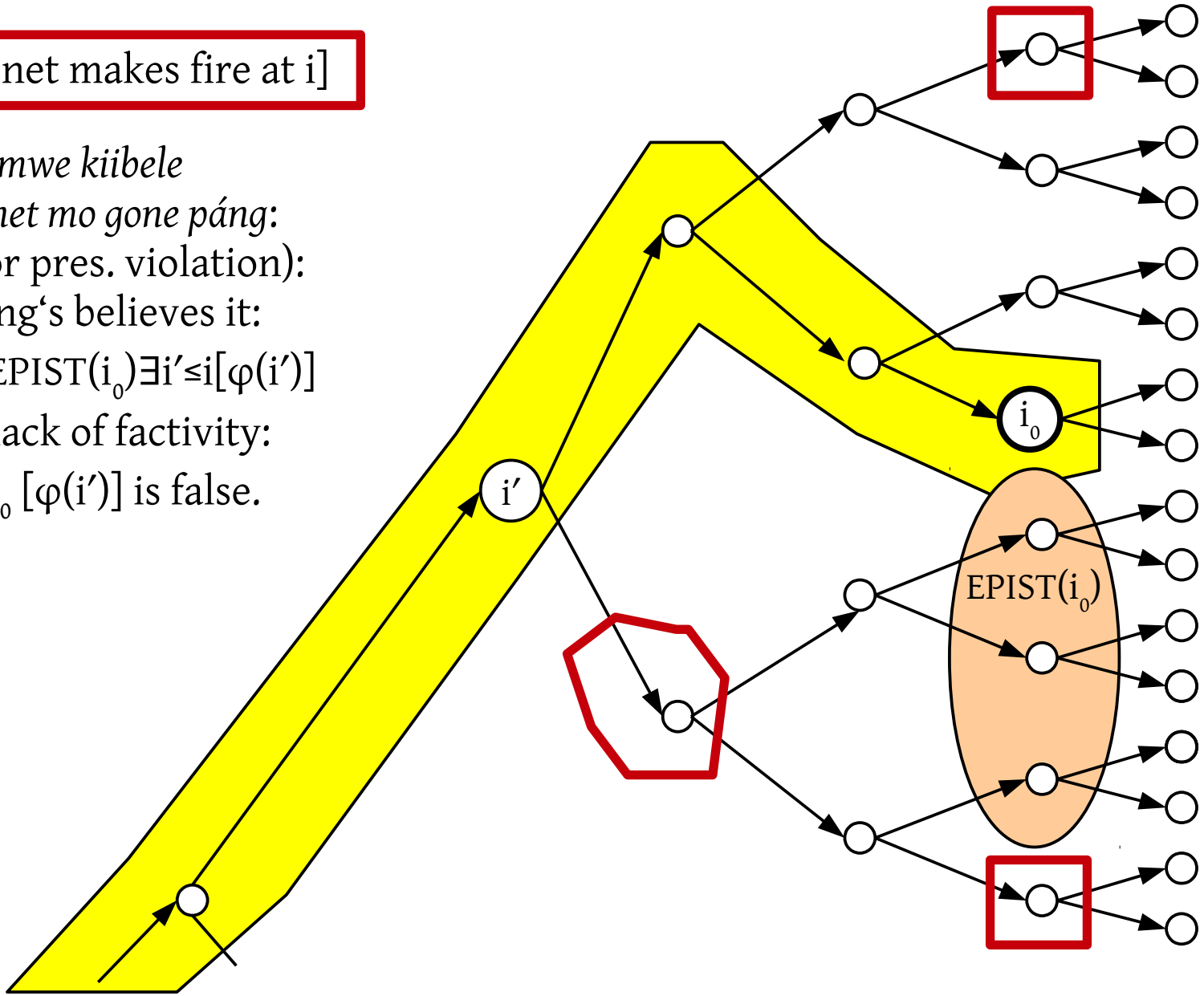
Example of embedded realis clause

λi[Enet makes fire at i]

Lissing mwe kiibele ke Enet mo gone páng:
false (or pres. violation):

– Lissing's believes it:
$\forall i \in EPIST(i_0) \exists i' \leq i [\varphi(i')]$

- but: lack of factivity:
$\exists i' \leq i_0 [\varphi(i')]$ is false.



Realis negation

Simplest interpretation:
Negation of existence of an index at which proposition is true.

(61) $[\![[_{I'}\ \text{RE-N}\ \text{VP}]]\!](i_0) = \lambda i \lambda i' \lambda x \neg \exists i'' \leq i [[\![\text{VP}]\!](i_0)(i'')]$

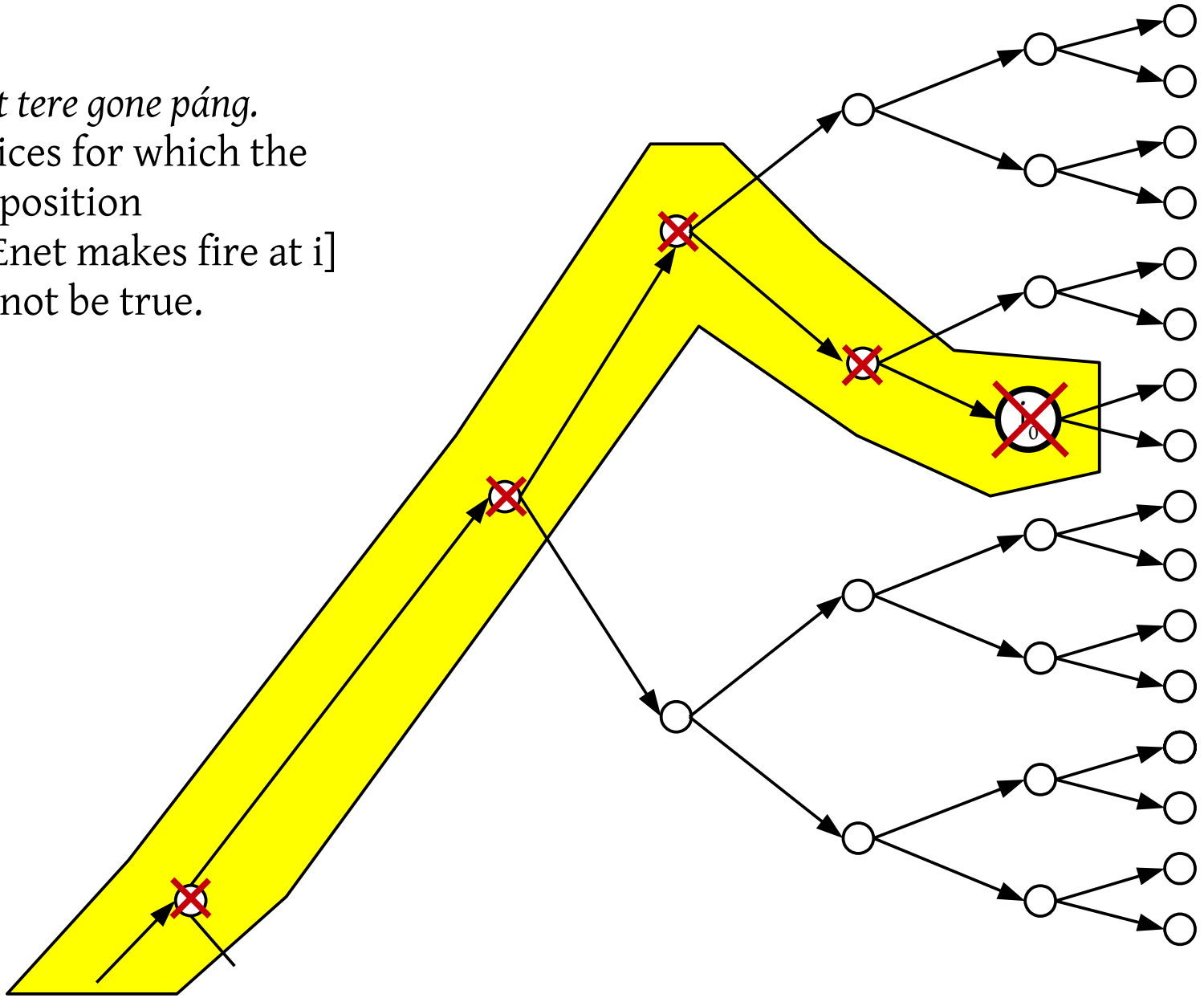
(62) $[\![[_{\text{ForceP}}\ \text{ASSERT}\ [_{\text{CP}}\ \exists\ [_{\text{IP}}\ \textit{Enet}\ [\textit{tere}_{[\text{RE-N}][3\text{SG}]}\ [_{\text{VP}}\ \textit{gone páng}]]]]]\!](i_0)$
$= \exists i' [\neg \exists i'' \leq i_0 \wedge \text{E. makes fire at } i'']]$

Another option:
Negation of existence within a reference index, seen as interval
(cf. Partee 1973, example *I didn't turn off the stove*).

$\lambda i \lambda i'\ \lambda x \neg \exists i'' [i'' \subseteq i' \wedge i' \leq i \wedge [\![\text{VP}]\!](i_0)(i'')]$
(62) $= \exists i' \neg \exists i'' [i'' \subseteq i' \wedge i' \leq i_0 \wedge \text{E. makes fire at } i'']$, where i' is a time interval.

Realis negation

Enet tere gone páng.
Indices for which the proposition
λi[Enet makes fire at i]
cannot be true.



Irrealis modality: Future reference

Interpretation of irrealis as future-directed -- "potentialis":

(63) $[\![[_{I'}\ \text{IR}\ \text{VP}]]\!](i_0) = \lambda i \lambda i' \lambda x[i < i' \wedge [\![\text{VP}]\!](i_0)(i')(x)]$

(64) $[\![[_{\text{IP}}\ \textit{Enet}_{[3\text{SG}]}\ [\textit{bwe}_{[\text{IR}][3\text{SG}]}\ [\textit{gone páng}]]]\!](i_0) = \lambda i \lambda i'[i < i' \wedge \text{E. makes fire at } i']$

This interpretation is too weak for future reference in branching time model:

-- Existential quantification over i' too weak – expresses just possibility.

-- We need quantification over all future indices, or all expectable indices (Dowty 1977).

-- This universal quantification can be related to the future prefix *a-*.

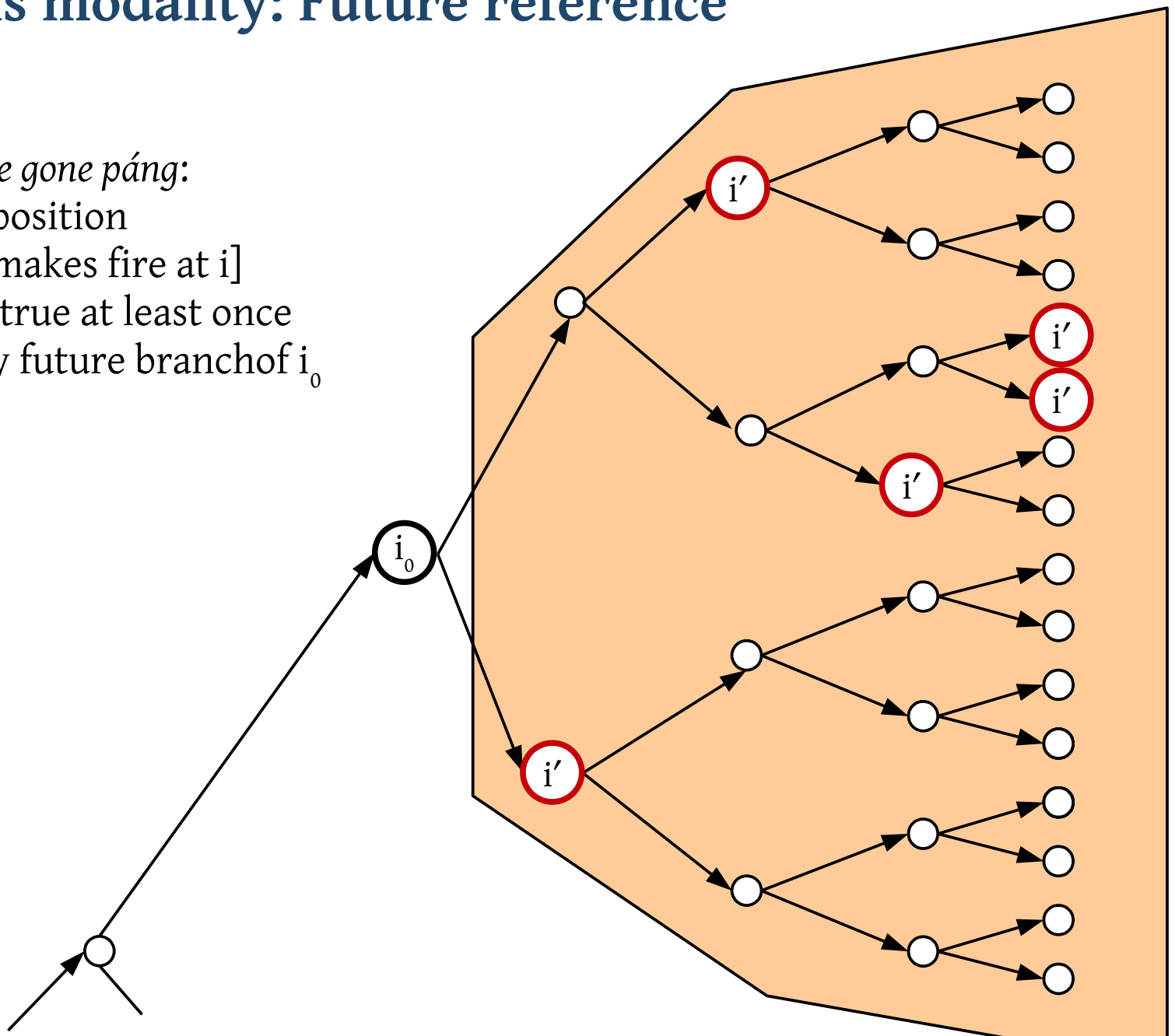
(65) $[\![[_{\text{CP}}\ \text{FUT}\ \text{IP}]]\!] = \lambda i \forall i'[i \leq i' \rightarrow \exists i''[i' \sim i'' \wedge [\![\text{IP}]\!](i_0)(i)(i'')]]$

(66) $[\![[_{\text{CP}}\ \text{FUT}\ [_{\text{IP}}\ \textit{Enet}_{[3\text{SG}]}\ [a_{[\text{FUT}]}\ \textit{bwe}_{[\text{IR}][3\text{SG}]}\ [\textit{gone páng}]]]]]\!](i_0)$
$= \lambda i \forall i'[i \leq i' \rightarrow \exists i''[i' \sim i'' \wedge i < i'' \wedge \text{E. makes fire at } i'']]$

where i ~ i' iff i, i' are part of the same history, i.e. i ≤ i' or i'≤ i.

Irrealis modality: Future reference

Enet abwe gone páng:
The proposition
λi[Enet makes fire at i]
must be true at least once
for every future branchof i_0



Irrealis modality: Wishes

Irrealis for the expression of wishes:
-- Representation of preferences following Heim (1992):

(67) $[\![[_{\text{ForceP}}\ \text{PREF}\ \text{IP}]]\!](i_0) = \forall i,i'[i, i' \text{ maximally similar to } i_0 \wedge [\![\text{IP}]\!](i_0)(i_0)(i) \wedge \neg[\![\text{IP}]\!](i_0)(i_0)(i') \rightarrow \text{speaker}(i_0) \text{ prefers } i \text{ over } i']$

(68) $[\![[_{\text{ForceP}}\ \text{PREF}\ [_{\text{IP}}\ kop_{[2\text{SG}][\text{IR}]}\ gone\ páng]]]\!](i_0)$
$= \forall i \forall i'[i, i' \text{ maximally similar to } i_0 \wedge [\text{addr}(i_0) \text{ m. fire in } i] \wedge \neg[\text{addr}(i_0) \text{ m. fire in } i'] \rightarrow \text{speaker}(i_0) \text{ prefers } i \text{ over } i']$

Notice: This interpretation scheme requires irrealis.

Irrealis in embedded clauses; to know how and to know that

Irrealis complementizer *ka*, like *ke* except for realis precondition:

(69) $[\![[_{cP}\ ka\ CP]]\!](i_0) = \lambda i \lambda R \forall i''[R(i)(i'') \rightarrow [\![CP]\!](i_0)(i'')]]$

Specification of accessible relation by embedding verb, here *kiibele* 'to know (how)'

(70) a. $[\![[_{VP}\ kiibele\ [_{cP} ka\ [_{CP}\ \exists\ [_{IP}\ \_\ [_{I'}\ bwe_{[IR][3SG]}\ [_{VP}\ gone\ páng]]]]]]]\!](i_0)$
$= \lambda i \lambda x \forall i''[\text{ABILITY}(i)(i'')(x) \rightarrow \exists i'[i'' < i' \wedge x \text{ makes fire at } i']]$

b. $[\![[_{CP}\ \exists\ [_{IP}\ Enet_{[3SG]}\ [_{I'}\ mwe_{[3SG][RE]}\ [_{VP} kiibele_2\ ka\ bwe\ gone\ páng]]]]]\!](i_0)$
$= \lambda i \exists i'[i' \leq i \wedge \forall i''[\text{ABILITY}(i')(i'')(E.) \rightarrow \exists i'''[i'' < i''' \wedge E. \text{ makes fire at } i''']] \wedge \ldots]$

'To know that':

-- *kiibele* with realis complementizer, realis complement clause: 'to know that'
mwe kiibele ke vanten mu-syoo lam du okiye
3SG.RE know COMP.RE man RE-some 3PL-RE stay there
'He knows/knew that some men stay/stayed there.'

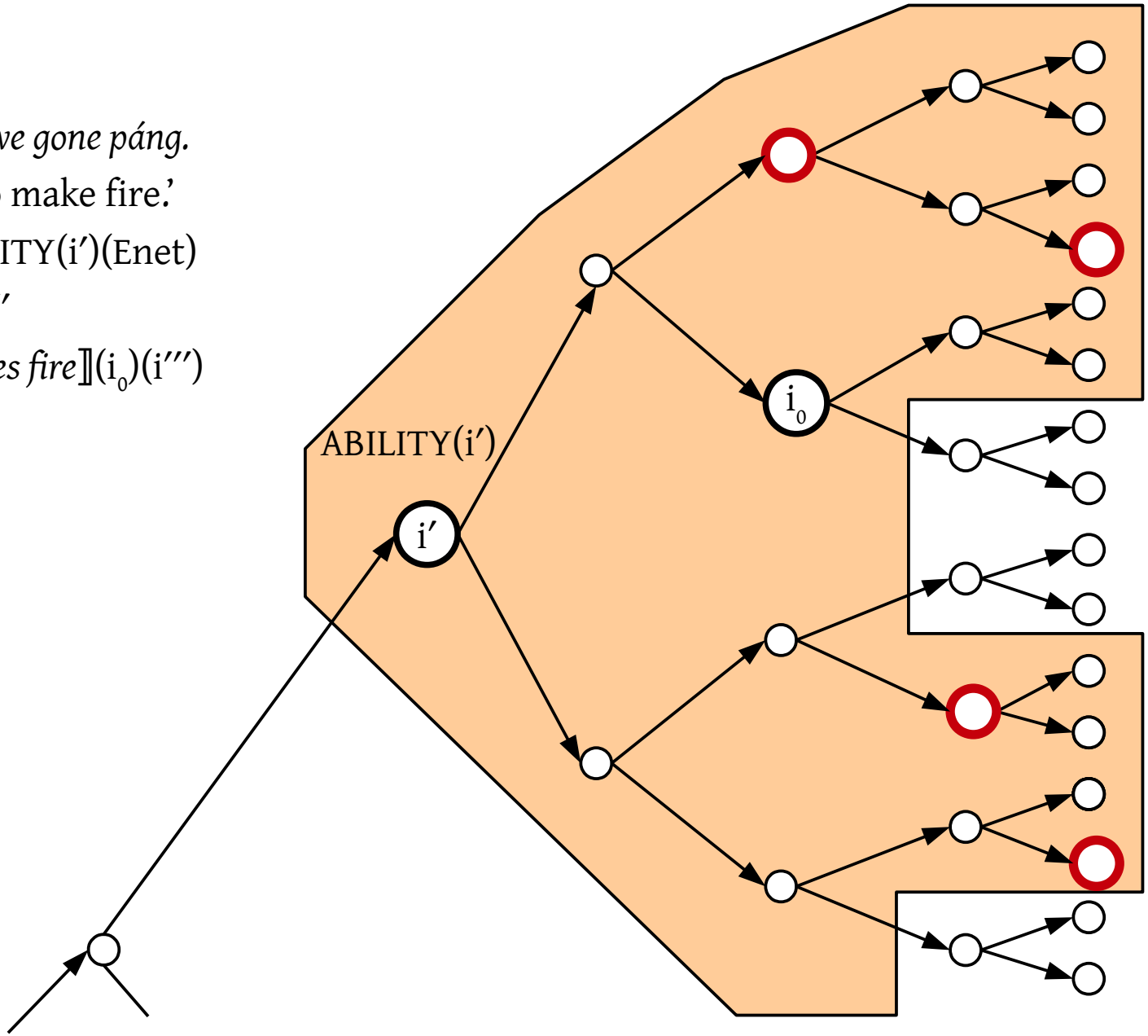
-- *kiibele* with irrealis complementizer, future complement clause: 'to know that s.th. will be'
kye-m kiibele ka Jisas a-bwe kuone kiyee
3PAUC-RE know COMP.NR Jesus FUT-IR.3SG help 3PAUC
'They thought that Jesus would help them.'

Proposal:

-- Basic meaning of *kiibele*: 'to believe'
-- To believe sth. about past/present indices: to believe that sth. has happened.
-- To believe sth. about future indices: to believe that sth. will happen in all future histories.
-- To believe sth. about one's own actions: to know how;
knowing how entails that one performs an action in at least one branch in the future.

Example of embedded irrealis clause: *kiibele ka* ‘to know how’

Enet me kiibele ka bwe gone páng.
‘Inet knows how to make fire.’
For every i″ ∈ ABILITY(i′)(Enet)
there is a i‴, i″ ≤ i‴
such that *Enet makes fire*⟧(i_0)(i‴)



Irrealis mood in protasis of conditionals

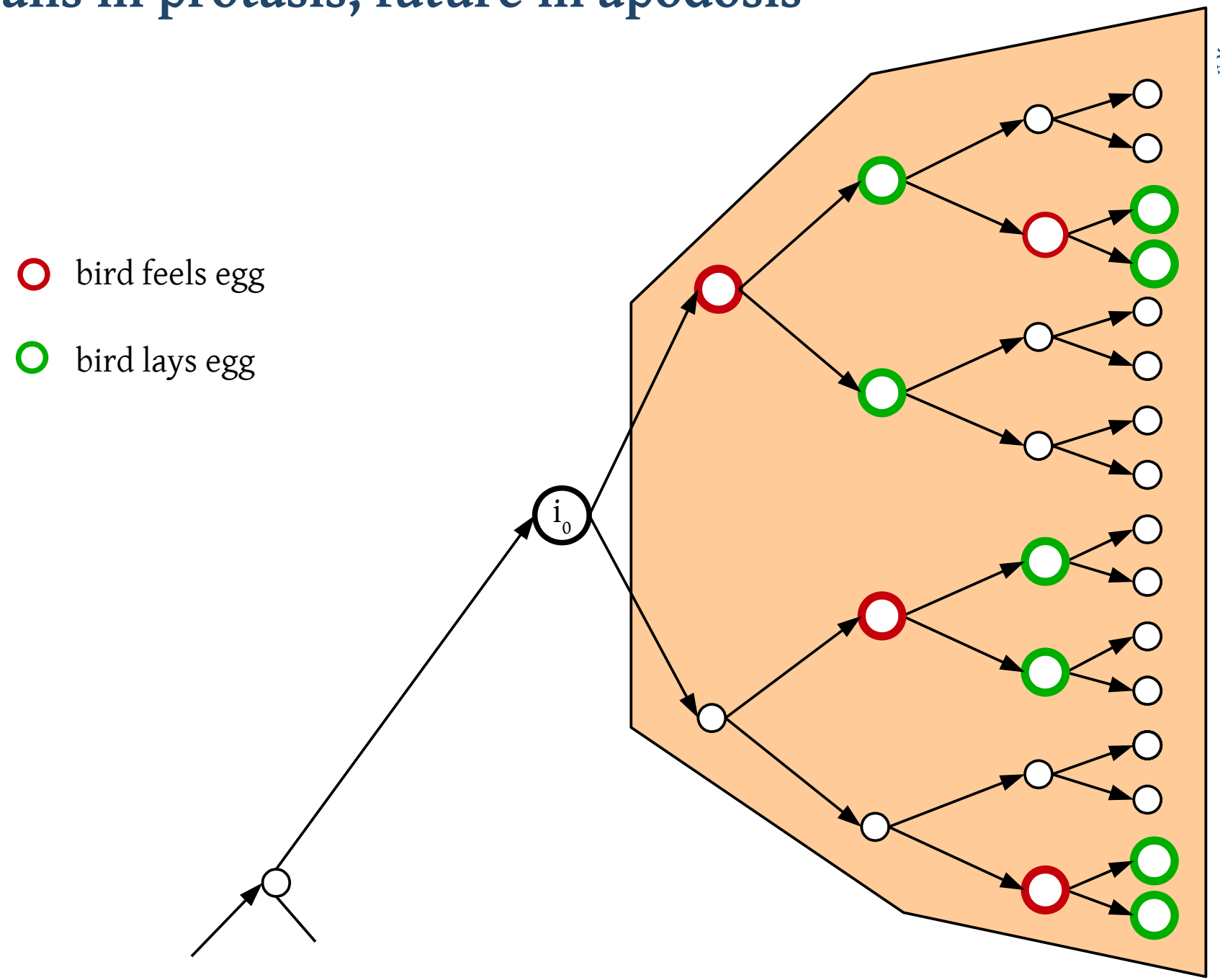
Protasis in irrealis mood, apodosis in irrealis future *a* + irrealis.
Irrealis complementizer specifies future as accessbility relation.

(71) $[\![[_{CP}\,[ka\ \text{IP}]\ \text{CP}]]\!](i_0) = \lambda i \forall i'[[\![\text{IP}]\!](i_0)(i)(i') \rightarrow [\![\text{CP}]\!](i_0)(i')]$

(72) $[\![[_{\text{ForceP}}\,\text{ASSERT}\ [_{CP}\ molo_i\ [_{C0}\ ka\ [_{IP}\ t_i\ bo_{[3SG][IR]}\ longane\ diliri]]\ [_{CP}\ t_i\ abe_{[FUT][3SG][IR]}\ pisih]]]]](i_0)$
$= \forall i'[i_0 < i' \wedge$ bird feels egg in $i' \rightarrow \forall i''[i_0 \leq i'' \rightarrow \exists i'''[i'' \sim i''' \wedge i' < i''' \wedge$ bird lays egg in $i''']]]$

For all indices i′ in the future, when the incubator bird feels an egg at i′,
then in all histories that i′ is a part of, there is an index i‴ at which the bird lays an egg.
To be understood:
– i′ and i‴ tend to be closely related, causal/temporal relation
– Literally a statement about the future, but generalizable to other indices as well.
– Possible generalized meaning of *ka* + IRREALIS, *a* + IRREALIS:
reference to set of indices that are compatible with the knowledge of speaker at i_0.

Conditionals:
Irrealis in protasis, future in apodosis



Distal modality: Specifiying temporal reference

Distal modality is used in stative predications (habituals, adjectival)
-- Modelled as quantification over the times of an interval
-- Requires a model that contains time intervals (index intervals).

Distal modality does not refer to the time of utterance:
-- No reference to i_0 in its semantic representation.
-- Consequently, IP is a proposition, not a relation between two indices;
for type homogeneity, we could assume dummy index, constant relation.

(73) $[\![[_{I'}\ \text{DIST}\ \text{VP}]]\!](i_0) = \lambda i \lambda x \exists i' \leq i \forall i''[i' \leq i'' \leq i \rightarrow [\![\text{VP}]\!](i_0)(i'')(x)]$

(74) $[\![[_{IP}\ yaa_{[3SG]}\ [te_{[DIST][3SG]}\ [_{VP}\ van]]]]\!](i_0) = \lambda i \exists i' \leq i \forall i''[i' \leq i'' \leq i \rightarrow$ the sun goes (down) at $i'']$

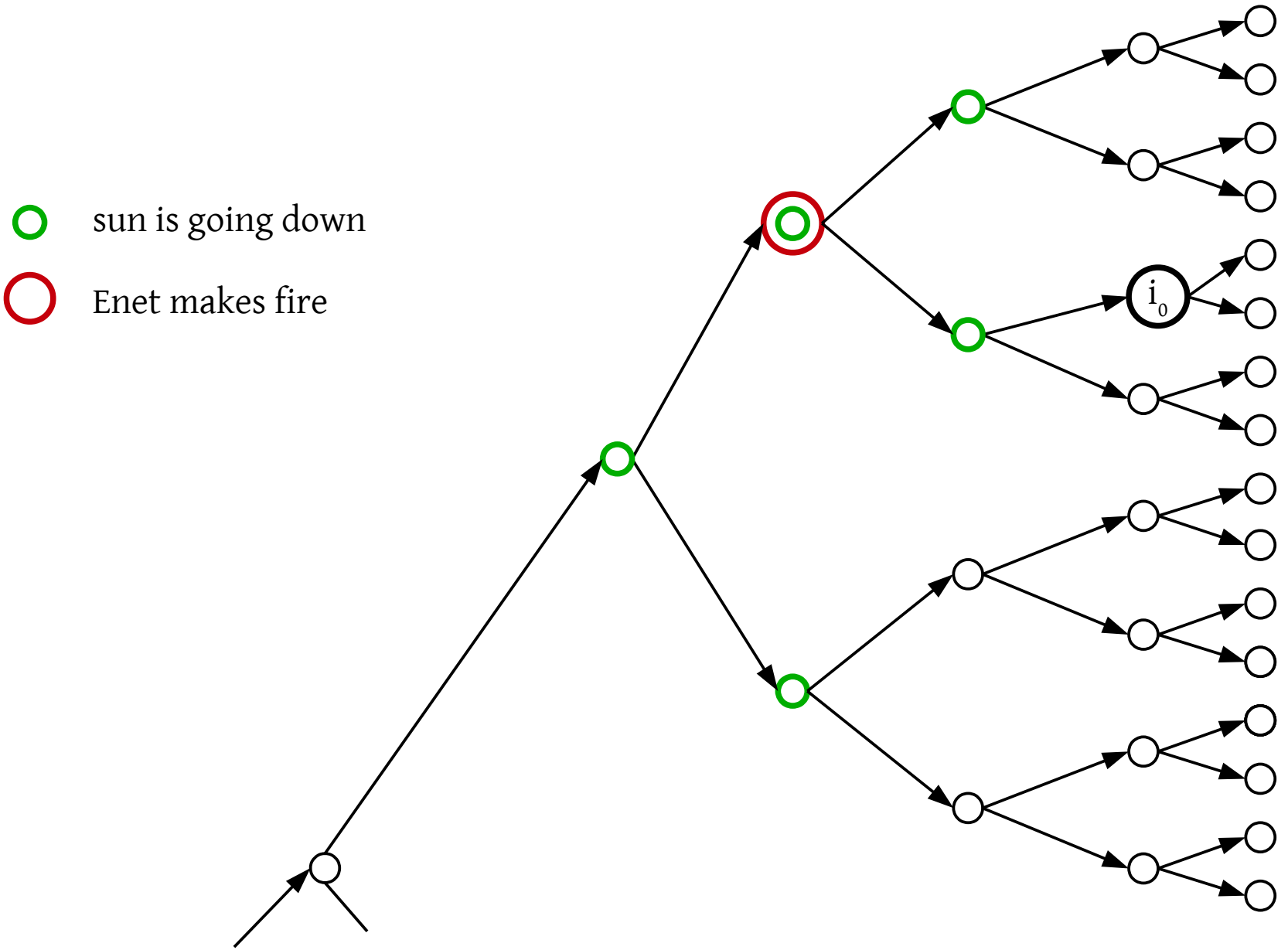
Setting temporal reference for other clauses
-- QU: temporal quantifier, ∃ or other, e.g. *kevene wobuong* 'every day'
-- Specification of restrictor of quantifier by *te*-clause in Spec-CP

(75) $[\![[_{CP}\ \text{Spec-CP}\ [_{C'}\ [_{C0}\ \text{QU}]\ \text{IP}]]]\!](i_0) = \lambda i\ [\![\text{QU}]\!]: [\![\text{Spec-CP}]\!](i_0)\ [[\![\text{IP}]\!](i_0)]$

(76) $[\![[_{\text{ForceP}}\ \text{ASSERT}\ [_{CP}\ [_{IP}\ yaa_{[3SG]}\ te_{[3SG][DIST]}\ van]\ [_{C'}\ \exists^{44}\ [_{IP}\ Enet_{[3SG]}\ mo_{[3SG][DIST]}\ gone\ páng]]]]\!](i_0)$
$= \exists i: \exists i' \leq i \forall i''[i' \leq i'' \leq i \wedge$ the sun goes at $i''] [i \leq i_0 \wedge$ E. m. fire at $i \wedge \underline{\exists i' \leq i_0[\text{E. m. fire at } i']}]$

'When the sun was going down / As the sun is going down, Enet made / is making fire.'

Distal modality: Specifying temporal reference



Distal modality in main clause, temporal reference specified by adverbial

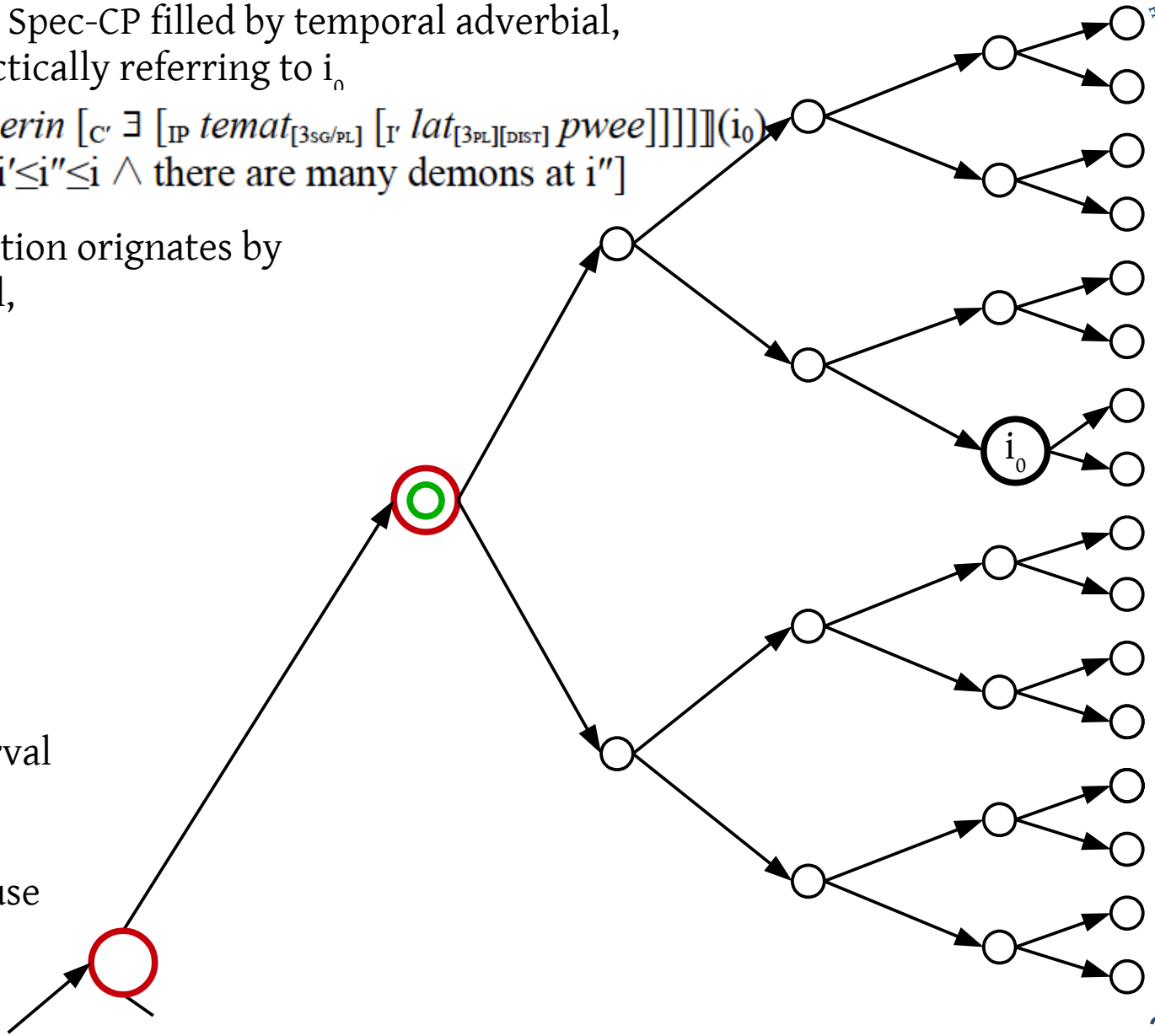
Distal in main clause, with Spec-CP filled by temporal adverbial, here *meerin* 'long ago', deictically referring to i_0

(77) $[\![[_{\text{ForceP}}\ \text{ASSERT}\ [_{\text{CP}}\ \textit{meerin}\ [_{\text{C}'}\ \exists\ [_{\text{IP}}\ \textit{temat}_{[3\text{SG/PL}]}\ [_{\text{I}'}\ \textit{lat}_{[3\text{PL}][\text{DIST}]}\ \textit{pwee}]]]]]\!](i_0)$
$= \exists i\colon i << i_0\ \exists i' \forall i''[i' \leq i'' \leq i \wedge$ there are many demons at $i'']$

Notice: "realis" interpretation orignates by deictic temporal adverbial, not by realis mood.

- 'long time ago'
- 'there are many demons'

Alternative option:
meerin species a time interval in the past,
interval of *meerin*
and of distal modality clause align.



Distal modality: Adjectival predications

Distal modality in adjectival predications

-- Realis relative clause complementizer *ke* creates reference to utterance index i_0

(78) $[\![[_{AP}\ ke\ IP]]\!](i_0) = \lambda i \lambda x[[\![IP]\!](i_0)(i)(x) \wedge \underline{[\![IP]\!](i_0)(i_0)(x)}]$

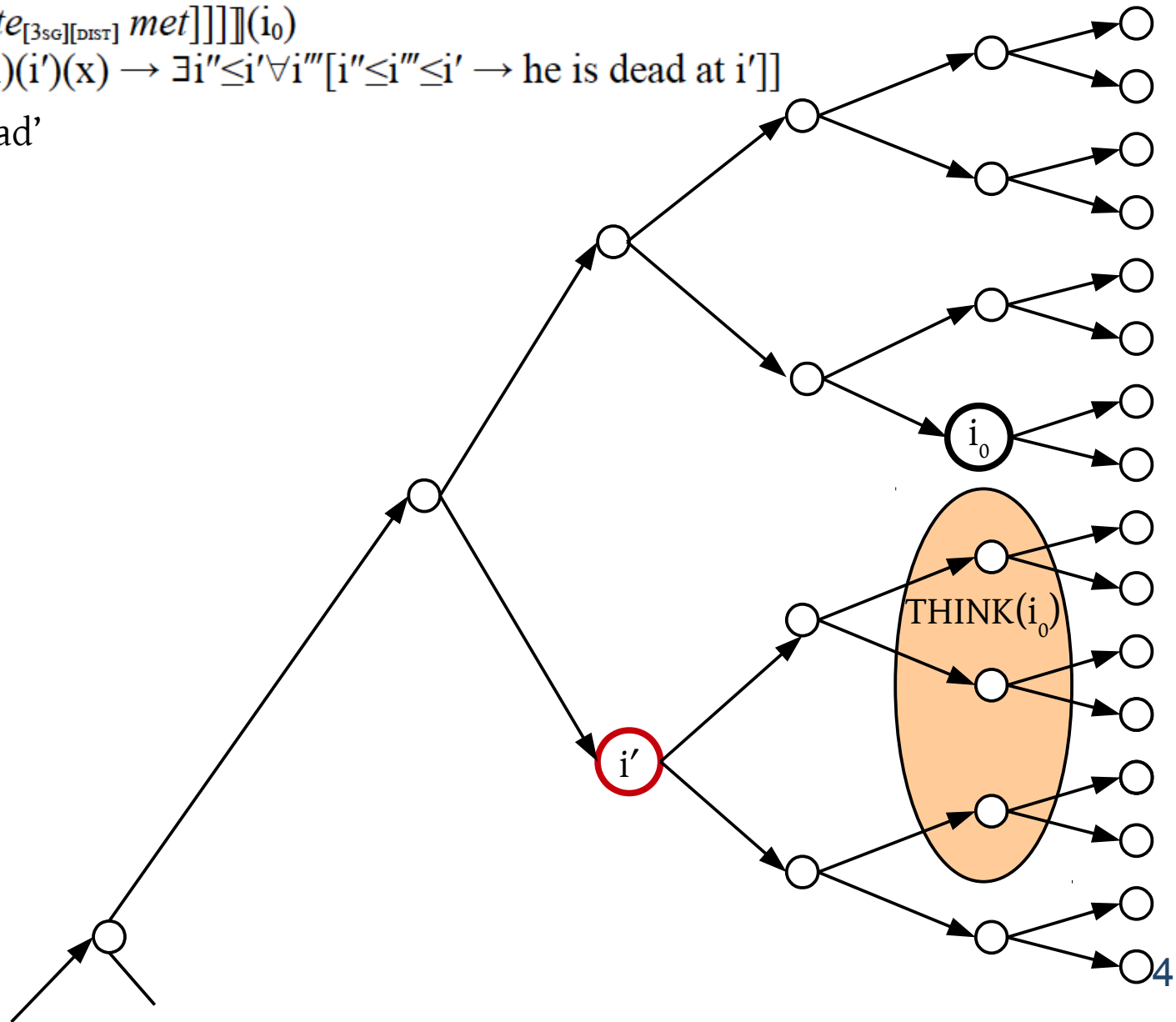
(79) $[\![[_{NP}\ tyenem\ [_{AP}\ ke\ [_{IP}\ \_\ [_{I'}\ to_{[3SG][DIST]}\ [_{VP}\ bo]]]]]]\!](i_0)$
$= \lambda i \lambda x[x \text{ is a village in } i \wedge \exists i' \leq i \forall i''[i' \leq i'' \leq i \rightarrow x \text{ is big in } i'] \wedge$
$\underline{\exists i' \leq i \forall i''[i' \leq i'' < i_0 \rightarrow x \text{ is big in } i_0]}]$

Distal modality, Non-factive attitude predicates

Distal modality in complements of non-factive propositional attitude verbs.
-- Distal expresses no relation to realis (past, present) or future.

(80) $[\![[_{VP}\ deme\ [_{cP}\ ka\ [_{IP}\ te_{[3SG][DIST]}\ met]]]]\!](i_0)$
$= \lambda i \lambda x \forall i'[\text{THINK}(i)(i')(x) \rightarrow \exists i'' \leq i' \forall i'''[i'' \leq i''' \leq i' \rightarrow \text{he is dead at } i']]$

'think that he is dead'



Distal modality in conditional clauses

Distal in protasis of conditional with future apodosis
restricts accessibility relation of the future in the main clause.

(81) $[\![[_{\text{ForceP}}\ \text{ASSERT}\ [_{\text{CP}}[_{\text{IP}}\ kot_{[2\text{SG}][\text{DIST}]}\ pyak\ ne\ vyoh]\ [_{\text{C}'}\ \text{FUT}\ [_{\text{IP}}\ akop_{[\text{FUT}][2\text{SG}][\text{IR}]}\ idi\ popat]]]]]\!](i_0)$
$= \forall i'\colon \exists i''{\leq}i'\forall i'''[i''{\leq}i'''{\leq}i' \rightarrow \text{you}(i_0)\ \text{choose coconut at}\ i''']$
$[i_0 \leq i' \rightarrow \exists i''[i' \sim i'' \wedge i_0 < i'' \wedge \text{you}(i_0)\ \text{get pig at}\ i'']]$
'You will get a pig, provided that you have chosen a coconut.'

Ignoring the stativity part, which is irrelevant here:
-- For every i' for which it holds that addressee chooses a coconut at i'
-- it holds that i' follows the utterance time, and the addressee gets a pig in the branch of i'.

Distal in protasis with future+distal in apodosis

(82) $[\![[_{\text{ForceP}}\ \text{ASSERT}\ [_{\text{CP}}\ [\ ka\ [_{\text{IP}}\ kot_{[2\text{SG}][\text{DIST}]}\ pyak\ ne\ vyoh]]\ [_{\text{CP}}\ akot_{[\text{FUT}][2\text{SG}][\text{DIST}]}\ idi\ popat]]]\!](i_0)$
$= \forall i'\colon [\text{you}(i_0)\ \text{choose coconut at}\ i']\ [R(i_0)(i') \rightarrow \exists i''[i' \sim i'' \wedge \text{you}(i_0)\ \text{get a pig at}\ i'']]$

Simplified representation, suppressing the stativity part.
Meaning:
-- For every i' for which it holds that addressee chooses a coconut at i',
-- if i' is accessible from the utterance index by the accessibility relation R of the conditional,
-- it holds that the addressee gets a pig in the history that i' belongs to.
Notice:
-- No restriction to future of utterance index;
-- interpretation as hypothetical conditional.

The N modality:
Use in commands and deontic statements

Complex behavior, but simple representation:
-- does not change the VP denotation,
-- hence does not relate to the utterance index i_0

(83) $[\![[_{I'}\ N\ VP]]\!](i_0) = \lambda i \lambda x[[\![VP]\!](i_0)(i)]$

(84) $[\![[_{IP}\ [_{I'}\ kon_{[2SG][N]}\ peten]]]\!](i_0) = \lambda i[\text{you}(i_0)\ \text{are truthful at}\ i]$

Use in commands (cf. infinitival constructions in German: *Jetzt mal herhören!*

(85) $[\![[_{ForceP}\ \text{COMMAND}\ [_{CP}\ \text{REF}\ [_{IP}\ kon\ peten]]]]\!](i_0)$:
speaker(i_0) commands addressee(i_0) to act such that $[\![kon\ peten]\!](i_0)(\text{REF}(i_0)) = \text{true}$,
where REF(i_0) is the index that speaker(i_0) refers to at i_0, condition: $i_0 < \text{REF}(i_0)$.

Deontic modal statement with complementizer *ka*
- Complementizer introduces universal quantification over accessibility relation
- Accessibility relation: Deontic modality.
- *n*-marked sentence specifies proposition that should be true at all accessible indices,
  realis not possible, as this would come with a realis preconditon,
  irrealis not a good option, as this would come with a future-oriented interpretation

(86) $[\![[_{CP}\ ka\ [_{IP}\ kon_{[2SG][N]}\ peten]]]\!](i_0) = \lambda i \forall i'[R(i)(i') \rightarrow \text{you}(i_0)\ \text{truthful at}\ i']$

The N modality:
Use in the context of negation.

Assume an "excluded middle" presupposition for universal quantifier expressed by *ka,* here rendered with ∂ and in italics.
(cf. Gajewski 2005, for NEG raising phenomena)

(87) $[\![[_{cP}\ ka\ \text{IP}]]\!](i_0) = \lambda i[\forall i'[R(i)(i') \rightarrow [\![\text{IP}]\!](i_0)(i')] \wedge \partial[\forall i'[R(i)(i') \rightarrow [\![IP]\!](i_0)(i')] \vee \forall i'[R(i)(i') \rightarrow \neg[\![IP]\!](i_0)(i')]]$

IP is true for every accessible index i′,

presupposed: IP is true for every or for no accessible index.

Short rendering of excluded middle presupposition:

$\partial\forall i'[R(i)(i') \rightarrow \{\neg\}[\![IP]\!](i_0)(i')]$.

Negative complementizer *sa*:
-- expressing negation
-- with "excluded middle presuppositon" of *ka*: equivalent to narrow-scope negation.

(88) $[\![[_{CP}\ sa\ \text{cP}]]\!](i_0) = \lambda i[\neg[\![\text{cP}]\!](i_0)(i)]$

(89) $[\![[_{CP}\ sa\ [_{cP}\ ka\ wel\text{-}em_{[2SG]}\ ne_{[3SG][N]}\ nek]]]\!](i_0)$
$= \lambda i\ [\neg[\forall i'[R(i)(i') \rightarrow \text{you}(i_0)\ \text{afraid at}\ i'] \wedge \partial\forall i'[R(i)(i') \rightarrow \{\neg\}[you(i_0)\ afraid\ at\ i]]]$
$= \lambda i\ \forall i'[R(i)(i') \rightarrow \neg\ \text{you}(i_0)\ \text{afraid at}\ i']$

The N modality: Negation in embedded clauses

Embedding predicate is negated:
-- Due to excluded middle presupposition of *ka*: correct interpretation.
-- Realis modality in dependend clauses is excluded
because it would state that the proposition is in fact true.

(90) a. $[\![[_{VP}\ kiibele_2\ [_{cP}\ ka\ ne_{[3SG][N]}\ kuu]]]\!](i_0)$
$= \lambda i \lambda x[\forall i'[ABIL(i)(i')(x) \rightarrow x \text{ moves at } i'] \wedge \partial \forall i'[ABIL(i)(i')(x) \rightarrow \{\neg\} x \text{ moves at } i']]]$

b. $[\![[_{ForceP}\ \text{ASSERT}\ [_{CP}\ \exists\ [_{IP}\ Enet\ [_{I'}\ tere_{[3SG][RE.N]}\ [_{VP}\ kiibele_2\ ka\ ne\ kuu]]]]]]\!](i_0)$
$= \neg \exists i \leq i_0[\forall i'[ABIL(i)(i')(E.) \rightarrow E. \text{ moves at } i'] \wedge \partial[(excluded\ middle)]]$
$= \forall i \leq i_0 \neg[\forall i'[ABIL(i)(i')(E.) \rightarrow E. \text{ moves at } i'] \wedge \partial[(excluded\ middle)]]$
$= \forall i \leq i_0[\forall i'[ABIL(i)(i')(E) \rightarrow \neg\ E. \text{ moves at } i']]$

Negative-implying embedding verbs:
-- Speaker assumes that proposition is false:
Restriction to those indices that are not on the branch of the utterance index.
-- Hence realis or irrealis cannot be used for embedded clause.
-- N modality expresses no restriction, hence can be used in this context.

(91) a. $[\![[_{VP}\ notselaane]]\!](i_0) = \lambda i \lambda i' \lambda x[THINK(i)(i')(x) \wedge \neg[i' \sim i_0]]$

b. $[\![[_{VP}\ notselaane\ [_{cP}\ ka\ ne_{[3SG][N]}\ kuu]]]\!](i_0)$
$= \lambda i \lambda x[\forall i'[[THINK(i)(i')(x) \wedge \neg[i' \sim i_0]] \rightarrow x \text{ moves at } i'] \wedge \partial[(excluded\ middle)]]$

c. $[\![[_{ForceP}\ \text{ASSERT}\ [_{CP}\ \exists\ [_{IP}\ Enet_{[3SG]}\ [_{I'}\ [mwe_{[3SG][RE]}\ [_{VP}\ notselaane\ ka\ ne\ kuu]]]]]]]\!](i_0)$
$= \exists i \leq i_0\ [\forall i'[THINK(i)(i')(E.) \wedge \neg[i' \sim i_0]] \rightarrow E. \text{ moves at } i'] \wedge \partial[(excluded\ middle)]$
$\wedge$ (realis precondition)]

Conclusion

The five (six) modal markers of Daakie:

- *m* Realis:
  Proposition true at or before i_0.
- *b/p* Irrealis (Potentialis):
  Proposition true after i_0.
- *b/p* Irrealis with future *a-*:
  Propostition true after i_0 for all future histories.
- *re* Negation:
  Proposition not true at or before i_0.
- *t* Distal:
  - No relation to i_0 expressed; restricts modal accessibility relations.
  - Stative interpretation: Quantification over interval
- *n* Modality:
  - No relation to i_0 expressed; restricts modal accessibility relations.
  - Compatible with uses in the scope of negation, where Realis/Irrealis are blocked.

Other claims:

- Realis / Irrealis complementizers:
  - express modal notions themselves
  - which can be restricted by the embedding predicate.

Goodies: The Story of the Redhead bird.

Examples of sand drawings:

Goodies: Sandroing, by Ilson Magekon