Reportative evidentials in Kalaallisut (MB fw)

- (REQUEST FOR) REPORTED ASSERTIONS: =RPT…DEC

(1) *Qangagooq anguteqarpoq Aataarsuarmik atilimmik.*
*qanga=**guuq** angut-qar-pu-q Aataarsuaq-mik atiq-lik-mik*
long.ago=RPT man-have-DEC.IV-3SG Aataarsuaq-MOD name-with-MOD
Once upon a time, 'tis said, there was a man named Aataarsuaq.

(2) I have sad news for you.
Nuliavinngooq ullumi qimappaatit.
*nulia-vit=**guuq** ulluq-mi qimat-pa-atit*
wife-2SG.ERG=RPT day-LOC leave-DEC.TV-3SG.2SG
Your wife, I hear, left you today.

(3) When Suulut knocked, Ole, who disliked him, said to his wife:
a. "*Anisimavungagooq.*"
*ani-sima-pu-nga=**guuq***
go.out-prf-DEC.IV-1SG=RPT
"Say that I am out."

b. "*Olegooq anivoq.*"
*Ole=**guuq** ani-pu-q*
Ole=RPT go.out-DEC.IV-3SG
"Say that Ole is out."

Ole's wife obediently told Suulut:
"*Ole anivoq.*"
Ole ani-pu-q
Ole go.out-DEC.IV-3SG
"Ole is out."

(4) *Ole ippassaq anisimavoq. Suligooq utinngilaq.*
*Ole ippassaq ani-sima-pu-q suli=**guuq** utir-nngit-la-q*
Ole yesterday go.out-prf-DEC.IV-3SG still=RPT return-not-DEC$_{\notin}$-3SG
Ole went out yesterday. He still hasn't come back, they say.

(5) *Aani neriorsuivoq ullumi isissalluni.*
Aani niriursui-pu-q ulluq-mi isir-ssa-llu-ni
Aani promise-DEC.IV-3SG day-LOC enter-exp/des-ELA$_T$-3SG$_T$
Viinnisiguinngooq nuannaassaaq.
*viinni-si-gu-vit=**guuq** nuannaar-ssa-pu-q*
bottle.of.wine-get-HYP$_T$-2SG=RPT happy-exp/des-DEC.IV-3SG
Aani has promised to drop in today. If you get a bottle of wine, [she] said, she'll be happy.

(6) Today Aani told Kaali (a) or (b):

a. “*Siorna ikinngutit Suulut Danmarkimut angerlarpoq*,
siurna ikinngut-t Suulut Danmark-mut angirlar-pu-q
last.year friend-2SG Suulut Danmark-DAT go.home-DEC.IV-3SG
naparsimagami.”
naparsima-ga-mi
ill-FCT$_{\top}$-3SG$_{\top}$
“Last year your friend Suulut went home to Denmark, because he was ill.”

b. “*Siorna ikinngutit Suulut Danmarkimut angerlarpoq*.
siurna ikinngut-t Suulut Danmark-mut angirlar-pu-q
last.year friend-2SG Suulut Danmark-DAT go.home-DEC.IV-3SG
Naparsimanerarpoq.”
naparsima-nirar-pu-q
ill-say-DEC.IV-3SG
“Last year your friend Suulut went home to Denmark. He said he was ill.”

Kaali repeated (a) or (b) to his wife:
“*Siornaguuq ikinngutiga Danmarkimut angerlarpoq*,
*siurna=**guuq** ikinngut-ga Danmark-mut angirlar-pu-q*
last.year=RPT friend-1SG Danmark-DAT go.home-DEC.IV-3SG
naparsimagamigooq.”
*naparsima-ga-mi=**guuq***
ill-FCT$_{\top}$-3SG$_{\top}$=RPT

a′. “Last year, I hear, my friend went home to Denmark, because he was ill”

b′. “Last year, I hear, my friend went home to Denmark. He said he was ill, they said.”

(7) *Ullumi Suulup Ole tilluppaa ippassarooq*
*ulluq-mi Suulut-p Ole tillug-pa-a ippassaq=**guuq***
day-LOC Suulut-ERG Ole hit-DEC.TV-3SG.3SG [yesterday=RPT
Ole oqarsimammat Suulunngooq tillissimasoq.
*Ole uqar-sima-mm-at Suulut=**guuq** tillig-sima-tu-q*
Ole say-prf-FCT$_{\perp}$-3SG$_{\perp}$ [Suulut=RPT steal-prf-ELA$_{\perp}$.IV-3SG$_{\perp}$]]
Oleli taama oqarsimanngilaq.
Ole=li taama uqar-sima-nngit-la-q
Ole=but thus say-prf-not-DEC$_{\notin}$-3SG
Today Suulut hit Ole because, he said, yesterday Ole had said that Suulut had stolen something. But Ole didn't say that.

- (REQUESTS FOR) REPORTED QUESTIONS OR ANSWERS: =RPT…QUE/DEC

(8) Aani, Kaali and Juuna (teacher), after a dog sled race for kids:

A to K: "*Juunamut aperiartorniarit*! *Kinagooq ajugaava*?"
*Juuna-mut apiri-iartur-niar-gi-t kina=**guuq** ajugaa-pi-a*
Juuna-DAT ask-go.to-POL-IMP-2SG who=RPT win-QUE-3SG
"Run to Juuna and ask, please. Ask [him], who won?"

K to J: "*Aanip aperiartoqquaanga.* *Kinagooq ajugaava*?"
*Aani-p apiri-iartur-qqu-pa-anga kina=**guuq** ajugaa-pi-a*
Aani-ERG ask-go.to-tell-DEC.TV-3SG.1SG who=RPT win-QUE-3SG
"Aani has sent me to ask [you]. [She]'s asking, who won."

J to K: "*Suulut*"

A to K: "*Juuna qanoq oqarpa*? *Kinagooq ajugaava*?"
*Juuna qanuq uqar-pi-a kina=**guuq** ajugaa-pi-a*
Juuna how say-QUE-3SG who=RPT win-QUE-3SG
"What did Juuna say? According to [him], who won?"

K to A: "*Suulunngooq ajugaavoq*."
*Suulut=**guuq** ajugaa-pu-q*
Suulut=RPT win-DEC.IV-3SG
"According to [him], Suulut won."

(9) Aani, Juuna, and Ole, after Ole's trip to Nuuk.

A to J: "*Ole Nuummiikkami susiva*?"
Ole *Nuuk-mi=it-ga-mi su-si-pi-a*
Ole Nuuk-LOC=be-FCT$_{\top}$-3SG$_{\top}$ what-get-QUE-3SG
"When Ole was in Nuuk, what did he buy?"

O to J: "*qanuq=**guuq***?"
how=RPT
"What did [she] say?"

J to O: "*Nuummiikkavinngooq susivit*?"
*Nuuk-mi=it-ga-vit=**guuq** su-si-pi-t*
Nuuk-LOC=be-FCT$_{\top}$-2SG=RPT what-get-QUE-2SG
"[She]'s asking, when you were in Nuuk what did you buy?"

O to J: "*Susinngilangagooq*."
*su-si-nngit-la-nga=**guuq***
what-get-not-DEC$_{\notin}$-1SG=RPT
"Tell [her] I didn't buy anything."

J to A: "*Susinngilarooq*."
*su-si-nngit-la-q=**guuq***
what-get-not-DEC$_{\notin}$-3SG=RPT
"He didn't buy anything, [he] says."

(10) Little Peter is gravely ill. A doctor is visiting the village, and this morning mom took little Peter to the clinic. After school, Peter's sister, Sofia, asks:

Sofia:	"*Nakorsaq*	*qanorooq*?"		
	nakursaq	*qanuq=**guuq***		
	doctor	how=RPT		
	"What did the doctor say?"			
Mom:	"*Aqagugooq*	*Piitaaraq*	*qallunaat*	*nunaannut*
	*aqagu=**guuq***	*Piita-araq*	*qallunaa-t*	*nuna-at-nut*
	tomorrow=RPT	Piita-little	Dane-PL.ERG	land-3PL$_\perp$.SG-DAT
	naparsimaviliassaaq."			
	naparsima-vik-liar-ssa-pu-q			
	ill-iv\loc-go-exp/des-DEC.IV-3SG			
	"Tomorrow, [he] said, little Peter is going to hospital in Denmark."			
Sofia:	"*Kianngooq*	*ilagissavaa*?"		
	*kia-p=**guuq***	*ilagi-ssa-pa-a*		
	who-ERG=RPT	accompany-exp/des-QUE-3SG.3SG		
	"Who will accompany him, according to [the doctor]?"			
Mom:	"*Nakorsagooq*	*nammineq*	*ilagissavaa*."	
	*nakursaq=**guuq***	*namminiq*	*ilagi-ssa-pa-a*	
	doctor=RPT	self	accompany-exp/des-DEC.TV-3SG.3SG	
	"The doctor himself, [he] said, will accompany him."			
Sofia:	"*Qaqugugooq*	*Piitaaraq*	*utissava*?"	
	*qaqugu=**guuq***	*Piita-araq*	*utir-ssa-pa-a*	
	when$^{>}$=RPT	Piita-little	return-exp/des-QUE-3SG.3SG	
	"When is little Peter going to come back, according to [the doctor]?"			
Mom:	"*Sivisuuminngooq*	*tappavaniissaaq*."		
	*sivi-suuq-mik=**guuq***	*tappava-ni=it-ssa-pu-q*		
	duration-big-MOD=RPT	there-LOC=be-exp/des-DEC.IV-3SG		
	"He's going to be over there a long time, [he] said."			

• (REQUESTS FOR) REPORTED DIRECTIVES/WISHES: =RPT…IMP/OPT

(11) D = Dad, K = Kaali, J = Juuna

D to K: "*Juuna oqarfiginiaruk aallalerumagooq*
*Juuna uqar-vigi-niar-gi-uk aallar-lir-gu-ma=**guuq***
Juuna say-to-POL-IMP-2SG.3SG set.out-begin-HYP$_T$-1SG
ilaaniarili."
ilaa-niar-li
join-POL-OPT.3SG
"Tell Juuna, when I set out [on my next hunting trip] I'd like him to come along."

K to J: "*Ataatagagooq aallaleruni ilaaniarina*."
*ataata-ga=**guuq** aallar-lir-gu-ni ilaa-niar-gi-t=na*
dad-1SG=RPT set.out-begin-HYP$_T$-3SG$_T$ join-POL-IMP-2SG=THN$^>$
"I was to say, when my dad sets out you're invited to come along."

J to K: "*Qujanarooq*."
*qujanaq=**guuq***
thanks=RPT
"Say 'thanks' to [your dad]"

K to D: "*Juuna oqarfigaara. Qujanarooq*."
*Juuna uqar-vigi-pa-ra qujanaq=**guuq***
Juuna say-to-DEC.TV-1SG.3SG thanks=RPT
"I have told Juuna. [He] says 'thanks'."

(12) Last year Aani got a letter. Her husband wrote:
"*Maqaasivakkit. Uterniarit*!"
maqaasi-pa-kkit utir-niar-gi-t
miss-DEC.TV-1SG.2SG return-POL-IMP-2SG
"I miss you. Come back, please!"

Today Aani repeated this to her mother:
"*Siorna uinnit allagarsivunga.* .
siurna ui-n-nit allagar-si-pu-nga
last.year hsb-1SG-ABL letter-get-DEC.IV-1SG
"Last year I got a letter from my husband.
Maqaasivaangagooq. Uterlangagooq."
*maqaasi-pa-anga=**guuq** utir-la-nga=**guuq***
miss-DEC.TV-3SG.1SG=RPT return-OPT-1SG=RPT
He missed me, [he] said. [He] wanted me to come back, [he] said."

(13) Eskimo myth about S = Suitor, L = Lady, and M = Maid

L to M: "*Nuliarsartoq taanna akaarinngilara.*
nuliarsar-tuq taanna akaari-nngit-la-ra
propose-iv\cn that fancy-not-DEC.NEG-1SG.3SG
I don't fancy this suitor.
Illinngooq pilisit!"
*illit=**guuq** pi-li-sit*
2SG=RPT v-OPT-3SG.2SG
Tell [him] I want him to take YOU (instead)!"

M to S: "*Uangagooq piginga*!"
*uanga=**guuq** pi-gi-nga*
1SG=RPT v-IMP-2SG.1SG
"Take ME, [she] says."

S to M: "*Pinniikkavinngooq pissanngilakkit*."
*pinniit-ga-vit=**guuq** pi-ssa-nngit-la-kkit*
ugly-FCT$_{\top}$-2SG=RPT v-exp/des-not-DEC.NEG-1SG.2SG
"Tell [her], I won't take you because you're ugly."

M to L: "*Pinniikkamagooq pissanngilaanga*."
*pinniit-ga-ma=**guuq** pi-ssa-nngit-la-anga*
ugly-FCT$_{\top}$-1SG=RPT v-exp/des-not-DEC.NEG-3SG.1SG
"He won't take me because I am ugly, [he] says."

(14) After playing up in the mountains, Kaali says to his playmate:
"*Ilavut orninniartigit*,
ila-vut urnig-niar-gi-tigit
part-1PL.PL approach-POL-IMP-1PL.3PL
kinamigooq apuuteqaartoq!"
*kina=mi=**guuq** apuut-qaar-tu-q*
who=&=RPT arrive-first-ELA$_{\perp}$-3SG$_{\perp}$
"Let's go [down] to the others, and let's see who gets there first!"

(15) One day Kaali and Ole took their toy boats up to a lake to play.

Ole: "*Aajunagooq Canadap avannaata sineriaa.*
*aajuna=**guuq** Canada-p avanna-ata siniriaq-a*
this.here=RPT Canada-ERG north-3SG$_{\perp}$.SG.ERG coast-3SG$_{\perp}$.SG
Kinamigooq Canadamut peqaassava.
*kina=mi=**guuq** Canada-mut pi-qaar-ssa-pi-a*
who=&=RPT Canada-DAT v-first-exp/des-QUE-3SG
"Let's play that this here is the northern coast of Canada.
And let's see who gets to Canada first."

Kaali: "Ok, let's do that."

Grammatical centering across domains

1 CENTERING THEORY OF TENSE & *i*-MOOD

(1) a. *I am busy.* — nonpast state
1SG be.NPST_σ busy

b. *Today John leaves for Paris.* — nonpast event
today John leave+for.NPST_ε Paris

c. *Today I was busy.* — past state
today 1SG be.PST_σ busy

d. *Today John left for Paris.* — past event
today John leave+for.PST_ε Paris

(T) ^{1}tmp.presupposition; ^{2}modal-tmp.update; ^{3}tmp.attention.update

-NPST_σ ⇝
$^1({}^{P}[(\vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon) \leq \mathbf{d}\tau)^{o}]);\ ^2([\subset\langle \mathbf{d}\omega\!: d\sigma, \mathbf{d}\tau\rangle]; [(\text{CTR}\ d\sigma = \mathbf{d}\alpha)^{o}])$

-NPST_ε ⇝
$^1({}^{P}[(\vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon) \leq \mathbf{d}\tau)^{o}]);\ ^2([\supset\langle \mathbf{d}\omega\!: d\varepsilon, \mathbf{d}\tau\rangle]; [(\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{o}]);$
$^3[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(\mathbf{d}\omega, \text{CON}\ d\varepsilon))^{o}]$

-PST_σ ⇝
$^1({}^{P}[(\mathbf{d}\tau < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{o}]);\ ^2([\subset\langle \mathbf{d}\omega\!: d\sigma, \mathbf{d}\tau\rangle]; [(\text{CTR}\ d\sigma = \mathbf{d}\alpha)^{o}])$

-PST_ε ⇝
$^1({}^{P}[(\mathbf{d}\tau < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{o}]);\ ^2([\supset\langle \mathbf{d}\omega\!: d\varepsilon, \mathbf{d}\tau\rangle]; [(\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{o}]);$
$^3[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(\mathbf{d}\omega, \text{CON}\ d\varepsilon))^{o}, (\mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{o}]$

• English (1b): nonpast event

(1b′) today — John
$[\mathbf{t}|\ (\mathbf{t} \subseteq \textit{day.of}\ \mathbf{d}\varepsilon)^{o}];\ [\mathbf{a}|\ (\text{AGT}\ \mathbf{d}\varepsilon = \mathbf{a})^{o}];$
leave+for
$[e\ b|\ \textit{leave.for}\langle \mathbf{d}\omega, e\!: \text{AGT}\!: b\rangle];$
-NPST_ε
${}^{P}[(\vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon) \leq \mathbf{d}\tau)^{o}];\ [\supset\langle \mathbf{d}\omega\!: \mathrm{d}\varepsilon, \mathbf{d}\tau\rangle];\ [(\text{CTR}\ \mathrm{d}\varepsilon = \mathbf{d}\alpha)^{o}];$
$[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(\mathbf{d}\omega, \text{CON}\ d\varepsilon))^{o}];$
Paris — . (prosody)
$[(d\beta = \textit{paris})^{o}];\ [\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

${}^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_1 \subseteq \mathtt{p}_0$ • ${}^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0(\mathtt{w}_0)$: $\mathtt{e}_0$–agt speaks, updates CG to $\mathtt{p}_1$
| $\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
||| ${}^{\top}\mathtt{t}_1 \subseteq \mathtt{e}_0$-day
• $\mathtt{e}_1$: John leaves for Paris

(2) Fact-oriented *i*-moods

a. *Ole anivuq.*
Ole ani-pu-q
Ole go.out-DEC.IV$_\varepsilon$-3SG
Ole has gone out.

b. *Ole aniva*?
Ole ani-pi-a
Ole go.out-QUE$_\varepsilon$-3SG
Has Ole gone out?

Prospect-oriented *i*-moods

c. *Ole anili*!
Ole ani-li
Ole go.out-OPT$_\varepsilon$.3SG
Let Ole go out!

d. *Anigit*!
ani-gi-t
go.out-IMP$_\varepsilon$-2SG
Go out!

(*i*M) ^{1}*illoc*.presup.; ^{2}modal-tmp.upd; ^{3}modal.attention.upd; (^{4}*illoc*.decl.)

-DEC$_\sigma$ $\rightsquigarrow$
$^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^2([\subset\langle \mathbf{d}\omega{:}\ d\sigma, \mathbf{d}\tau\rangle];\ [\text{BEG}\ d\sigma \leq_{\vartheta\mathbf{d}_\omega} d\omega\varepsilon,$
$(\text{CTR}\ d\sigma = \mathbf{d}\alpha)^{o}]);\ ^3([\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}])$

-DEC$_\varepsilon$ $\rightsquigarrow$
$^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^2([\subset\{\mathbf{d}\omega{:}\ d\varepsilon, \mathbf{d}\tau\}];\ [d\varepsilon <_{\vartheta\mathbf{d}_\omega} d\omega\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{o}]);$
$^3([\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}])$

-QUE$_\sigma$ $\rightsquigarrow$
$^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^2([\subset\langle d\omega{:}\ d\sigma, \mathbf{d}\tau\rangle];\ [\text{BEG}\ d\sigma \leq_{\vartheta d_\omega} d\omega\varepsilon,$
$(\text{CTR}\ d\sigma = \mathbf{d}\alpha)^{o}]);\ ^3([p];\ [d\Omega = d\omega\{|\}];\ [\mathbf{Q}];\ [\mathbf{d}\Omega t = d\Omega\{|\}]);$
$^4[ask\langle\omega, d\omega\varepsilon{:}\ \text{AGT}{:}\ \mathbf{d}\Omega t\rangle]$

-OPT$_\varepsilon$ $\rightsquigarrow$
$^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^2([\subset\{d\omega{:}\ d\varepsilon, \vartheta(\omega{:}\ \text{CON}\ \mathbf{d}\varepsilon)\}];\ [\text{CON}\ d\omega\varepsilon <_{\vartheta d_\omega} \text{CON}\ d\varepsilon,$
$(\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{o}]);\ ^3([p];[d\Omega = d\omega\{|\}]);\ ^4[wish.for\langle\omega, d\omega\varepsilon{:}\ \text{AGT}{:}\ d\Omega\rangle]$

-IMP$_\varepsilon$ $\rightsquigarrow$
$^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^2([\subset\{d\omega{:}\ d\varepsilon, \vartheta(\omega{:}\ \text{CON}\ \mathbf{d}\varepsilon)\}];[\text{CON}\ d\omega\varepsilon <_{\vartheta d_\omega} \text{CON}\ d\varepsilon,$
$(\text{CTR}\ d\varepsilon = \text{EXP}\ \mathbf{d}\varepsilon)^{o}]);\ ^3([p];\ [d\Omega = d\omega\{|\}]);\ ^4[direct.to\langle\omega, d\omega\varepsilon{:}\ \text{AGT},$
$\text{EXP}{:}\ d\Omega\rangle]$

• Kalaallisut (2a): assertion of currently verifiable event

(2a′) Ole go.out-
$[\mathbf{a}|\ (\mathbf{a} = ole)^{o}];\ [e|\ go.out\langle\mathbf{d}\omega, e{:}\ \text{AGT}\rangle];$
-DEC.IV$_\varepsilon$-3SG
$^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon];\ [\subset\{\mathbf{d}\omega{:}\ d\varepsilon, \mathbf{d}\tau\}];\ [d\varepsilon <_{\vartheta\mathbf{d}_\omega} d\omega\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{o}];$
$[\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

$^{\top}w_0 \in {}^{\top}p_1 \subseteq p_0$ • $^{\top}e_0 = \underline{e}_0(w_0)$: e_0–agt speaks, updates CG to $^{\top}p_1$
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
• e_1: Ole goes out
——— CON e_1: Ole is out

2 CONTEXTUAL EQUIVALENCE OF TENSE & *i*-MOOD

(3_E) i. *Ole has gone out.* ii. *Ann is asleep.*
Ole have.NPST$_\sigma$ go+out.PRF — Ann be.NPST$_\sigma$ asleep

(3_K) i. *Ole anivuq.* ii. *Aani sinippuq.*
Ole ani-pu-q — *Aani sinig-pu-q*
Ole go.out-DEC.IV$_\varepsilon$-3SG — Aani be.asleep-DEC.IV$_\varepsilon$-3SG

• English (3_E): (real) present

($3_E'$) i. Ole have-
$[\mathbf{a}|\ (\mathbf{a} = ole)^o]$; $[s|\ (\text{EXP}\ s = \text{CTR}\ s)^o]$;
-NPST$_\sigma$
$^P[(\vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon) \leq \mathbf{d}\tau)^o]$; $[\subset\langle \mathbf{d}\omega{:}\ d\sigma, \mathbf{d}\tau\rangle]$; $[(\text{CTR}\ d\sigma = \mathbf{d}\alpha)^o]$;
go+out -PRF **.** (prosody)
$[e|\ go.out\langle \mathbf{d}\omega, e{:}\ \text{AGT}\rangle]$; $[(\text{CON}\ d\varepsilon = d\sigma)^o]$; $[\mathbf{p}]$; $[\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

ii. Ann be-
$[\mathbf{a}|\ (\mathbf{a} = ann)^o]$; $[s|\ (\text{EXP}\ s = \text{CTR}\ s)^o]$;
-NPST$_\sigma$
$^P[(\vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon) \leq \mathbf{d}\tau)^o]$; $[\subset\langle \mathbf{d}\omega{:}\ d\sigma, \mathbf{d}\tau\rangle]$; $[(\text{CTR}\ d\sigma = \mathbf{d}\alpha)^o]$;
asleep **.** (prosody)
$[asleep\langle \mathbf{d}\omega, d\sigma{:}\ \text{EXP}\rangle]$; $[\mathbf{p}]$; $[\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

• Kalaallisut (3_K): real (present) = evt's verifiable from $^{\top}e_0$ at $^{\top}e_0$-instant

($3_K'$) i. Ole go.out-
$[\mathbf{a}|\ (\mathbf{a} = ole)^o]$; $[e|\ go.out\langle \mathbf{d}\omega, e{:}\ \text{AGT}\rangle]$;
-DEC.IV$_\varepsilon$-3SG
$^P[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]$; $[\subset\{\mathbf{d}\omega{:}\ d\varepsilon, \mathbf{d}\tau\}]$; $[d\varepsilon <_{\vartheta\mathbf{d}_\omega} d\omega\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^o]$;
$[\mathbf{p}]$; $[\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

ii. Ann be.asleep-
$[\mathbf{a}|\ (\mathbf{a} = ann)^o]$; $[s|\ asleep\langle \mathbf{d}\omega, s{:}\ \text{EXP}\rangle, (\text{EXP}\ s = \text{CTR}\ s)^o]$;
-DEC.IV$_\sigma$-3SG
$^P[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]$; $[\subset\langle \mathbf{d}\omega{:}\ d\sigma, \mathbf{d}\tau\rangle]$; $[\text{BEG}\ d\sigma \leq_{\vartheta\mathbf{d}_\omega} d\omega\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^o]$;
$[\mathbf{p}]$; $[\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

$^{\top}w_0 \in {}^{\top}p_2 \subseteq {}^{\{\}}p_0$ • $^{\top}e_0 = \underline{e}_0(w_0)$: e_0–agt speaks, updates CG to $^{\top}p_2$
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
• e_1: Ole goes out
——— $s_1 = [\![\text{CON}]\!](e_1)$: Ole is out
—— s_2: Ann is asleep

(4_{E}) i.	*Today*	*Ole*	*went out.*	ii.	*Ann*	*was*	*asleep.*
	today	Ole	go+out.$\mathrm{PST}_{\varepsilon}$		Ann	be.NPST_{σ}	asleep

(4_{K}) i.	*Ullumi*	*Ole*	*anivuq*	ii.	*Aani*	*sinippuq.*
	ulluq-mi	*Ole*	*ani-pu-q*		*Aani*	*sinig-pu-q*
	day-LOC	Ole	go.out-$\mathrm{DEC.IV}_{\varepsilon}$-3SG		Ann	be.asleep-$\mathrm{DEC.IV}_{\sigma}$-3SG

• English (4_{E}): (real) past

$(4_{\mathrm{E}}')$ i. today Ole go+out

$[\mathbf{t}|\ (\mathbf{t} \subseteq \mathit{day.of}\ \mathbf{d}\varepsilon)^{\circ}];\ [\mathbf{a}|\ (\mathbf{a} = \mathit{ole})^{\circ}];\ [e|\ \mathit{go.out}\langle \mathbf{d}\omega, e{:}\ \mathrm{AGT}\rangle];$

-$\mathrm{PST}_{\varepsilon}$

$^{\mathrm{P}}[(\mathbf{d}\tau < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}];\ [\supset\langle \mathbf{d}\omega{:}\ d\varepsilon, \mathbf{d}\tau\rangle];\ [(\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\circ}];$

$[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(\mathbf{d}\omega, \mathrm{CON}\ d\varepsilon))^{\circ}, (\mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}];$

. (prosody)

$[\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

ii. Ann be-

$[\mathbf{a}|\ (\mathbf{a} = \mathit{ann})^{\circ}];\ [s|\ (\mathrm{EXP}\ s = \mathrm{CTR}\ s)^{\circ}];$

-PST_{σ}

$^{\mathrm{P}}[(\mathbf{d}\tau_2 < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}];\ [\subset\langle \mathbf{d}\omega{:}\ d\sigma, \mathbf{d}\tau_2\rangle];\ [(\mathrm{CTR}\ d\sigma = \mathbf{d}\alpha)^{\circ}];$

asleep **.** (prosody)

$[\mathit{asleep}\langle \mathbf{d}\omega, d\sigma{:}\ \mathrm{EXP}\rangle];\ [\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

$^{\top}w_0 \in {}^{\top}p_2 \subseteq {}^{\{\}}p_0$ •	$^{\top}e_0 = \underline{e}_0(w_0)$: e_0–agt speaks, updates CG to $^{\top}p_2$
|	$t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
||	$^{\top}t_{11} \subseteq e_0$-day
•	e_1: Ole goes out
||	$^{\top}t_{12} \subset [\![\vartheta]\!](w_0, [\![\mathrm{CON}]\!](e_1))$
——	s_2: Ann is asleep

• Kalaallisut $(4_{\mathrm{K}}')$: real (past) = eventualities verifiable from $^{\top}\underline{e}_0$ at $^{\top}$period

(4_{K}) i. day-LOC Ole go.out-

$[\mathbf{t}|\ (\mathbf{t} \subseteq \mathit{day.of}\ \mathbf{d}\varepsilon)^{\circ}];\ [\mathbf{a}|\ (\mathbf{a} = \mathit{ole})^{\circ}];\ [e|\ \mathit{go.out}\langle \mathbf{d}\omega, e{:}\ \mathrm{AGT}\rangle]$

-$\mathrm{DEC.IV}_{\varepsilon}$-3SG

$^{\mathrm{P}}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon];\ [\subset\{\mathbf{d}\omega{:}\ d\varepsilon, \mathbf{d}\tau\}];\ [d\varepsilon <_{\vartheta\mathbf{d}\omega} d\omega\varepsilon, (\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\circ}];$

$[\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

ii. Ann be.asleep-

$[\mathbf{a}|\ (\mathbf{a} = \mathit{ann})^{\circ}];\ [s|\ \mathit{asleep}\langle \mathbf{d}\omega, s{:}\ \mathrm{EXP}\rangle, (\mathrm{EXP}\ s = \mathrm{CTR}\ s)^{\circ}];$

-$\mathrm{DEC.IV}_{\sigma}$-3SG

$^{\mathrm{P}}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon];\ [\subset\langle \mathbf{d}\omega{:}\ d\sigma, \mathbf{d}\tau\rangle];\ [\mathrm{BEG}\ d\sigma \leq_{\vartheta\mathbf{d}\omega} d\omega\varepsilon, (\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\circ}];$

$[\mathbf{p}];\ [\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$

• Temporal reference: *nonpast topic time vs. ✓default override

(5$_E$) * *Yesterday Ole is busy.*
yesterday Ole be.NPST$_\sigma$ busy

(5$_K$) *Ippassaq Ole ulapippuq.*
ippassaq Ole ulapig-pu-q
yesterday Ole be.busy-DEC.IV$_\sigma$-3SG
Yesterday Ole was busy.

• Modal reference: ✓default override vs. *currently verifiable habit

(6$_E$) *Members of this club help each other.*
member.PL of this club help.NPST each other
(✓ club rule, not yet instantiated)

(6$_K$) *Piqatigiivvimmi uani ilaasurtat ikiuqatigiittarput.*
piqatigiivvik-mi ua-ni ilausurtaq-t ikiur-qatigiig-tar-pu-t
club-SG.LOC this-LOC member-PL help-rcp-habit-DEC.IV-3PL
'Members of this club help each other.' (*club rule, not yet inst'ed)

3 ANAPHORIC THEORY OF *i*-EVIDENTIALITY

• BASIC IDEA: *i*-evidentials are semantically reduced *i*-moods that form anaphoric chains with compatible items (other i-evidentials, i-moods, etc)

• *i*-EVIDENTIAL ANTECEDENTS FOR *i*-MOODS

(7) *Olegooq anivoq.*
*Ole=**guuq** ani-**pu**-q*
Ole=RPT go.out-DEC.IV-3SG
A. Ole is out, [I] hear. (=RPT)
B. Say that Ole is out. (=RPT$^>$)

(8) *Olegooq isirli.*
*Ole=**guuq** isir-**li***
Ole=RPT come.in-OPT.3SG
A. Let Ole come in, [they] say. (=RPT)
B. Tell Ole to come in. (=RPT$^>$)

(9) *Kinaguuq ajugaava*?
*kina=**guuq** ajugaa-**pi**-a*
who=RPT win-QUE-3SG
A. [He]'s asking, who has won? (=RPT)
B. According to [him], who has won? (=RPT)
C. Ask who has won? (=RPT$^>$)

(iM) ^{1}*illoc*.presup.; ^{2}modal-tmp.upd; ^{3}modal.attention.upd; (^{4}*illoc*.decl.)
(iE) ^{1}*illoc*.presup.; ^{3}modal.attention.upd; ^{4}*illoc*.decl.

initial infotention state

$^\top\mathtt{w}_0 \in {}^\top\mathtt{p}_0$ • $^\top\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt speaks up
| $^\top\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

(7A′) Reported assertion: Ole is out, [x] says
Ole=**RPT**
$[\mathbf{a}|\ (\mathbf{a} = ole)°]$; $^1(^{\mathrm{P}}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon])$; $^3[\mathbf{p}\ \underline{e}|\ \mathbf{d}\varepsilon \subset_{\vartheta\omega} \mathrm{CON}\ \underline{e}$,
$say\langle\omega, \underline{e}$: AGT: $\{\mathbf{p}\}\rangle]$; $^4[rhs\langle\omega, d\omega\varepsilon_2$: AGT: $\{\mathbf{d\Omega}\}\rangle]$;

$^\top\mathtt{w}_0 \in \mathtt{p}_0$ • $^\top\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt repeats as hs $\{^\top\mathtt{p}_1\}$
| $^\top\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \mathrm{Dom}\ \underline{\mathtt{e}}_1$ • $\underline{\mathtt{e}}_1\mathtt{v}$: $\underline{\mathtt{e}}_1\mathtt{v}$-agt says $\{^\top\mathtt{p}_1\}$
——— $[\![\mathrm{CON}]\!](\underline{\mathtt{e}}_1\mathtt{v})$

go.out-
$[e\ w|\ go.out\langle w, e$: AGT$\rangle]$;
-DEC.IV$_\varepsilon$-3SG
$^{\mathrm{P}}[d\omega\varepsilon_2 =_\omega \mathbf{d}\varepsilon]$; $[\subset\{d\omega, d\varepsilon, \mathbf{d}\tau\}]$; $[d\varepsilon <_{\vartheta d\omega} d\omega\varepsilon$, $(\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)°]$;
$[\mathbf{d\Omega} = d\omega\{|_{d\omega\varepsilon}\}]$

$^\top\mathtt{w}_0 \in \mathtt{p}_0$ • $^\top\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt repeats as hs $\{^\top\mathtt{p}_1\}$
| $^\top\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \mathrm{Dom}\ \underline{\mathtt{e}}_1$ • $\underline{\mathtt{e}}_1\mathtt{v}$: $\underline{\mathtt{e}}_1\mathtt{v}$-agt says $\{^\top\mathtt{p}_1\}$
——— $[\![\mathrm{CON}]\!](\underline{\mathtt{e}}_1\mathtt{v})$

~~~~~~

$\mathtt{w}_1 \in {}^\top\mathtt{p}_1 \subseteq \mathrm{Dom}\ \underline{\mathtt{e}}_1$
• $\mathtt{e}_2$: Ole goes out
———— $[\![\mathrm{CON}]\!](\mathtt{e}_2)$: Ole is out

• sample CG-world where the hearsay is true (see D6)
$^\top\mathtt{w}_0 \in \mathtt{p}_0 \cap {}^\top\mathtt{p}_1$ • $^\top\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt repeats as hs $\{^\top\mathtt{p}_1\}$
| $^\top\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
• $\underline{\mathtt{e}}_1\mathtt{w}_0$: $\underline{\mathtt{e}}_1\mathtt{w}_0$-agt says $\{^\top\mathtt{p}_1\}$
——— $[\![\mathrm{CON}]\!](\underline{\mathtt{e}}_1\mathtt{w}_0)$
• $\mathtt{e}_2$: Ole goes out
———— $[\![\mathrm{CON}]\!](\mathtt{e}_2)$: Ole is out
~~~~~~

initial infotention state

$^{\top}w_0 \in {}^{\top}p_0$ • $^{\top}e_0 = \underline{e}_0w_0$: e_0-agt speaks up
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

(7B′) Directive to report an assertion: Say that Ole is out

Ole=**RPT**$^{>}$

[**a**| (**a** = *ole*)°]; $^{1}(^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon])$; $^{3}[\mathbf{p}\ \underline{e}|\ \underline{e} \subset_{\vartheta\omega}$ CON **d**ε, *rhs*⟨ω, $\underline{e}$, EXP **d**ε, {**p**}⟩]; $^{4}[$*say*⟨ω, $d\omega\varepsilon_2$: AGT: {**dΩ**}⟩];

$^{\top}w_0 \in p_0$ • $^{\top}e_0 = \underline{e}_0w_0$: e_0-agt says $\{^{\top}p_1\}$
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

~~~~~~

$v \in$ Dom $\underline{e}_1$ ——— $[\![\text{CON}]\!](e_0)$
• $\underline{e}_1v$: e_0-exp repeats as hs $\{^{\top}p_1\}$

go.out-

[*e w*| *go.out*⟨*w*, *e*: AGT⟩];

-DEC.IV$_{\varepsilon}$-3SG

$^{P}[d\omega\varepsilon_2 =_{\omega} \mathbf{d}\varepsilon]$; [⊂{*d*ω, *d*ε, **d**τ}]; [$d\varepsilon <_{\vartheta d\omega} d\omega\varepsilon$, (CTR $d\varepsilon = \mathbf{d}\alpha$)°];

[**dΩ** = $d\omega\{|_{d\omega\varepsilon}\}$]

$^{\top}w_0 \in p_0$ • $^{\top}e_0 = \underline{e}_0w_0$: e_0-agt says $\{^{\top}p_1\}$
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

~~~~~~

$v \in$ Dom $\underline{e}_1$ ——— $[\![\text{CON}]\!](e_0)$
• $\underline{e}_1v$: e_0-exp repeats as hs $\{^{\top}p_1\}$

~~~~~~

$w_1 \in {}^{\top}p_1 \subseteq$ Dom $\underline{e}_1$
• e_2: Ole goes out
——— $[\![\text{CON}]\!](e_2)$: Ole is out

• sample CG-world where the directive is complied with

$^{\top}w_0 \in p_0 \cap$ Dom $\underline{e}_1$
• $^{\top}e_0 = \underline{e}_0w_0$: e_0-agt says $\{^{\top}p_1\}$
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
——— $[\![\text{CON}]\!](e_0)$
• $\underline{e}_1w_0$: e_0-exp repeats as hs $\{^{\top}p_1\}$

~~~~~~

$w_1 \in {}^{\top}p_1 \subseteq$ Dom $\underline{e}_1$
• e_2: Ole goes out
——— $[\![\text{CON}]\!](e_2)$: Ole is out

<u>initial infotention state</u>

${}^{\top}w_0 \in {}^{\top}p_0$ • ${}^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt speaks up
| ${}^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

(8A′) <u>Reported wish: Let Ole come in, [*x*] says</u>

Ole=**RPT**

$[\mathbf{a}|\ (\mathbf{a} = ole^{\circ})]$; ${}^{1}({}^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon])$; ${}^{3}[p\ \underline{e}|\ \mathbf{d}\varepsilon \subset_{\vartheta\omega} \text{CON}\ \underline{e},$
$say\langle\omega, \underline{e}\text{: AGT: } \{p\}\rangle]$; ${}^{4}[rhs\langle\omega, d\omega\varepsilon_2\text{: AGT: } \{d\Omega\}\rangle]$;

${}^{\top}w_0 \in {}^{\top}p_0$ • ${}^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt repeats as hs $\{p_1\}$
| ${}^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

\~

$v \in \text{Dom}\ \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt says p_1
——— $[\![\text{CON}]\!](\underline{e}_1 v)$

come.in-

$[e\ w|\ come.in\langle w, e\text{: AGT}\rangle]$;

-**OPT**$_{\varepsilon}$-3SG

${}^{1}({}^{P}[d\omega\varepsilon_2 =_{\omega} \mathbf{d}\varepsilon])$; ${}^{2}([\subset\{d\omega\text{: } d\varepsilon, \vartheta(\omega, \text{CON}\ d\omega\varepsilon)\}]$;
$[\text{CON}\ d\omega\varepsilon <_{\vartheta d\omega} \text{CON}\ d\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)])$; ${}^{3}[d\Omega = d\omega\{|_{d\omega\varepsilon}\}]$;
${}^{4}[wish.for\langle\omega, d\omega\varepsilon\text{: AGT: } d\Omega]$

${}^{\top}w_0 \in {}^{\top}p_0$ • ${}^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt repeats as hs $\{p_1\}$
| ${}^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

\~

$v \in \text{Dom}\ \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt (audibly) wishes for p_1
——— $[\![\text{CON}]\!](\underline{e}_1 v)$

\~

$w_1 \in p_1 \subseteq \text{Dom}\ \underline{e}_1$
• e_2: Ole comes in, end of $[\![\text{CON}]\!](\underline{e}_1 w_1)$

• sample CG-world where the reported wish is fulfilled

${}^{\top}w_0 \in {}^{\top}p_0 \cap p_1$ • ${}^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt repeats as hs $\{p_1\}$
| ${}^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
• $\underline{e}_1 w_0$: $\underline{e}_1 w_0$-agt (audibly) wishes for p_1
——— $[\![\text{CON}]\!](\underline{e}_1 w_0)$
• e_2: Ole comes in, end of $[\![\text{CON}]\!](\underline{e}_1 w_1)$

<u>initial infotention state</u>

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt speaks up
| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

(8B′) <u>Directive to report a wish: Tell [*x*], let Ole come in</u>

Ole=**RPT**$^{>}$

$[\mathbf{a}|\ (\mathbf{a} = ole°)]$; $^{1}(^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon])$; $^{3}[p\ \underline{e}|\ \underline{e} \subset_{\vartheta\omega} \text{CON}\ \mathbf{d}\varepsilon,$
$rhs\langle\omega, \underline{e}, \text{EXP}\ \mathbf{d}\varepsilon, \{p\}\rangle]$; $^{4}[say\langle\omega, d\omega\varepsilon_2\text{: AGT: } \{d\Omega\}\rangle]$;

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt says $\mathtt{p}_1$
| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \text{Dom}\ \underline{\mathtt{e}}_1$ ——— $[\![\text{CON}]\!](\mathtt{e}_0)$
• $\underline{\mathtt{e}}_1\mathtt{v}$: $\mathtt{e}_0$-exp repeats as hs $\{\mathtt{p}_1\}$

go.out-

$[e\ w|\ go.out\langle w, e\text{: AGT}\rangle]$;

-**OPT**$_{\varepsilon}$-3SG

$^{1}(^{P}[d\omega\varepsilon_2 =_{\omega} \mathbf{d}\varepsilon])$; $^{2}([\subset\{d\omega\text{: } d\varepsilon, \vartheta(\omega, \text{CON}\ \mathbf{d}\varepsilon)\}]$;
$[\text{CON}\ d\omega\varepsilon_2 <_{\vartheta d\omega} \text{CON}\ d\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)])$; $^{3}[d\Omega = d\omega\{|_{d\omega\varepsilon 2}\}]$;
$^{4}[wish.for\langle\omega, d\omega\varepsilon_2\text{: AGT: } d\Omega]$

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt (audibly) wishes for $\mathtt{p}_1$
| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \text{Dom}\ \underline{\mathtt{e}}_1$ ——— $[\![\text{CON}]\!](\mathtt{e}_0)$
• $\underline{\mathtt{e}}_1\mathtt{v}$: $\mathtt{e}_0$-exp repeats as hs $\{\mathtt{p}_1\}$

~~~~~~

$\mathtt{w}_1 \in \mathtt{p}_1 \subseteq \text{Dom}\ \underline{\mathtt{e}}_1$
• $\mathtt{e}_2$: Ole comes in, end of $[\![\text{CON}]\!](\mathtt{e}_0)$

• sample CG-world where the directive is complied with

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0 \cap \text{Dom}\ \underline{\mathtt{e}}_1$
• $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt (audibly) wishes for $\mathtt{p}_1$
| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
——— $[\![\text{CON}]\!](\mathtt{e}_0)$
• $\underline{\mathtt{e}}_1\mathtt{w}_0$: $\mathtt{e}_0$-exp repeats as hs $\{\mathtt{p}_1\}$

~~~~~~

$\mathtt{w}_1 \in \mathtt{p}_1 \subseteq \text{Dom}\ \underline{\mathtt{e}}_1$
• $\mathtt{e}_2$: Ole comes in, end of $[\![\text{CON}]\!](\mathtt{e}_0)$

initial infotention state

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{(\top)}\mathtt{e}_{-1}$: $\mathtt{e}_{-1}$-agt speaks
• $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt speaks
| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

(9A′) Reported question: [He]'s asking, who has won?

who.SG=**RPT**

$[\mathbf{a}|\ person\{\omega\text{: }\mathbf{a}\}]$; $^{\mathrm{P}}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon]$; $[\mathbf{Q}\ \underline{e}|\ \mathbf{d}\varepsilon \subset_{\vartheta\omega} \mathrm{CON}\ \underline{e},$
$say\langle\omega, \underline{e}\text{: AGT: }\mathbf{Q}\rangle]$; $[rhs\langle\omega, d\omega\varepsilon_2\text{: AGT: }\mathbf{d\Omega}t\rangle]$;

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{(\top)}\mathtt{e}_{-1}$: $\mathtt{e}_{-1}$-agt speaks
• $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt repeats as hs $^{\top}\mathtt{Q}_1$
| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \mathrm{Dom}\ \underline{\mathtt{e}}_1$ • $\underline{\mathtt{e}}_1\mathtt{v}$: $\underline{\mathtt{e}}_1\mathtt{v}$-agt says $^{\top}\mathtt{Q}_1$
——— $[\![\mathrm{CON}]\!](\underline{\mathtt{e}}_1\mathtt{v})$

win-

$[e\ w|\ win\langle w, e\text{: AGT}\rangle]$;

-**QUE**$_{\varepsilon}$-3SG

$^{\mathrm{P}}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon_2]$; $[\subset\{d\omega, d\varepsilon, \mathbf{d}\tau\}]$; $[d\varepsilon <_{\vartheta d_{\omega}} d\omega\varepsilon, (\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)]$;
$[p]$; $[d\Omega = d\omega\{|_{\mathbf{d}\alpha,\, d\omega\varepsilon}\}]$; $[\mathbf{d\Omega}t = d\Omega\{|_{d\omega\varepsilon}\}]$; $[ask\langle d\omega\varepsilon\text{, AGT, }\mathbf{d\Omega}t\rangle]$

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{(\top)}\mathtt{e}_{-1}$: $\mathtt{e}_{-1}$-agt speaks
• $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt repeats as hs $^{\top}\mathtt{Q}_1$
| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \mathrm{Dom}\ \underline{\mathtt{e}}_1$ • $\mathtt{e}_{-1} = \underline{\mathtt{e}}_1\mathtt{v}$: $\mathtt{e}_{-1}$-agt asks $^{\top}\mathtt{Q}_1 = \{\ldots, \mathtt{p}_{1n}, \ldots\}$
——— $[\![\mathrm{CON}]\!](\underline{\mathtt{e}}_1\mathtt{v})$

~~~~~~

$\mathtt{w}_{1n} \in \mathtt{p}_{1n} \subseteq \mathrm{Dom}\ \underline{\mathtt{e}}_1$
• $\mathtt{e}_{2n}$: person $\mathtt{a}_{2n}$ wins
——— $[\![\mathrm{CON}]\!](\mathtt{e}_{2n})$
~~~~~~

initial infotention state

$^{\top}w_0 \in {}^{\top}p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt speaks
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

(9B′) Reported answer: According to [him], who has won?

who.SG=**RPT**

$[\mathbf{a}|\ person\{\omega: \mathbf{a}\}];\ ^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon];\ [p\ \underline{e}|\ \mathbf{d}\varepsilon \subset_{\vartheta\omega} \text{CON}\ \underline{e},$
$say\langle\omega, \underline{e}: \text{AGT}:\{p\}\rangle];\ [rhs\langle\omega, \text{ANS}\ d\omega\varepsilon_2: \text{AGT}:\{d\Omega\}\rangle];$

$^{\top}w_0 \in {}^{\top}p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt speaks
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

~~~~~~

$v \in \text{Dom}\ \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt says $\{p_1\}$
——— $[\![\text{CON}]\!](\underline{e}_1 v)$

~~~~~~

$v' \in \text{Dom}\ [\![\text{ANS}]\!](\underline{e}_0) \subseteq {}^{\top}p_0$
—— $[\![\text{CON}]\!](e_0)$
• $[\![\text{ANS}]\!](\underline{e}_0)(v')$: e_0-exp answers $\underline{e}_0 v' = e_0$,
repeats as hearsay $\{p_1\}$

win-

$[e\ w|\ win\langle w, e: \text{AGT}\rangle];$

-QUE$_{\varepsilon}$-3SG

$^{P}[d\omega\varepsilon_2 =_{\omega} \mathbf{d}\varepsilon];\ [\subset\{d\omega, d\varepsilon, \mathbf{d}\tau\}];\ [d\varepsilon <_{\vartheta d\omega} d\omega\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{o}];$
$[d\Omega = d\omega\{|_{\mathbf{d}\alpha,\, d\omega\varepsilon}\}];\ [\mathbf{Q}|\ \mathbf{Q} = d\Omega\{|_{d\omega\varepsilon}\}];\ [ask\langle\omega, d\omega\varepsilon_2: \text{AGT}: \mathbf{d}\Omega t\rangle]$

$^{\top}w_0 \in {}^{\top}p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt asks $^{\top}Q_1 = \{\ldots, p_1, \ldots\}$
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

~~~~~~

$v \in \text{Dom}\ \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt says $\{p_1\}$
——— $[\![\text{CON}]\!](\underline{e}_1 v)$

~~~~~~

$w_1 \in p_1 \subseteq \text{Dom}\ \underline{e}_1$
• e_2: person a_2 wins
——— $[\![\text{CON}]\!](e_2)$

~~~~~~

$v' \in \text{Dom}\ [\![\text{ANS}]\!](\underline{e}_0) \subseteq {}^{\top}p_0$
—— $[\![\text{CON}]\!](e_0)$
• $[\![\text{ANS}]\!](\underline{e}_0)(v')$: e_0-exp answers $\underline{e}_0 v' = e_0$,
repeats as hearsay $\{p_1\}$
~~~~~~

<u>initial infotention state</u>

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt speaks

| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

(9C′) <u>Directive to report a question: Ask, who has won?</u>

who.SG=**RPT**$^{>}$

$[\mathbf{a}|\ \textit{person}\{\omega: \mathbf{a}\}]; {}^{\mathrm{P}}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon]; [\mathbf{Q}\ \underline{e}|\ \underline{e} \subset_{\vartheta\omega} \text{CON}\ \mathbf{d}\varepsilon,$
$\textit{rhs}\langle\omega, \underline{e}, \text{EXP}\ \mathbf{d}\varepsilon, \mathbf{Q}\rangle]; [\textit{say}\langle\omega, d\omega\varepsilon_2\text{: AGT: } \mathbf{d}\Omega t\rangle];$

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt says $^{\top}\mathtt{Q}_1$

| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \text{Dom}\ \underline{\mathtt{e}}_1$ —— $[\![\text{CON}]\!](\mathtt{e}_0)$

• $\underline{\mathtt{e}}_1\mathtt{v}$: $\mathtt{e}_0$-exp repeats as hearsay $^{\top}\mathtt{Q}_1$

win-

$[e\ w|\ \textit{win}\langle w, e\text{: AGT}\rangle];$

-QUE$_{\varepsilon}$-3SG

$^{\mathrm{P}}[d\omega\varepsilon_2 =_{\omega} \mathbf{d}\varepsilon]; [\subset\{d\omega, d\varepsilon, \mathbf{d}\tau\}]; [d\varepsilon <_{\vartheta d\omega} d\omega\varepsilon_2, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\mathrm{o}}];$
$[d\Omega = d\omega\{|_{\mathbf{d}\alpha,\, d\omega\varepsilon}2\}]; [\mathbf{d}\Omega t = d\Omega\{|_{d\omega\varepsilon}2\}]; [\textit{ask}\langle\omega, d\omega\varepsilon_2\text{: AGT: } \mathbf{d}\Omega t\rangle]$

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt asks $^{\top}\mathtt{Q}_1 = \{\ldots, \mathtt{p}_{1n}, \ldots\}$

| $^{\top}\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

~~~~~~

$\mathtt{v} \in \text{Dom}\ \underline{\mathtt{e}}_1$ —— $[\![\text{CON}]\!](\mathtt{e}_0)$

• $\underline{\mathtt{e}}_1\mathtt{v}$: $\mathtt{e}_0$-exp repeats as hearsay $^{\top}\mathtt{Q}_1$

~~~~~~

$\mathtt{w}_{1n} \in \mathtt{p}_{1n} \subseteq {}^{\top}\mathtt{p}_0$

• $\mathtt{e}_{2n}$: person $\mathtt{a}_{2n}$ wins

———— $[\![\text{CON}]\!](\mathtt{e}_{2n})$: $\mathtt{a}_{2n}$ has won
~~~~~~

• ANAPHORIC REPORTATIVE WITH AMBIGUOUS RESOLUTION

(10) i. *Siornagooq ikinngutiga angerlarpuq.*
*siurna=**guuq** ikinngut-ga angirlar-pu-q*
last.year=RPT friend-1SG go.home-DEC.IV-3SG
Last year, [I] hear, my friend went home.

ii. *Naparsimavorooq*
*naparsima-pu-q=**guuq***
be.ill-FCT$_{\top}$-3SG$_{\top}$=RPT
A. He was ill, [they] say.
B. [He] said he was ill, [they] say.

Meaning postulate:
$rhs(w, e, a, \{p\}) \wedge rhs(w, e, a, \{q\}) \rightarrow rhs(w, e, a, \{p, q\})$

(10′)i. last.year=**RPT**
$[\mathbf{t}|\ (\mathbf{t} \subseteq last.year.of\ \mathbf{d}\varepsilon)^{o}]$; $^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon]$; $[\mathbf{p}\ \underline{e}|\ \mathbf{d}\varepsilon \subset_{\vartheta\omega} \text{CON}\ \underline{e}$, $say\langle\omega, \underline{e}: \text{AGT}: \{\mathbf{p}\}\rangle]$; $[rhs\langle\omega, d\omega\varepsilon_2: \text{AGT}: \{\mathbf{d}\Omega\}\rangle]$;

$^{\top}w_0 \in p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt repeats as hs $\{^{\top}p_1\}$
| $t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
||| $^{\top}t_1 \subseteq e_0$-last.year

~~~~~~

$v \in \text{Dom}\ \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt says $\{^{\top}p_1\}$
——— $[\![\text{CON}]\!](\underline{e}_1 v)$

friend-1SG go.home-
$[\mathbf{a}|\ friend.of\{\omega: \vartheta(\omega: \mathbf{d}\varepsilon), \mathbf{a}, \text{AGT}\ \mathbf{d}\varepsilon\}]$; $[e\ w|\ go.home\langle w, e: \text{AGT}\rangle]$;
-DEC.IV$_{\varepsilon}$-3SG
$^{P}[d\omega\varepsilon_2 =_{\omega} \mathbf{d}\varepsilon]$; $[\subset\{d\omega: d\varepsilon, \mathbf{d}\tau\}]$; $[d\varepsilon <_{\vartheta d\omega} d\omega\varepsilon, (\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{o}]$;
$[\mathbf{d}\Omega = d\omega\{|_{d\omega\varepsilon}\}]$

$^{\top}w_0 \in p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt repeats as hs $\{^{\top}p_1\}$
| $t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
||| $^{\top}t_1 \subseteq e_0$-last.year

~~~~~~

$v \in \text{Dom}\ \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt says $\{^{\top}p_1\}$
——— $[\![\text{CON}]\!](\underline{e}_1 v)$

~~~~~~

$w_1 \in {}^{\top}p_1 \subseteq \text{Dom}\ \underline{e}_1$
||| $^{\top}t_1 \subseteq e_0$-last.year
• e_2: e_0-agt's friend goes home
~~~~~~

(10A′) <u>Reading A: Extended hearsay</u>

ii. be.ill-

$[s|\ ill\langle d\omega, s\text{: EXP}\rangle];$

-DEC.IV$_\sigma$-3SG

$^{\mathrm{P}}[d\omega\varepsilon_2 =_\omega \mathbf{d}\varepsilon]; [\subset\langle d\omega\text{: } d\sigma, \mathbf{d}\tau\rangle]; [\text{BEG } d\sigma \leq_{\vartheta d_\omega} d\omega\varepsilon, (\text{CTR } d\sigma = \mathbf{d}\alpha)^{\mathrm{o}}]$

$; [\mathbf{p}]; [\mathbf{d}\Omega = d\omega\{|_{d\omega\varepsilon}\}];$

$^{\top}\mathtt{w}_0 \in \mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt repeats as hs $\{\mathtt{p}_1\}$

| $\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

||| $^{\top}\mathtt{t}_1 \subseteq \mathtt{e}_0$-last.year

~~~~~~

$\mathtt{v} \in$ Dom $\underline{\mathtt{e}}_1$ • $\underline{\mathtt{e}}_1\mathtt{v}$: $\underline{\mathtt{e}}_1\mathtt{v}$-agt says $\{\mathtt{p}_1\}$

——— $[\![\text{CON}]\!](\underline{\mathtt{e}}_1\mathtt{v})$

~~~~~~

$\mathtt{w}_1 \in {}^{\top}\mathtt{p}_2 \subseteq \mathtt{p}_1 \subseteq$ Dom $\underline{\mathtt{e}}_1$

||| $^{\top}\mathtt{t}_1 \subseteq \mathtt{e}_0$-last.year

• $\mathtt{e}_2$: $\mathtt{e}_0$-agt's friend goes home

——— $\mathtt{s}_2$: $\mathtt{e}_0$-agt's friend is ill

=RPT

$^{\mathrm{P}}[d\omega\varepsilon_2 =_\omega \mathbf{d}\varepsilon]; [\mathbf{d}\varepsilon \subset_{\vartheta\omega} \text{CON } d\omega\varepsilon, say\langle\omega, d\omega\varepsilon\text{: AGT: } \{\mathbf{d}\Omega\}\rangle];$

$[rhs\langle\omega, d\omega\varepsilon_2\text{: AGT: } \{\mathbf{d}\Omega\}\rangle]$

$^{\top}\mathtt{w}_0 \in \mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt repeats as hs $\{\mathtt{p}_1, {}^{\top}\mathtt{p}_2\}$

| $\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant

||| $^{\top}\mathtt{t}_1 \subseteq \mathtt{e}_0$-last.year

~~~~~~

$\mathtt{v} \in$ Dom $\underline{\mathtt{e}}_1$ • $\underline{\mathtt{e}}_1\mathtt{v}$: $\underline{\mathtt{e}}_1\mathtt{v}$-agt says $\{\mathtt{p}_1, {}^{\top}\mathtt{p}_2\}$

——— $[\![\text{CON}]\!](\underline{\mathtt{e}}_1\mathtt{v})$

~~~~~~

$\mathtt{w}_1 \in {}^{\top}\mathtt{p}_2 \subseteq \mathtt{p}_1 \subseteq$ Dom $\underline{\mathtt{e}}_1$

||| $^{\top}\mathtt{t}_1 \subseteq \mathtt{e}_0$-last.year

• $\mathtt{e}_2$: $\mathtt{e}_0$-agt's friend goes home

——— $\mathtt{s}_2$: $\mathtt{e}_0$-agt's friend is ill

(10B′) Reading B: Hearsay within hearsay

ii. be.ill-**DEC**.IV$_\sigma$-3SG

$[s\ w|\ ill\langle w, s\text{: EXP}\rangle]$; $^{P}[\underline{e}|\ \underline{e} =_\omega d\varepsilon]$; $[\subset\langle d\omega\text{: } d\sigma, \mathbf{d\tau}\rangle]$;

$[\text{BEG } d\sigma \leq_{\vartheta d\omega} d\omega\varepsilon, (\text{CTR } d\sigma = \mathbf{d}\alpha)^{o}]$; $[\mathbf{p}]$; $[\mathbf{d\Omega} = d\omega\{|_{d\omega\varepsilon}\}]$;

$^{\top}w_0 \in p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt repeats as hs $\{p_1\}$

| $t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

|| $^{\top}t_1 \subseteq e_0$-last.year

~~~~~~

$v \in \text{Dom } \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt says $\{p_1\}$

——— $[\![\text{CON}]\!](\underline{e}_1 v)$

~~~~~~

$w_1 \in p_1 \subseteq \text{Dom } \underline{e}_1$

• e_2: e_0-agt's friend goes home

~~~~~~

$v' \in \text{Dom } \underline{e}_3$ • $e_2 = \underline{e}_3 v'$

~~~~~~

$w_2 \in {}^{\top}p_2 \subseteq \text{Dom } \underline{e}_3$

——— s_2: e_0-agt's friend is ill

=RPT

$^{P}[d\omega\varepsilon =_\omega d\varepsilon]$; $[d\omega\varepsilon_2 \subset_{\vartheta\omega} \text{CON } d\varepsilon, say\langle\omega, d\omega\varepsilon\text{: AGT:}\{\mathbf{d\Omega}\}\rangle]$;

$[rhs\langle\omega, d\omega\varepsilon_2\text{: AGT:}\{\mathbf{d\Omega}\}\rangle]$

$^{\top}w_0 \in p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt repeats as hs $\{p_1\}$

| $t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

|| $^{\top}t_1 \subseteq e_0$-last.year

~~~~~~

$v \in \text{Dom } \underline{e}_1$ • $\underline{e}_1 v$: $\underline{e}_1 v$-agt says $\{p_1\}$, repeats as hs $\{^{\top}p_2\}$

——— $[\![\text{CON}]\!](\underline{e}_1 v)$

~~~~~~

$w_1 \in p_1 \subseteq \text{Dom } \underline{e}_1$

• e_2: e_0-agt's friend goes home

~~~~~~

$v' \in \text{Dom } \underline{e}_3$ • $e_2 = \underline{e}_3 v'$: e_0-agt's friend says $\{^{\top}p_2\}$

——— $[\![\text{CON}]\!](e_2)$

~~~~~~

$w_2 \in {}^{\top}p_2 \subseteq \text{Dom } \underline{e}_3$

——— s_2: e_0-agt's friend is ill

4 *i*-EVIDENTIALS LINKED TO *i*-PROSODY

(11) Cuzco Quechua: From 'The first airplane over the Andes' (http://www.quechua.org.uk)

i. When the airplane headed in our direction, they all said:

ii. *Chay=qa Tayta-cha milagro=m*!
that=TOP Father-DIM miracle=**DIR**
It's a divine miracle!

iii. And when I saw it was definitely coming toward us, I thought:

iv. *Tayta-cha milagro=chá riki*.
Father-DIM miracle=**CNJ** really
Maybe it really is a divine miracle.

(12) Cuzco Quechua (cf. Faller 2007:75, MB)
Pi=chá llalli-rqa-n?
who=**CNJ** win-PST-3?
Who won, you reckon?

(13) Cuzco Quechua (Faller 2002:187)

i. *Inés=chá llalli-rqa-n.*
Inés=**CNJ** win-PST-3
Possibly Inés won.

ii. *Pilar-taq=chá llalli-rqa-n*
Pilar-CNTR=**CNJ** win-PST-3
And possibly Pilar won.

(14) Cuzco Quechua (Faller 2002:69, MB)

i. *Atuq=chá wallpa-y-ta apa-rqa-n.*
fox=**CNJ** hen-1-ACC take-PST-3
A fox took my hen, I guess.

ii. *Ichaqa wasi masi-y riku-sqa*
but house friend-1 see-PST′.3
But my neighbor saw it, and

ii′. *puma=s apa-n-man ka-rqa-n.*
puma=**RPT** take-3-SBJ be-PST-3
according to [him], a puma took it.

• Faller (2002:122, 167, 184, 200)

(14_F)i. p_1 = 'A fox took my hen'
ILL = $\text{ASSERT}_s(\Diamond p_1)$ SINC = $\{Bel(s, \Diamond p_1), Rea(s, Bel(\Diamond p_1))\}$

ii. p_2 = 'My neighbor saw $it_?$'
ILL = $\text{ASSERT}_s(p_2)$ SINC = $\{Bel(s, p_2), Bpg(s, Bel(s, p_2))\}$

ii′. p_3 = 'A puma took $it_{??}$'
ILL = $\text{PRESENT}_s(p_3)$ SINC = $\{\exists s_2[Assert(s_2, p_3) \wedge s_2 \notin \{h, s\}]\}$

• given (B), from Bittner (2008b), and definition (|):

(B) $\text{BEL}(w, e) \quad :=$
$$\lambda p.\ \exists s(\vartheta(w, e) \subset \vartheta(w, s) \wedge \text{EXP}\ s = \text{EXP CON}\ e \wedge believe(w, s, \text{EXP}\ s, p))$$

(|) For any event concept $\underline{e}$ and modality p s.t. $p \cap \text{Dom}\ \underline{e} \neq \varnothing$, we define the p-restriction of $\underline{e}$, written $(\underline{e}|p)$, as follows:[1]
$$(\underline{e}|p) \quad := \quad \langle \underline{e}w|\ w \in p \cap \text{Dom}\ \underline{e}\rangle$$

[i.e. the p-restriction of $\underline{e}$ is restricted to the p-worlds in the domain of $\underline{e}$ and for those worlds it agrees on the value with $\underline{e}$]

(iE) $\underline{^1\text{illoc.presupposition; }^3\text{modal.(info)tention.update; }^4\text{illoc.declaration}}$

=DIR $\quad ^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^3[\mathbf{p}\ \underline{e}|\ \mathbf{d}\omega \in \mathbf{p}, \underline{e} = (d\omega\varepsilon|\mathbf{p})];$
$\quad ^4[\{\omega\} \subseteq_\omega \cap\text{BEL}(\omega, d\omega\varepsilon) \subseteq_\omega \mathbf{d}\Omega]$

=CNJ $\quad ^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^3[\mathbf{p}|\ \mathbf{p} \circ \mathbf{d}\omega\{|\}];$
$\quad ^4[\cap\text{BEL}(\omega, d\omega\varepsilon) \circ_\omega \mathbf{d}\Omega]$

=RPT $\quad ^1(^{P}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon]);\ ^3[\mathbf{p}\ \underline{e}|\ \mathbf{d}\varepsilon \subset_{\vartheta\omega} \text{CON}\ \underline{e}, say\langle\omega, \underline{e}: \text{AGT}: \{\mathbf{p}\}\rangle];$
$\quad ^4[rhs\langle\omega, d\omega\varepsilon_2: \text{AGT}: \{\mathbf{d}\Omega\}\rangle]$

---

[1] In general, function abstraction is defined as follows, for any function f and set $A \neq \varnothing$:

• $\langle fa|\ a \in A\rangle \quad := \quad \{\langle a, fa\rangle|\ a \in A\}$

That is, in this case, for function $\underline{e}$ and non-empty subdomain $p \cap \text{Dom}\ \underline{e}$:

• $(\underline{e}|p) \quad := \quad \langle \underline{e}w|\ w \in p \cap \text{Dom}\ \underline{e}\rangle$
$\qquad\qquad := \quad \{\langle w, \underline{e}w\rangle|\ w \in p \cap \text{Dom}\ \underline{e}\}$

(11′) Knowledge (true belief) vs. epistemic possibility

i. When [the airplane]^b headed in our direction, they all said:

$^{\top}w_0 \in {}^{\top}p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt (one of 'them') speaks up
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant

ii. "It's a divine miracle!"

that =TOP Father-DIM miracle

$^{\mathbf{P}}[\mathit{point.at}\langle \mathbf{d}\omega, \mathbf{d}\varepsilon\text{: AGT: } d\beta\rangle]$; $[\mathbf{b}|\ \mathbf{b} = d\beta]$; $[w|\ \mathit{dvn.miracle}\langle w, \mathbf{d}\beta\rangle]$;

=**DIR**

$^1(^{\mathrm{P}}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon])$; $^3[\mathbf{p}\ \underline{e}|\ \mathbf{d}\omega \in \mathbf{p}, \underline{e} = (d\omega\varepsilon|\mathbf{p})]$;

$^4[\{\omega\} \subseteq_\omega \cap\text{BEL}(\omega, d\omega\varepsilon) \subseteq_\omega \mathbf{d}\Omega]$

. (***prosody***)

$[\mathbf{d}\Omega = d\omega\{|\}]$

$^{\top}w_0 \in {}^{\top}p_1 \cap p_0$
• $^{\top}e_0 = \underline{e}_1 w_0 = (\underline{e}_0|p_1)w_0$: e_0-agt speaks, points at plane b_{-1} knows p_1 (believes w_0-fact p_1), updates CG to $^{\top}p_1 \cap p_0$
| $^{\top}t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
b_{-1} is a divine miracle

~~~~~~

$w_1 \in {}^{\top}p_1$ b_{-1} is a divine miracle

iii. And when I saw it was definitely coming toward us, I thought:

$^{\top}w_2 \in {}^{\top}p_0$ • $^{\top}e_2 = \underline{e}_2 w_2$: e_2-agt speaks (to himself)
| $^{\top}t_0 = [\![\vartheta]\!](w_2, e_2)$: e_0-instant

iv. "Maybe it (really) is divine miracle."

Father-DIM miracle

$[w|\ \mathit{dvn.miracle}\langle w, \mathbf{d}\beta\rangle]$;

=**CNJ**

$^1(^{\mathrm{P}}[d\omega\varepsilon =_\omega \mathbf{d}\varepsilon])$; $^3[\mathbf{p}|\ \mathbf{p} \circ \mathbf{d}\omega\{|\}]$; $^4[\cap\text{BEL}(\omega, d\omega\varepsilon) \circ_\omega \mathbf{d}\Omega]$

. (***prosody***)

$[\mathbf{d}\Omega = d\omega\{|\}]$

$^{\top}w_2 \in p_0$ • $^{\top}e_2 = \underline{e}_2 w_2$: e_2-agt speaks, believes p_0-compatible proposition $^{\top}p_1$ to be possible
| $^{\top}t_0 = [\![\vartheta]\!](w_2, e_2)$: e_0-instant

~~~~~~

$w_1 \in {}^{\top}p_1$ b_{-1} is a divine miracle

(12′) Request for epistemically possible answer: Who won, you reckon?

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt speaks
| $\mathtt{t}_0 = \llbracket\vartheta\rrbracket(\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
||| $^{\top}\mathtt{t}_1 < \llbracket\vartheta\rrbracket(\mathtt{w}_0, \mathtt{e}_0)$: topical $\mathtt{e}_0$-past

who
$[\mathbf{a}|\ \mathit{person}\{\omega\text{: }\mathbf{a}\}]$;
=**CNJ**
$^{1}(^{\mathrm{P}}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon])$; $^{3}[p|\ p \bigcirc \mathbf{d}\omega\{|\}]$; $^{4}[\bigcap\mathrm{BEL}(\omega, \mathrm{ANS}\ d\omega\varepsilon) \bigcirc_{\omega} d\Omega]$

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt speaks
| $\mathtt{t}_0 = \llbracket\vartheta\rrbracket(\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
||| $^{\top}\mathtt{t}_{11} < \llbracket\vartheta\rrbracket(\mathtt{w}_0, \mathtt{e}_0)$: topical $\mathtt{e}_0$-past

~~~~~~

$\mathtt{v} \in \mathrm{Dom}\,\llbracket\mathrm{ANS}\rrbracket(\underline{\mathtt{e}}_0)$
—— $\llbracket\mathrm{CON}\rrbracket(\mathtt{e}_0)$
• $\llbracket\mathrm{ANS}\rrbracket(\underline{\mathtt{e}}_0)(\mathtt{v})$: $\mathtt{e}_0$-exp answers $\underline{\mathtt{e}}_0\mathtt{v} = \mathtt{e}_0$, believes $\mathtt{p}_0$-compatible $\mathtt{p}_{1n}$ to be possible

win-
$[e\ w|\ \mathit{win}\langle w, e\text{: }\mathrm{AGT}\rangle]$;
-PST$_{\varepsilon}$-3
$^{\mathrm{P}}[\mathbf{d}\tau < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon)]$; $[\supset\langle d\omega\text{: } d\varepsilon, \mathbf{d}\tau\rangle]$; $[(\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\circ}]$;
$[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(d\omega, \mathrm{CON}\ d\varepsilon))^{\circ}, (\mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}]$;
? (*prosody*)
$[d\Omega = d\omega\{|_{\mathbf{d}\alpha}\}]$; $[\mathbf{Q}|\ \mathbf{Q} = d\Omega\{|\}]$; $[\mathit{ask}\langle\omega, d\omega\varepsilon\text{: }\mathrm{AGT}\text{: }\mathbf{d}\Omega t\rangle]$

$^{\top}\mathtt{w}_0 \in {}^{\top}\mathtt{p}_0$ • $^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt asks $^{\top}\mathtt{Q}_1 = \{\ldots\mathtt{p}_{1n}\ldots\}$
| $\mathtt{t}_0 = \llbracket\vartheta\rrbracket(\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
||| $^{(\top)}\mathtt{t}_{11} < \llbracket\vartheta\rrbracket(\mathtt{w}_0, \mathtt{e}_0)$: topical $\mathtt{e}_0$-past

~~~~~~

$\mathtt{v}_n \in \mathrm{Dom}\,\llbracket\mathrm{ANS}\rrbracket(\underline{\mathtt{e}}_0)$
—— $\llbracket\mathrm{CON}\rrbracket(\mathtt{e}_0)$
• $\llbracket\mathrm{ANS}\rrbracket(\underline{\mathtt{e}}_0)(\mathtt{v})$: $\mathtt{e}_0$-exp answers $\underline{\mathtt{e}}_0\mathtt{v} = \mathtt{e}_0$, believes $\mathtt{p}_0$-compatible $\mathtt{p}_{1n}$ to be possible

~~~~~~

$\mathtt{w}_{1n} \in \mathtt{p}_{1n}$ • $\mathtt{e}_{1n}$: person $\mathtt{a}_n$ wins
||| $^{\top}\mathtt{t}_{1n} \subset \llbracket\vartheta\rrbracket(\mathtt{w}_{1n}, \llbracket\mathrm{CON}\rrbracket(\mathtt{e}_{1n})) < \llbracket\vartheta\rrbracket(\mathtt{w}_0, \mathtt{e}_0)$
~~~~~~

(13′) Competing epistemic possibilities: (13′i) vs. (13′ii)

i. Possibly, Inés won.
Inés
$[\mathbf{a}|\ (\mathbf{a} = \textit{inés})^{\circ}]$;
=**CNJ**
$^{1}(^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon]);\ ^{3}[\mathbf{p}|\ \mathbf{p} \bigcirc \mathbf{d}\omega\{|\}];\ ^{4}[\cap\mathrm{BEL}(\omega, d\omega\varepsilon) \bigcirc_{\omega} \mathbf{d}\Omega]$
win-
$[e\ w|\ win\langle w, e{:}\ \mathrm{AGT}\rangle]$;
-PST$_{\varepsilon}$-3
$^{P}[\mathbf{d}\tau_2 < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon)];\ [\supset\langle d\omega{:}\ d\varepsilon, \mathbf{d}\tau_2\rangle];\ [(\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\circ}]$;
$[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(d\omega, \mathrm{CON}\ d\varepsilon))^{\circ}, (\mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}]$;
. (***prosody***)
$[\mathbf{d}\Omega = d\omega\{|\}]$

ii. And possibly, Pilar won.
Pilar =CNTR
$[\mathbf{a}|\ (\mathbf{a} = pilar)^{\circ}];\ ^{P}[\mathbf{d}\alpha \neq \mathbf{d}\alpha_2]$;
=**CNJ**
$^{1}(^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon]);\ ^{3}[\mathbf{p}|\ \mathbf{p} \bigcirc \mathbf{d}\omega\{|\}];\ ^{4}[\cap\mathrm{BEL}(\omega, d\omega\varepsilon) \bigcirc_{\omega} \mathbf{d}\Omega]$;
win-
$[e\ w|\ win\langle w, e{:}\ \mathrm{AGT}\rangle]$
-PST$_{\varepsilon}$-3
$^{P}[\mathbf{d}\tau_3 < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon)];\ [\supset\langle d\omega{:}\ d\varepsilon, \mathbf{d}\tau_3\rangle];\ [(\mathrm{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\circ}]$;
$[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(d\omega, \mathrm{CON}\ d\varepsilon))^{\circ}, (\mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}]$;
. (***prosody***)
$[\mathbf{d}\Omega = d\omega\{|\}]$

$^{\top}\mathtt{w}_0 \in \mathtt{p}_0$	•	$\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt asks $^{\top}\mathtt{Q}_1 = \{\ldots\mathtt{p}_{1n}\ldots\}$
	|	$\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
	|||	$^{(\top)}\mathtt{t}_{11} < [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: topical $\mathtt{e}_0$-past
	——	$[\![\mathrm{CON}]\!](\mathtt{e}_0)$
	•	$^{\top}\mathtt{e}_2 = \underline{\mathtt{e}}_2\mathtt{w}_0 = [\![\mathrm{ANS}]\!](\underline{\mathtt{e}}_0)(\mathtt{w}_0)$: $\mathtt{e}_0$-exp answers $\underline{\mathtt{e}}_0\mathtt{w}_0 = \mathtt{e}_0$, believes $\mathtt{p}_0$-compatible $\mathtt{p}_{11}$ to be possible & believes $\mathtt{p}_0$-compatible $\mathtt{p}_{12}$ to be possible

~~~~~~

$\mathtt{w}_{11} \in {}^{(\top)}\mathtt{p}_{11}$	•	$\mathtt{e}_{11}$: Inés wins

~~~~~~

$\mathtt{w}_{12} \in {}^{\top}\mathtt{p}_{12}$	•	$\mathtt{e}_{12}$: Pilar wins

(14′) Epistemic possibility (14′i) vs. hearsay (14′iii)

$^{\top}w_0 \in {}^{\top}p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt speaks up (about $^{\top}t_{11}$)
| $t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
||| $^{\top}t_{11} < [\![\vartheta]\!](w_0, e_0)$: topical e_0-past

i. A fox took my hen, I guess.
fox
$[\mathbf{a}\ w|\ fox\langle w: \mathbf{a}\rangle]$;
=CNJ
$^1(^{P}[d\omega\varepsilon =_{\omega} \mathbf{d}\varepsilon])$; $^3[\mathbf{p}|\ \mathbf{p} \bigcirc \mathbf{d}\omega\{|\}]$; $^4[\bigcap \mathrm{BEL}(\omega, d\omega\varepsilon) \bigcirc_{\omega} \mathbf{d}\Omega]$
hen-1-ACC take-
$[a\ e|\ hen.of\langle \mathbf{d}\omega: \vartheta(\omega: e), a, \text{AGT}\ \mathbf{d}\varepsilon\rangle]$; $[take\langle \mathbf{d}\omega, d\varepsilon: \text{AGT}: d\alpha\rangle]$;
-PST$_{\varepsilon}$-3
$^{P}[\mathbf{t}|\ \mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon)]$; $[\supset\langle \mathbf{d}\omega: d\varepsilon, \mathbf{d}\tau\rangle]$; $[(\text{CTR}\ d\varepsilon = \mathbf{d}\alpha)^{\circ}]$;
$[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(\mathbf{d}\omega, \text{CON}\ d\varepsilon))^{\circ}, (\mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}]$;
. (***prosody***)
$[\mathbf{d}\Omega = d\omega\{|_{\mathbf{d}\alpha}\}]$

$^{\top}w_0 \in p_{12} \subseteq p_0$ • $^{\top}e_0 = \underline{e}_0 w_0$: e_0-agt believes p_0-compatible prop. p_{11} to be possible, updates CG to p_{12}
| $t_0 = [\![\vartheta]\!](w_0, e_0)$: e_0-instant
||| $^{(\top)}t_{11} < [\![\vartheta]\!](w_0, e_0)$: topical e_0-past
• e_1: a_1 takes e_0-agt's hen a_2
||| $^{\top}t_{12} \subset [\![\vartheta]\!](w_0, [\![\text{CON}]\!](e_1)) < [\![\vartheta]\!](w_0, e_0)$

~~~~~~

$w_1 \in {}^{\top}p_{11}$ • e_1: a_1 is a fox
~~~~~~

ii. But my neighbour saw it, …
But house friend-1
$[w|\ d\omega \neq w]$; $[\mathbf{a}|\ \mathit{neighbor.of}\{\omega: \vartheta(\omega: \mathbf{d}\varepsilon), \mathbf{a}, \text{AGT } \mathbf{d}\varepsilon\}]$;
see-
$[e|\ \mathit{see}\langle \mathbf{d}\omega, e: \text{AGT}: d\varepsilon\rangle]$;
-PST$'_{\varepsilon}$-3
${}^{\mathrm{P}}[\mathbf{d}\tau_2 < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon)]$; $[\supset\langle \mathbf{d}\omega: d\varepsilon, \mathbf{d}\tau_2\rangle]$; $[(\text{CTR } d\varepsilon = \mathbf{d}\alpha)^{\mathrm{o}}]$;
$[\underline{e}|\ \underline{e} \subset_{\vartheta\omega} \text{CON } d\varepsilon, \mathbf{d}\varepsilon \subset_{\vartheta\omega} \text{CON } \underline{e}]$;
, (***prosody***)
$[\mathbf{p}]$; $[\mathbf{d}\Omega = \mathbf{d}\omega\{|\}]$;

${}^{\top}\mathrm{w}_0 \in {}^{\top}\mathrm{p}_2 \subseteq \mathrm{p}_0$	•	${}^{\top}\mathrm{e}_0 = \underline{\mathrm{e}}_0\mathrm{w}_0$: e_0-agt believes p_0-compatible prop. p_{11} to be possible, updates CG to p_2
	|	$\mathrm{t}_0 = [\![\vartheta]\!](\mathrm{w}_0, \mathrm{e}_0)$: e_0-instant
|||		${}^{(\top)}\mathrm{t}_{11} < [\![\vartheta]\!](\mathrm{w}_0, \mathrm{e}_0)$: topical e_0-past
•		e_1: a_1 takes e_0-agt's hen a_2
•		e_2: e_0-agt's neighbor sees e_1
|||		${}^{\top}\mathrm{t}_{12} \subset [\![\vartheta]\!](\mathrm{w}_0, [\![\text{CON}]\!](\mathrm{e}_1)) < [\![\vartheta]\!](\mathrm{w}_0, \mathrm{e}_0)$

~~~~~~

$\mathrm{w}_1 \in \mathrm{p}_{11}$	•	e_1: a_1 is a fox

~~~~~~

$\mathrm{v} \in \mathrm{Dom}\ \underline{\mathrm{e}}_3$	——	$[\![\text{CON}]\!](\mathrm{e}_2)$
	•	$\underline{\mathrm{e}}_3\mathrm{v}$
	————	$[\![\text{CON}]\!](\underline{\mathrm{e}}_3\mathrm{v})$

iii. … and, according to [him], a puma took it.
puma
$[\mathbf{a}|\ \mathit{puma}\langle d\omega: \mathbf{a}\rangle]$;
=**RPT**
${}^{\mathrm{P}}[d\omega\varepsilon_2 =_{\omega} \mathbf{d}\varepsilon]$; $[\mathbf{p}|\ \mathbf{d}\varepsilon \subset_{\vartheta\omega} \text{CON } d\omega\varepsilon, \mathit{say}\langle \omega, d\omega\varepsilon: \text{AGT}: \{\mathbf{p}\}\rangle]$;
$[\mathit{rhs}\langle \omega, d\omega\varepsilon_2: \text{AGT}: \{\mathbf{d}\Omega\}\rangle]$;
take- -SBJ
$[e|\ e = d\varepsilon_2]$; $[\mathit{take}\langle d\omega, d\varepsilon: \text{AGT}, d\alpha\rangle]$;${}^{\mathrm{P}}[d\omega \neq d\omega_2]$;
be-PST$_{\varepsilon}$-3
${}^{\mathrm{P}}[\mathbf{d}\tau_2 < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon)]$; $[\supset\langle d\omega: d\varepsilon, \mathbf{d}\tau_2\rangle]$; $[(\text{CTR } d\varepsilon = \mathbf{d}\alpha)^{\mathrm{o}}]$;
$[\mathbf{t}|\ (\mathbf{t} \subset \vartheta(\mathbf{d}\omega, \text{CON } d\varepsilon))^{\circ}, (\mathbf{t} < \vartheta(\mathbf{d}\omega, \mathbf{d}\varepsilon))^{\circ}]$;
. (***prosody***)
$[\mathbf{d}\Omega = d\omega\{|_{\mathbf{d}\alpha,\, d\omega\varepsilon}\}]$

${}^{\top}\mathtt{w}_0 \in \mathtt{p}_2 \subseteq \mathtt{p}_0$	•	${}^{\top}\mathtt{e}_0 = \underline{\mathtt{e}}_0\mathtt{w}_0$: $\mathtt{e}_0$-agt believes $\mathtt{p}_0$-compatible prop. $\mathtt{p}_{11}$ to be possible, updates CG to $\mathtt{p}_2$, repeats as hearsay $\{{}^{\top}\mathtt{p}_3\}$
	|	$\mathtt{t}_0 = [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: $\mathtt{e}_0$-instant
	|||	${}^{(\top)}\mathtt{t}_{11} < [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$: topical $\mathtt{e}_0$-past
	•	$\mathtt{e}_1$: $\mathtt{a}_1$ takes $\mathtt{e}_0$-agt's hen $\mathtt{a}_2$
	•	$\mathtt{e}_2$: $\mathtt{e}_0$-agt's neighbor sees $\mathtt{e}_1$
	|||	${}^{\top}\mathtt{t}_{12} \subset [\![\vartheta]\!](\mathtt{w}_0, [\![\text{CON}]\!](\mathtt{e}_1)) < [\![\vartheta]\!](\mathtt{w}_0, \mathtt{e}_0)$

~~~~~~

$\mathtt{w}_1 \in \mathtt{p}_{11}$		($\mathtt{e}_0$-agt's $\mathtt{e}_0$-current epi. possibility in $\mathtt{w}_0$)
	•	$\mathtt{e}_1$: $\mathtt{a}_1$ is a fox

~~~~~~

$\mathtt{v} \in \text{Dom } \underline{\mathtt{e}}_3$	——	$[\![\text{CON}]\!](\mathtt{e}_2)$
	•	$\underline{\mathtt{e}}_3\mathtt{v}$: $\underline{\mathtt{e}}_3\mathtt{v}$-agt says $\{{}^{\top}\mathtt{p}_3\}$
	————	$[\![\text{CON}]\!](\underline{\mathtt{e}}_3\mathtt{v})$

~~~~~~

$\mathtt{w}_2 \in {}^{\top}\mathtt{p}_3 \subseteq \text{Dom } \underline{\mathtt{e}}_3$		($\mathtt{e}_0$-hearsay, incompatible with $\mathtt{p}_{11}$)
	•	$\mathtt{e}_1$: $\mathtt{a}_1$ is a puma, $\mathtt{a}_1$ takes $\mathtt{a}_2$

5 CONCLUSION

Incremental update with centering provides a unified account of grammatical centering systems. These include *tense*, which monitors and updates topic times; *illocutionary mood*, which monitors and updates illocutionary concepts and related modal topics; and secondary grammatical systems such as *illocutionary evidentials*, which are semanticaly reduced illocutionary moods.

Given the universal 'commonplace' effect of Stalnaker (1978) formalized as default centering, the parallel centering account explains how tense and illocutionary mood can be contextually equivalent, up to a point. Extending the centering parallels to illocutionary evidentials further explains the interaction of these supplementary grammatical markers with compatible elements (other evidentials, illocutionary moods, or mood-like prosody), in terms of centering-based anaphora with possibly ambiguous anaphora resolution.
~~~~~~

APPENDIX UC: *Update with Centering*

D1.1 Definition (Infotention states). Let D be a non-empty set of objects.

- $Z^{n,m} = D^n \times D^m$ is the set of structured stacks with n topical objects and m background objects, for all natural numbers $n, m \in \mathbf{N}$
- $C^{n,m} = Pow(Z^{n,m})$ is the set of states of infotention about n topical objects and m background objects
- $C = \cup_{n,\, m \in \mathbf{N}} C^{n,m}$ is the set of states of infotention

A1 Abbreviations (Stacks, cardinality, extensions)

- For $\mathtt{z} = \langle \mathtt{z}_1, \mathtt{z}_2 \rangle \in Z^{n,m}$, $\top\mathtt{z} := \mathtt{z}_1$ is the top stack of $\mathtt{z}$ and $\bot\mathtt{z} := \mathtt{z}_2$ is the bottom stack of $\mathtt{z}$
- For $\mathtt{z} \in Z^{n,m}$ ($\mathtt{c} \in C^{n,m}$), $|\mathtt{z}|_\top := n$ ($=: |\mathtt{c}|_\top$) and $|\mathtt{z}|_\bot := m$ ($=: |\mathtt{c}|_\bot$)
- $(\mathtt{x} \cdot \mathtt{y}) := \langle \mathtt{x}_1, \ldots, \mathtt{x}_n, \mathtt{y}_1, \ldots, \mathtt{y}_m \rangle \in D^{n+m}$, for $\mathtt{x} \in D^n$ and $\mathtt{y} \in D^m$
- $\mathtt{y}$ extends $\mathtt{x}$, $\mathtt{x} \leq \mathtt{y}$, iff $\exists \mathtt{x}'$: $\mathtt{y} = (\mathtt{x}' \cdot \mathtt{x})$

D1.2 Definition (Infotention update) State $\mathtt{c}'$ is an *update* of state $\mathtt{c}$, $\mathtt{c} \leq \mathtt{c}'$, iff $|\mathtt{c}|_\top \leq \mathtt{c}'|_\top \wedge |\mathtt{c}|_\bot \leq |\mathtt{c}'|_\bot \wedge \forall \mathtt{z}' \in \mathtt{c}' \exists \mathtt{z} \in \mathtt{c}(\top\mathtt{z} \leq \top\mathtt{z}' \wedge \bot z \leq \bot\mathtt{z}')$

D2.1 Definition (*UC* types). The set of *UC* types, *Typ*, is the smallest set Y such that (i) $\{\alpha, \beta, \varepsilon, \sigma, \tau, \omega, s, t\} \subseteq Y$, and (ii) $(\mathsf{ab}) \in Y$ if $\mathsf{a}, \mathsf{b} \in Y$.

The subset $DTyp := \{\alpha, \beta, \varepsilon, \sigma, \tau, \omega, (\omega\varepsilon), (\omega t), ((\omega t)t)\} \subseteq Typ$ is the set of UC types of discourse objects.

D2.2 Definition (UC frames). A UC frame is a set of sets $\{D_\mathsf{a}\}_{\mathsf{a} \in Typ}$ where

i. $D_\alpha, D_\beta, D_\varepsilon, D_\sigma, D_\tau, D_\omega$ and D_t are non-empty pairwise disjoint sets

ii. $D_\alpha = \{\mathtt{a} \subseteq \mathbf{A} | \ \mathtt{a} \neq \varnothing\}$ for some non-empty set $\mathbf{A}$ (of α-*atoms*)

$D_\tau = \{\mathtt{t} \subseteq \mathbf{Z} | \ \mathtt{t} \neq \varnothing \wedge \forall n, n' \in \mathtt{t} \forall m \in \mathbf{Z}(n < m < n' \rightarrow m \in \mathtt{t})\}$

iii. $D_t = \{1, 0\}$

iv. $D_s = \cup_{n, m \in \mathbf{N}} (D^n \times D^m)$, where $D = \cup_{\mathsf{a} \in DTyp} D_\mathsf{a}$

v. $D_{(\mathsf{ab})} = \{\mathtt{f} | \ \varnothing \subset \text{Dom } \mathtt{f} = D_\mathsf{a} \wedge \text{Ran } \mathtt{f} \subseteq D_\mathsf{b}\}$, if $\mathsf{b} = t$

$= \{\mathtt{f} | \ \varnothing \subset \text{Dom } \mathtt{f} \subseteq D_\mathsf{a} \wedge \text{Ran } \mathtt{f} \subseteq D_\mathsf{b}\}$, if $\mathsf{b} \neq t$

A2 Abbreviations (Basic terms of UC)

$\mathsf{a} \in Typ$	$^{\top}Var_{\mathsf{a}}$	$^{\perp}Var_{\mathsf{a}}$	Con_{a}	Name of objects
s		i, j		structured stacks
st		I, J		infotention states
α	**a**	a	*john*	animate (entities)
β	**b**	b	*John*	inanimate (entities)
ε	**e**	e		events
σ	**s**	s		states (of entities)
τ	**t**	t		times
ω	**w**, **v**	w, v		worlds
$\omega\varepsilon$	$\underline{\mathbf{e}}$	$\underline{e}$		event concepts
$\omega t =: \Omega$	**p**, **q**	p, q		propositions (sets of worlds)
Ωt	**Q**	Q		sets of propositions
$\omega\tau\alpha t$			*man*, …	$\omega\tau\alpha$-predicates
$\omega\sigma\alpha t$			*happy*, …	$\omega\sigma\alpha$-predicates
$\omega\varepsilon\alpha t$			*speak*, …	$\omega\varepsilon\alpha$-predicates
$\omega\sigma\alpha\Omega t$			*hope*, …	$\omega\sigma\alpha\Omega$-predicates
$\omega\varepsilon\alpha\Omega t$			*promise*, …	$\omega\varepsilon\alpha\Omega$-predicates
$\omega\varepsilon\alpha\alpha\Omega t$			*direct.to*, …	$\omega\varepsilon\alpha\alpha\Omega$-predicates
$\omega\varepsilon\alpha(\Omega t)t$			*ask*, …	$\omega\varepsilon\alpha(\Omega t)$-predicates
$\varepsilon\alpha$			AGT	ε-dependent animates
$\varepsilon\sigma$			CON	ε-dependent states
$\sigma\varepsilon$			BEG, END	σ-dependent events
$(\omega\varepsilon)\omega\varepsilon$			ANS	$\omega\varepsilon$-dependent evt concepts
$s\mathsf{a}$			$\mathbf{d}\mathsf{a}_1$, $\mathbf{d}\mathsf{a}_2$, … $d\mathsf{a}_1$, $d\mathsf{a}_2$, …	a-projections ($\mathsf{a} \in DTyp$)

A3 Abbreviations (Functions, projections, τ-precedence and τ-sum)

- For $\mathtt{f} \in D_{\mathsf{a}1\ldots\mathsf{a}nt}$ and $\langle \mathtt{a}_1, \ldots, \mathtt{a}_n\rangle \subseteq D_{\mathsf{a}1} \times \ldots \times D_{\mathsf{a}n}$,
  $\mathtt{f}(\mathtt{a}_1, \ldots, \mathtt{a}_n) := \mathtt{f}(\mathtt{a}_1)\ldots(\mathtt{a}_n)$
  $^{\{\}}(\mathtt{f}) := \{\langle \mathtt{a}_1,\ldots \mathtt{a}_n\rangle: \mathtt{f}(\mathtt{a}_1,\ldots \mathtt{a}_n) = 1\}$ is the set characterized by $\mathtt{f}$
  $^{\chi}(\mathtt{A}) := \mathtt{f}$ is the characteristic function of $\mathtt{A}$, iff $^{\{\}}(\mathtt{f}) = \mathtt{A}$
- For $\mathtt{x} \in D^{n+m}$, $(\mathtt{x})_n$ is the nth coordinate of $\mathtt{x}$, and $^{\mathsf{a}}(\mathtt{x})$ (read: the a-subsequence of $\mathtt{x}$) is the sequence of the D_{a}-coordinates of $\mathtt{x}$
- $\mathtt{t}$ τ-precedes $\mathtt{t}'$, $\mathtt{t} <_\tau \mathtt{t}'$, iff $\mathtt{t}, \mathtt{t}' \in D_\tau \wedge \forall m \in \mathtt{t} \forall n \in \mathtt{t}'(m < n)$
  $\mathtt{t} \cup_\tau \mathtt{t}' := \inf_{\subseteq}\{\mathtt{t}'' \in D_\tau | \mathtt{t} \subseteq \mathtt{t}'' \wedge \mathtt{t}' \subseteq \mathtt{t}''\}$

D2.3 Definition (UC models). A UC model is a pair $\langle \{D_a\}_a, [\![\cdot]\!] \rangle$ where $\{D_a\}_a$ is a UC frame and $[\![\cdot]\!]$ assigns $[\![A]\!] \in D_a$ to each $A \in Con_a$. Moreover:

i. $\text{Dom}\,[\![\mathbf{d}a_n]\!] = \{z \in D_s \mid \exists m \in \mathbf{N}: {}^a(\top z) \in (D_a)^{n+m}\}$
$\quad \wedge\ \forall z \in \text{Dom}\,[\![\mathbf{d}a_n]\!]: [\![\mathbf{d}a_n]\!](z) = ({}^a(\top z))_n$
$\text{Dom}\,[\![da_n]\!] = \{z \in D_s \mid \exists m \in \mathbf{N}: {}^a(\bot z) \in (D_a)^{n+m}\}$
$\quad \wedge\ \forall z \in \text{Dom}\,[\![da_n]\!]: [\![da_n]\!](z) = ({}^a(\bot z))_n$

ii. $\varnothing \subset \text{Dom}\,[\![\text{AGT}]\!] = D_\varepsilon \backslash (\text{Ran}\,[\![\text{BEG}]\!] \cup \text{Ran}\,[\![\text{END}]\!])$
$\varnothing \subset \text{Dom}\,[\![F]\!] \subseteq D_\varepsilon \cup D_\sigma \wedge \text{Ran}\,[\![F]\!] \subseteq D_\alpha$ for $F \in \{\text{EXP}, \text{CTR}\}$
$\varnothing \subset \text{Dom}\,[\![\text{CTR}']\!] \subseteq D_\varepsilon \cup D_\sigma \wedge \text{Ran}\,[\![\text{CTR}']\!] \subseteq D_\beta$
$\forall e \in \text{Dom}\,[\![\text{AGT}]\!]: [\![\text{CTR}]\!](e) = [\![\text{AGT}]\!](e) = [\![\text{EXP}]\!]([\![\text{CON}]\!](e))$
$\forall e \in \text{Dom}\,[\![\text{EXP}]\!] \backslash \text{Dom}\,[\![\text{AGT}]\!]: [\![\text{EXP}]\!](e) = [\![\text{EXP}]\!]([\![\text{CON}]\!](e))$
$\forall s \in \text{Dom}\,[\![\text{EXP}]\!]: [\![\text{EXP}]\!](s) = [\![\text{EXP}]\!]([\![\text{BEG}]\!](s)) = [\![\text{EXP}]\!]([\![\text{END}]\!](s))$
$\forall e \in \text{Dom}\,[\![\text{CTR}]\!] \backslash \text{Dom}\,[\![\text{AGT}]\!]: [\![\text{CTR}]\!](e) = [\![\text{CTR}]\!]([\![\text{CON}]\!](e)))$
$\forall s \in \text{Dom}\,[\![\text{CTR}]\!]: [\![\text{CTR}]\!](s) = [\![\text{CTR}]\!]([\![\text{BEG}]\!](s)) = [\![\text{CTR}]\!]([\![\text{END}]\!](s))$
$\forall \underline{e} \in \text{Dom}\,[\![\text{ANS}]\!](\varnothing \subset [\![\text{ANS}]\!](\underline{e}) \subseteq \text{Dom}\,\underline{e} \wedge \forall w \in \text{Dom}\,[\![\text{ANS}]\!](\underline{e})$:
$\quad [\![\text{AGT}]\!]([\![\text{ANS}]\!](\underline{e}w)) = [\![\text{EXP}]\!](\underline{e}w)$
$\quad \wedge\ [\![\vartheta]\!](w, [\![\text{ANS}]\!](\underline{e}w)) = [\![\vartheta]\!](w, [\![\text{END}]\!]([\![\text{CON}]\!](\underline{e}w))))$

iii. $\forall w \in D_\omega(\varnothing \subset \text{Dom}\,[\![\vartheta]\!](w) \subseteq D_\varepsilon \cup D_\sigma \wedge \text{Ran}\,[\![\vartheta]\!](w) \subseteq D_\tau$
$\quad \wedge\ \forall e \in \text{Dom}\,[\![\vartheta]\!](w) \exists n \in \mathbf{Z}([\![\vartheta]\!](w, e) = \{n\}$
$\quad\quad \wedge\ [\![\vartheta]\!](w, [\![\text{BEG}]\!]([\![\text{CON}]\!](e))) = \{(n+1)\}$
$\quad\quad \wedge\ (e \in \text{Dom}\,[\![\text{AGT}]\!] \rightarrow |[\![\vartheta]\!](w, [\![\text{CON}]\!](e)| > 1))$
$\quad \wedge\ \forall s \in \text{Dom}\,[\![\vartheta]\!](w)([\![\vartheta]\!](w, [\![\text{BEG}]\!](s)) = \{\inf_< [\![\vartheta]\!](w, s)\}$
$\quad\quad \wedge\ [\![\vartheta]\!](w, [\![\text{END}]\!](s)) = \{\sup_< [\![\vartheta]\!](w, s)\} \wedge (|[\![\vartheta]\!](w, s)| > 1$
$\quad\quad \rightarrow [\![\vartheta]\!](w, s) = [\![\vartheta]\!](w, [\![\text{BEG}]\!](s)) \cup [\![\vartheta]\!](w, [\![\text{CON}]\!]([\![\text{BEG}]\!](s))))$

D3 Definition (UC syntax). For each UC type $a \in Typ$,

i. $Con_a \cup {}^\top Var_a \cup {}^\bot Var_a \subseteq Term_a$
ii. $BA \in Term_b$, if $A \in Term_a$ and $B \in Term_{ab}$
iii. $(A = B) \in Term_t$, if $A, B \in Term_a$
iv. $\neg\phi, (\phi \wedge \psi), (\phi \vee \psi), (\phi \rightarrow \psi) \in Term_t$, if $\phi, \psi \in Term_t$
v. $\exists u\phi, \forall u\phi \in Term_t$, if $u \in {}^\top Var_a \cup {}^\bot Var_a$ and $\phi \in Term_t$
vi. $\lambda u(B) \in Term_{ab}$, if $u \in {}^\top Var_a \cup {}^\bot Var_a$ and $B \in Term_b$
vii. $(u \cdot B) \in Term_s$, if $u \in {}^\top Var_a \cup {}^\bot Var_a$, $a \in DTyp$ and $B \in Term_s$.
viii. $(A \subset B) \in Term_t$, if $A, B \in Term_a$ and
$\quad a \in \{\tau, \alpha\} \cup \{b_1 \ldots b_n t: b_1, \ldots, b_n \in Typ\}$
ix. $(A < B) \in Term_t$, if $A, B \in Term_\tau$
x. $\text{EXP}\,A$, $\text{CTR}\,A \in Term_\alpha$ and $\text{CTR}'\,A \in Term_\beta$, if $A \in Term_\varepsilon \cup Term_\sigma$
xi. $\vartheta(W, A) \in Term_\tau$, if $W \in Term_\omega$ and $A \in Term_\varepsilon \cup Term_\sigma$

D4 Definition (UC semantics). The value $[\![A]\!]^g \in D_{\mathsf{a}}$ of a term $A \in Term_{\mathsf{a}}$ in a model $M = \langle \{D_{\mathsf{a}}\}_{\mathsf{a} \in Typ}, [\![\cdot]\!]\rangle$ under an M-assignment g is defined as follows. (Meta-language ∧, ∨, →, ∃, ∀, etc, have their usual meaning.)

$$
\begin{array}{rllll}
\text{i.} & [\![A]\!]^g & = & [\![A]\!] & \text{if } A \in Con_{\mathsf{a}} \\
 & [\![u]\!]^g & = & g(u) & \text{if } u \in {}^{\top}Var_{\mathsf{a}} \cup {}^{\perp}Var_{\mathsf{a}} \\
\text{ii.} & [\![B_{\mathsf{ab}}A_{\mathsf{a}}]\!]^g & = & [\![B]\!]^g([\![A]\!]^g) & \text{if } \mathsf{b} \neq t \wedge [\![B]\!]^g([\![A]\!]^g) \in D_{\mathsf{b}} \\
 & & = & [\![B]\!]^g([\![A]\!]^g) & \text{if } \mathsf{b} = t \wedge [\![A]\!]^g \in \mathrm{Dom}\,[\![B]\!]^g \\
 & & = & 0 & \text{otherwise} \\
\text{iii.} & [\![A = B]\!]^g & = & 1 & \text{iff } ([\![A]\!]^g = [\![B]\!]^g) \wedge [\![A]\!]^g, [\![B]\!]^g \in D_{\mathsf{a}} \\
\text{iv.} & [\![\neg\phi]\!]^g & = & 1 & \text{iff } [\![\phi]\!]^g = 0 \\
 & [\![(\phi \wedge \psi)]\!]^g & = & 1 & \text{iff } ([\![\phi]\!]^g = 1 \wedge [\![\psi]\!]^g = 1) \\
 & [\![(\phi \vee \psi)]\!]^g & = & 1 & \text{iff } ([\![\phi]\!]^g = 1 \vee [\![\psi]\!]^g = 1) \\
 & [\![(\phi \rightarrow \psi)]\!]^g & = & 1 & \text{iff } ([\![\phi]\!]^g = 1 \rightarrow [\![\psi]\!]^g = 1) \\
\text{v.} & [\![\exists u_{\mathsf{a}}\phi]\!]^g & = & 1 & \text{iff } \exists \mathtt{d} \in D_{\mathsf{a}}\text{: } [\![\phi]\!]^{g[u/\mathtt{d}]} = 1 \\
 & [\![\forall u_{\mathsf{a}}\phi]\!]^g & = & 1 & \text{iff } \forall \mathtt{d} \in D_{\mathsf{a}}\text{: } [\![\phi]\!]^{g[u/\mathtt{d}]} = 1 \\
\text{vi.} & [\![\lambda u_{\mathsf{a}}(B_{\mathsf{b}})]\!]^g(\mathtt{d}) & = & [\![B]\!]^{g[u/\mathtt{d}]} & \text{if } \mathtt{d} \in D_{\mathsf{a}} \wedge [\![B]\!]^{g[u/\mathtt{d}]} \in D_{\mathsf{b}} \wedge \mathsf{b} \neq t \\
 & & = & [\![B]\!]^{g[u/\mathtt{d}]} & \text{if } \mathtt{d} \in D_{\mathsf{a}} \wedge [\![B]\!]^{g[u/\mathtt{d}]} \in D_{\mathsf{b}} \wedge \mathsf{b} = t \\
 & & = & 0 & \text{otherwise} \\
\text{vii.} & [\![u_{\mathsf{a}} \cdot B_s]\!]^g & = & \langle (g(u) \cdot {\top}[\![B]\!]^g), {\perp}[\![B]\!]^g \rangle & \\
 & & & & \text{if } u \in {}^{\top}Var_{\mathsf{a}} \wedge [\![B]\!]^g \in D_s \\
 & & = & \langle {\top}[\![B]\!]^g, (g(u) \cdot {\perp}[\![B]\!]^g) \rangle & \\
 & & & & \text{if } u \in {}^{\perp}Var_{\mathsf{a}} \wedge [\![B]\!]^g \in D_s \\
\text{viii.} & [\![A \subset B]\!]^g & = & 1 & \text{if } [\![A]\!]^g \subset [\![B]\!]^g \wedge [\![A]\!]^g \in D_{\tau} \cup D_{\alpha} \\
 & & = & 1 & \text{if } {}^{\{\}}[\![A]\!]^g \subset {}^{\{\}}[\![B]\!]^g \wedge [\![A]\!]^g \in D_{\mathsf{b}1\ldots\mathsf{b}nt} \\
 & & = & 0 & \text{otherwise} \\
\text{ix.} & [\![A < B]\!]^g & = & 1 & \text{iff } [\![A]\!]^g <_{\tau} [\![B]\!]^g \\
\text{x.} & [\![F\,A]\!]^g & = & [\![F]\!]([\![A]\!]^g) & \text{if } F \in \{\mathrm{EXP}, \mathrm{CTR}, \mathrm{CTR}'\} \\
\text{xi.} & [\![\vartheta(W, A)]\!]^g & = & [\![\vartheta]\!]([\![W]\!]^g)([\![A]\!]^g) &
\end{array}
$$

D5.1 Definition (Initial contexts). An initial context is a stack $\langle \mathtt{p}_0, \mathtt{e}_0 \rangle \in D_{\omega t} \times D_{\varepsilon}$ where (i) ${}^{\{\}}\mathtt{p}_0 \neq \varnothing$, (ii) $\forall \mathtt{w} \in {}^{\{\}}\mathtt{p}_0(\langle \mathtt{w}, \mathtt{e}_0, [\![\mathrm{AGT}]\!](\mathtt{e}_0)\rangle \in {}^{\{\}}[\![speak]\!])$ and (iii) $\forall \mathtt{w}, \mathtt{v} \in {}^{\{\}}\mathtt{p}_0([\![\vartheta]\!](\mathtt{w}, \mathtt{e}_0) = [\![\vartheta]\!](\mathtt{v}, \mathtt{e}_0))$

D5.2 Definition (Initial states). $\langle \mathtt{p}_0, \mathtt{e}_0 \rangle$ induces the initial infotention state

$$
\begin{array}{ll}
{*}\langle \mathtt{p}_0, \mathtt{e}_0 \rangle := & {}^{\chi}\{\langle\langle \mathtt{t}, \mathtt{w}, \mathtt{p}_0, \mathtt{e}_0\rangle, \langle \underline{\mathtt{e}} \rangle\rangle \in D_s | \\
 & \quad \mathtt{w} \in {}^{\{\}}\mathtt{p}_0 \wedge \mathtt{t} = [\![\vartheta]\!](\mathtt{w}, \mathtt{e}_0) \wedge \underline{\mathtt{e}} = \{\langle \mathtt{v}, \mathtt{e}_0 \rangle\text{: } \mathtt{v} \in {}^{\{\}}\mathtt{p}_0\}\}
\end{array}
$$

D6 Definition (truth & falsity). Said in an initial context $\langle \mathtt{p}_0, \mathtt{e}_0 \rangle$,
K is *true* in $\mathtt{w}$, iff
$^{\{\}}((\top \mathtt{z})_1 \in D_\Omega \wedge \mathtt{w} \in {}^{\{\}}\mathtt{p}_0 \wedge \exists \mathtt{z} \forall g(\mathtt{z} \in {}^{\{\}}[\![K]\!]^g(*\langle \mathtt{p}_0, \mathtt{e}_0 \rangle) \wedge \mathtt{w} \in {}^{\{\}}((\top \mathtt{z})_1))$
K is *false* in $\mathtt{w}$, iff
$^{\{\}}((\top \mathtt{z})_1 \in D_\Omega \wedge \neg(\mathtt{w} \in {}^{\{\}}\mathtt{p}_0 \wedge \exists \mathtt{z} \forall g(\mathtt{z} \in {}^{\{\}}[\![K]\!]^g(*\langle \mathtt{p}_0, \mathtt{e}_0 \rangle) \wedge \mathtt{w} \in {}^{\{\}}((\top \mathtt{z})_1)))$

A4 Abbreviations (Set theory)

$B(A_1, \ldots, A_n)$	:=	$BA_1 \ldots A_n$	
$(A \in B)$	:=	$B_{\mathsf{a}t} A_{\mathsf{a}}$	
$(A \supset B)$	:=	$(B \subset A)$	
$(A \subseteq B)$	:=	$(A = B \vee A \subset B)$	
$(A \leq B)$	:=	$(A = B \vee A < B)$	
$(A <_B A')$	:=	$((\lambda u.\ u \in B \wedge A' \in u) \subset (\lambda u.\ u \in B \wedge A \in u))$	
$\{A_1, \ldots, A_n\}$	:=	$\lambda u.\ u = A_1 \vee \ldots \vee u = A_n$	
$\bigcap(A)$	:=	$\lambda u. \forall v(v \in A \to u \in v)$	
$\text{SG}\, A_{\mathsf{a}}$	:=	$\exists u_{\mathsf{a}}(u \subseteq A) \wedge \neg \exists u_{\mathsf{a}}(u \subset A)$	$\mathsf{a} \in \{\tau, \alpha\}$
$\text{PL}\, A_{\mathsf{a}}$	:=	$\exists u_{\mathsf{a}} \exists u'_{\mathsf{a}}(u \subset A \wedge u' \subset A \wedge \neg(u = u'))$	

A5 Abbreviations (Modal, causal, and attitudinal relations)

MIN	:=	$\lambda Q \lambda p \lambda w.\ w \in p \wedge \neg \exists v(v \in p \wedge v <_Q w)$
$^{+}$CON	:=	$\lambda w \lambda e \lambda s.\ \vartheta(w, s) = \vartheta(w, e) + \vartheta(w, \text{CON}\ e) \wedge \text{EXP}\ s = \text{EXP CON}\ e$
BEL	:=	$\lambda w \lambda e \lambda p.\ \exists s(\vartheta(w, e) \subset \vartheta(w, s) \wedge \text{EXP}\ s = \text{EXP CON}\ e$ $\wedge\ believe(w, s, \text{EXP}\ s, p))$
DES	:=	$\lambda w \lambda e \lambda p.\ \exists s(\vartheta(w, e) \subset \vartheta(w, s) \wedge \text{EXP}\ s = \text{EXP CON}\ e$ $\wedge\ want(w, s, \text{EXP}\ s, p))$
$^{\text{BEG}}B$	:=	$\lambda w \lambda e \lambda p.\ \neg(\bigcap B(w, e) \subseteq p) \wedge (\bigcap B(w, \text{BEG CON}\ e) \subseteq p)$

A6 Abbreviations (Dynamic expansions, local conditions, local updates)

$\mathbf{d}\mathsf{a}, d\mathsf{a}$	:=	$d\mathsf{a}_1, d\mathsf{a}_1$	if $\mathsf{a} \in DTyp$
$A_{\mathsf{a}}{}^{\mathrm{o}}$	:=	$\lambda i.\ A$	if $\mathsf{a} \in DTyp$
	:=	A	if $\mathsf{a} \in {}^{s}DTyp := \{s\mathsf{b} \colon \mathsf{b} \in DTyp\}$
$A_{\mathsf{a}}{}^{\omega}$	:=	$\lambda i \lambda w.\ A^{\mathrm{o}} i$	if $\mathsf{a} \in (DTyp \cup {}^{s}DTyp) \backslash \{\omega\varepsilon, s\omega\varepsilon\}$
	:=	$\lambda i.\ A$	if $\mathsf{a} = \omega\varepsilon$
	:=	A	if $\mathsf{a} = s\omega\varepsilon$
$(B(A_1, \ldots A_n))^{\mathrm{o}}$	:=	$\lambda i.\ B(A_1{}^{\mathrm{o}} i, \ldots, A_n{}^{\mathrm{o}} i)$	
$(B(\omega\colon A_1, \ldots A_n))^{\omega}$	:=	$\lambda i \lambda w.\ B(w, A_1{}^{\omega} iw, \ldots, A_n{}^{\omega} iw)$	
$R\langle W\colon A_1, \ldots, A_n \rangle$	:=	$\lambda i.\ R(W^{\mathrm{o}} i, A_1{}^{\omega} i W^{\mathrm{o}} i, \ldots, A_n{}^{\omega} i W^{\mathrm{o}} i)$	
$R\langle W, A\colon f_1, \ldots, f_n \rangle$	:=	$\lambda i.\ R(W^{\mathrm{o}} i, A^{\omega} i W^{\mathrm{o}} i, f_1(A^{\omega} i W^{\mathrm{o}} i), \ldots, f_n(A^{\omega} i\ W^{\mathrm{o}} i))$	
$R\langle W, A\colon f_1, \ldots, f_n\colon B \rangle$	:=	$\lambda i.\ R(W^{\mathrm{o}} i, A^{\omega} i W^{\mathrm{o}} i, f_1(A^{\omega} i W^{\mathrm{o}} i), \ldots, f_n(A^{\omega} i\ W^{\mathrm{o}} i), B^{\mathrm{o}} i)$	

$R\langle \omega, A\colon f_1, \ldots, f_n\rangle := \lambda i.\ \forall w(\exists u_{\mathsf{a}}(u = A^{\omega}iw) \to R(w, A^{\omega}iw, f_1(A^{\omega}iw), \ldots f_n(A^{\omega}iw)))$

$R\langle \omega, A\colon f_1, \ldots, f_n\colon B\rangle := \lambda i.\ \forall w(\exists u_{\mathsf{a}}(u = A^{\omega}iw) \to R(w, A^{\omega}iw, f_1(A^{\omega}iw), \ldots f_n(A^{\omega}iw), B^{\mathrm{o}}i))$

For $\mathbf{R} \in \{=, \in, \subseteq, \subset, \supset, \leq, <\}$

$(A\ \mathbf{R}\ B)^{\mathrm{o}} := \lambda i.\ A^{\mathrm{o}}i\ \mathbf{R}\ B^{\mathrm{o}}i$

$(A\ \mathbf{R}_{\omega}\ B) := \lambda i\ \forall w(\exists u \exists u'(u = A^{\omega}iw \wedge u' = B^{\omega}iw) \to A^{\omega}iw\ \mathbf{R}\ B^{\omega}iw)$

$(A\ \mathbf{R}_{\forall W}\ B) := \lambda i\ \forall w(w \in W^{\circ}i \to A^{\omega}iw\ \mathbf{R}\ B^{\omega}iw)$

$(A\ \mathbf{R}_{\vartheta W}\ B) := \lambda i.\ \vartheta(W^{\mathrm{o}}i, A^{\omega}iW^{\mathrm{o}}i)\ \mathbf{R}\ \vartheta(W^{\mathrm{o}}i, B^{\omega}iW^{\mathrm{o}}i)$

$\mathbf{R}\langle W\colon A, T\rangle := \lambda i.\ T^{\omega}iW^{\mathrm{o}}i\ \mathbf{R}\ \vartheta(W^{\mathrm{o}}i, A^{\omega}iW^{\mathrm{o}}i)$

$[C] := \lambda I\lambda j.\ Ij \wedge Cj$

$[u_1 \ldots u_n] := \lambda I\lambda j\ \exists u_1 \ldots u_n \exists i(j = (u_1 \cdot \ldots (u_n \cdot i)) \wedge Ii)$

$[u_1 \ldots u_n|\ C] := \lambda I\lambda j\ \exists u_1 \ldots u_n \exists i(j = (u_1 \cdot \ldots (u_n \cdot i)) \wedge Ii \wedge Ci)$

A7 Abbreviations (Global values, substates, global updates)

$A\{Z\} := \lambda u.\ \exists i(Zi \wedge A^{\circ}i = u)$

$Z_{(A1:B1,\ldots, An:Bn)} := \lambda i.\ Zi \wedge A_1{}^{\circ}i = B_1 \wedge \ldots \wedge A_n{}^{\circ}i = B_n$

$(K; K') := \lambda I.\ K'KI$

$({}^{\mathrm{P}}K) := \lambda I\lambda j.\ KIj \wedge \mathbf{d}\omega\{KI\} = \mathbf{d}\omega\{I\}$

$[R\{\omega\colon A_1, \ldots A_n\}] := \lambda I\lambda j.\ Ij \wedge \forall w(w \in \mathbf{d}\omega\{I\} \to R(w, A_1{}^{\omega}jw, \ldots A_n{}^{\omega}jw))$

$[\subset\{W\colon A, T\}] := \lambda I\lambda j.\ Ij \wedge (\exists i(Ii \wedge \textsc{pl}\ T^{\omega}iW^{\circ}i) \to \vartheta(W^{\mathrm{o}}j, A^{\omega}jW^{\mathrm{o}}j) \subset T^{\omega}jW^{\mathrm{o}}j) \wedge (\forall i(Ii \to \textsc{sg}\ T^{\omega}iW^{\circ}i) \to T^{\omega}jW^{\mathrm{o}}j \subset \vartheta(W^{\mathrm{o}}j, \textsc{con}\ A^{\omega}jW^{\mathrm{o}}j))$

For $\mathbf{R} \in \{=, \in, \subseteq, \subset, \supset, \varnothing\}$

$[A\ \mathbf{R}\ B\{|\}] := \lambda I\lambda j.\ Ij \wedge A^{\mathrm{o}}j\ \mathbf{R}\ B\{I\}$

$[A\ \mathbf{R}\ B\{|_{C1\ldots Cn}\}] := \lambda I\lambda j.\ Ij \wedge A^{\mathrm{o}}j\ \mathbf{R}\ B\{I_{(C1\colon C1j,\ \ldots Cn:Cnj)}\}$

F.# Fact.

$[\![\textsc{sg}\ u_{\mathsf{a}}]\!]^g = 1$ iff $|g(u)| = 1$ $[\![\textsc{pl}\ u_{\mathsf{a}}]\!]^g = 1$ iff $|g(u)| > 1$

F.*Z* Fact

$[\![A_{\mathsf{sa}}\{Z_{st}\}]\!]^g = {}^{\chi}\{[\![A]\!]^g(\mathrm{z}) \in D_{\mathsf{a}} |\ \mathrm{z} \in {}^{\{\}}[\![Z]\!]^g\}$

$[\![Z_{A1:B1,\ldots An:Bn}]\!]^g = {}^{\chi}\{\mathrm{z} \in {}^{\{\}}[\![Z]\!]^g |\ [\![A_1]\!]^g(\mathrm{z}) = [\![B_1]\!]^g \ldots \wedge [\![A_n]\!]^g(\mathrm{z}) = [\![B_n]\!]^g\}$

F.merge$^{\mathsf{T}}$. **Fact.** For $\mathbf{u}_{\mathsf{a}t} \in {}^{\mathsf{T}}Var_{\mathsf{a}}$:

$[\![[\mathbf{u}_{\mathsf{a}t}]; [\mathsf{da}t = B_{sa}\{|\}]]\!]^g = [\![\lambda I\lambda j\ \exists \mathbf{u}_{\mathsf{a}t} \exists i(j = (\mathbf{u} \cdot i) \wedge Ii \wedge \mathbf{u} = B_{sa}\{I\})]\!]^g$

$[\![[\mathbf{u}_{\mathsf{a}t}]; [\mathsf{da}t = B_{sa}\{|_{C1\ldots Cn}\}]]\!]^g = [\![\lambda I\lambda j\ \exists \mathbf{u}_{\mathsf{a}t} \exists i(j = (\mathbf{u} \cdot i) \wedge Ii \wedge \mathbf{u} = B_{sa}\{I_{(C1:C1i,\ \ldots Cn:Cni)}\})]\!]^g$