Tense and aspect in indirect reports: Toward a crosslinguistic theory

1. CROSSLINGUISTIC VARIATION (Gennari 2001)

• Indexical tenses: Sequence of tense (SOT)	Vendler asp. types (English-spc. tests)	MB asp. types (xlg anaphoric tests)
English		
(1) a. John said that [Mary *had been* sick].	*state*, PST+PPF	*state*, PST+PPF
b. John said that [Mary *was* sick].		*state*, PST *state*, PST
(2) a. John said that [Peter *wrote* a novel].	*accompl.*, PST	*process*, PST
b. John said that [Peter *was writing* a novel].	*accompl.*, PRG+PST	PRG-*state* of *process*,PST
(3) a. John said that [Peter *got* married].	*achieve.*, PST	*event*, PST
b. John said that [Peter *was getting* married].	*achieve.,* PRG+PST	PRG-*state* of *event*, PST

Spanish (Gennari 2001)

MB glosses:		SG glosses:
PST] 'bounded past'	~	PRET '*preterito*'
IPF.PST 'imperfective past'	~	IMPF '*imperfecto*'

(1_S)a. *Juan dij-o que Maria estuv-**o** enferma.* *state,* PST]
John say-PST].3s that Maria be-PST].3s sick
John said that Mary had been sick. [Gennari 2001, 20a]

b. *Juan dij-o que Maria est-**aba** enferma.* *state*, IPF.PST
John say-PST.3s that Maria be-IPF.PST.3s sick
John said that Mary was sick. [Gennari 2001, 20b]

(2_S)a. *Juan dij-o que Pedro escribi-**ó** una novela.* *process*, PST]
John say-PST].3s that Peter write-PST].3s a novel
John said that Peter wrote a novel. [Gennari 2001, 21a]

b. *Juan dij-o que Pedro escribi-**a** una novela.* *process*, IPF.PST
John say-PST.3s that Peter write-IPF.PST.3s a novel
John said that Peter was writing a novel. [Gennari 2001, 21b]

(3_S)a. *Juan dij-o que Pedro se cas-**ó*** *event*, PST]
John say-PST].3s that Peter slf marry-PST].3s
John said that Peter got married. [Gennari 2001, 22a]

b. *Juan dij-o que Pedro se cas-**aba*** *event*, IPF.PST
John say-PST.3s that Peter slf marry-IPF.PST.3s
John said that Peter was getting married. [Gennari 2001, 22b]

• Relative tenses (PST_ε 'relative past', $NPST_\varepsilon$ 'relative non-past'): No SOT — MB aspectual types

Polish (MB)

(1_P)a. *Jas powiedzia-l ze Maria* ***by-la*** *chor-a.* — IPF-*state*, PST_ε
Jas say.PFV-PST.3s that Maria IPF.be-PST_ε.3sf sick-sf
Jas said that Mary had been sick.

b. *Jas powiedzia-l ze Maria* ***jest*** *chor-a.* — IPF-*state*, $NPST_\varepsilon$
Jas say.PFV-PST.3s that Maria IPF.be-PRS_ε.3sf sick-sf
Jas said that Mary was sick.

(2_P)a. *Jas powiedzia-l ze* ***napisal*** *list.* — PFV-*process*, PST_ε
Jas say.PFV-PST.3s that PFV.write.PST_ε.3s letter.ACC_{sm}
John said that he wrote a letter.

b. *Jas powiedzia-l ze* ***pisze*** *list.* — IPF-*state* of *process* $NPST_\varepsilon$
Jas say.PFV-PST.3s that IPF.write.$NPST_\varepsilon$.3s letter.ACC_{sm}
John said that he was writing a letter.

(3_P)a. *Jas powiedzia-l ze Maria* ***wroci****-la.* — PFV-*event*, PST_ε
Jas say.PFV-PST.3s that Maria PFV.return-PST_ε.3sf
Jas said that Mary returned.

b. *Jas powiedzia-l ze Maria* ***wroci*** — PFV-*event*, $NPST_\varepsilon$
Jas say.PFV-PST.3s that Maria PFV.return.PRS_ε.3s
Jas said that Mary would return.

Japanese

(1_J) a. *John wa Mary ga byookidat-****ta*** *to it-ta.* — *state,* PST_ε
John TOP [Mary NOM be.sick-PST_ε] that say-PST
John said that Mary had been sick. [Gennari 2001, 59]

b. *Taroo wa Hanako ga Siatoru ni i-****ru*** *to it-ta* — *state*, $NPST_\varepsilon$
Taro TOP [Hanako NOM Seattle OBL be-$NPST_\varepsilon$] that say-PST
Taroo said that Mary *was* in Seattle. [Gennari 2001, 38]

(2_J) a. *John wa hon o yon-****da*** *to it-ta.* — *process*, PST_ε
John TOP [book ACC read-PST] that say-PST
John said that he (had) read the book. [Gennari 2001, 58 – *kare* 'he']

b. *John wa hon o yon-****de i-ru*** *to it-ta.* — TE-*state* of *process*, $NPST_\varepsilon$
John TOP [book ACC read-TE be.$NPST_\varepsilon$] that say-PST
John said that he was read*ing* a book. [Gennari 2001, 58 – *kare* 'he']

(3_J)a. *John wa Mary ga sin-****da*** *to it-ta.* — *event,* PST_ε
John TOP [Mary NOM die-PST_ε] that say-PST
John said that Mary died. [Gennari 2001, 57]

b. *Taroo wa Hanako ga shigotoru ni ku-****ru*** *to it-ta.* — *event,* $NPST_\varepsilon$ (Kuno 1973)
Taroo TOP [Hanako NOM work OBL come-$NPST_\varepsilon$] that say-PST
Taroo said that Mary would come to work. [~ Gennari 2001, 39]

2. GENNARI 2001 (building on Dowty 1979, 1986)

Gennari has interesting data (Section 1) and some intuitive ideas with some initial plausibility. I can't make sense of her 'formalization', so I ignore it.

Abbreviations

	MB	SG
TT	topic time	reference time
PT	perspective time (speech or attitude time)	local evaluation time
ET	eventuality time	event time
acc	*accomplishment*	
ach	*achievement*	
act	*activitiy*	

Gennari 2001 on ***English***

- Hypotheses (due to various people) about English *tense & aspect*

i. PST: TT < PT — PT = speech time
PRS: PT ⊆ TT (or PT = TT?) — PT = speech time
FUT: PT < TT — PT = speech time

ii. *state*-VP evokes a *state* whose ET is:
  i. ASSERTED to include TT — i.e. $TT \subseteq ET_{state}$
  ii. IMPLICATED to also include PT ('Superinterval implicature') — $^{I}(PT \subseteq ET_{state})$

prg-VP is a special case of a *state*-VP ('progressive state') — i.e. $TT \subseteq ET_{prg}$, $^{I}(PT \subseteq ET_{prg})$

prf-VP is a special case of a *state*-VP ('perfect state') — i.e. $TT \subseteq ET_{prf}$, $^{I}(PT \subseteq ET_{prf})$

iii. *act*-VP evokes an *activity* (atelic process) whose ET is:
  a. ASSERTED to overlap TT — i.e. $ET_{act} \circ TT$
  b. IMPLICATED to fall within TT ('ET-containment implic.') — $^{I}(ET_{act} \subseteq TT)$

acc-VP evokes an *accomplishment* (telic process) which is
  a. ASSERTED to fall within TT — i.e. $ET_{tel} \subseteq TT$
  b. ✓ *prg*(*acc*-VP)

ach-VP evokes an *achievement* (event) which is
  a. ASSERTED to fall within TT — i.e. $ET_{tel} \subseteq TT$
  b. # *prg*(*ach*-VP), ✓ *prg*(*prep.process*+*ach*-VP)

- Consequences for (1_E)–(3_E)

		SG descr.	SG prediction
(1_E)a.	John said that [Mary *had been* sick].	*state*, PST+PPF	?
b.	John said that [Mary *was* sick].	*state*, PST	? $s < \vartheta e_{say}$, ✓ $\vartheta e_{say} \subseteq s$
(2_E)a.	John said that [Peter *wrote* a novel].	*accompl.*, PST	✓ $ee < \vartheta e_{say}$, $*\vartheta e_{say} \subseteq ee$
b.	John said that [Peter *was writing* a novel].	*accompl.*, PRG+PST	? $s_{prg} < \vartheta e_{say}$ ✓ $\vartheta e_{say} \subseteq s_{prg}$
(3_E)a.	John said that [Peter *got* married].	*achieve.*, PST	✓ $e < \vartheta e_{say}$, $* \vartheta e_{say} \subseteq e$
b.	John said that [Peter *was getting* married].	*achieve.*, PRG+PST	? $s_{prg} < \vartheta e_{say}$ ✓ $\vartheta e_{say} \subseteq s_{prg}$

• Problems with matrix states	SG descr.	SG prediction
(4_E)a. Mary *was* a kind person.	*state*, PST	? $s < \vartheta^{\top} e$, ✓ $\vartheta^{\top} e \subseteq s$
b. Mary *was* busy.		
c. Tom loved Sue dearly.		
etc.		
(5_E)a. Peter *was* writ*ing* a novel.	*prg-state*, PST	? $s < \vartheta^{\top} e$ ✓ $\vartheta^{\top} e \subseteq s$
b. Peter *was* gett*ing* married.		
c. Mary *was* go*ing* to the party.		
etc.		

MB: According to SG all of these should implicate 'S/he still is' or 'S/he still does'. In fact, they have the opposite implicatures, which can be cancelled by such elaborations.

(6_E)a. John *will be* at home.	*state*, FUT	? $\vartheta^{\top} e < s$, ✓ $\vartheta^{\top} e \subseteq s$
b. John *wll be* at home ***now***.	*state*, FUT	? $\vartheta^{\top} e < s$, ✓ $\vartheta^{\top} e \subseteq s$

MB: According to SG both of these should implicate, 'He's already at home'. Intuitively, (6_Ea) doesn't implicate this at all, and (6_Eb) doesn't just implicate it but entails it. The effect is due to *now*, not to stative aspect.

Gennari 2001 on ***Spanish***

• Hypotheses about Spanish *tense* & *aspect*

i. PST]	TT < PT	^{I}(ET < PT 'end-point implicature')	PT = speech time
IPF.PST:	TT < PT, TT $\subseteq$ ET_{state}		PT = speech time
⋮			
ii. *state*-VP,	as in English		
ipf-VP	is a special case of a *state*-VP ('lexical *state* or *prg-state'*)		i.e. TT $\subseteq$ ET_{prg} ^{I}(PT $\subseteq$ ET_{prg})

iii. *act*-VP, *acc*-VP, *ach*-VP: all as in English

• Consequences for (1_S)–(3_S)	SG prediction
(1_S)a. John say-PST].3s that Maria *be-PST*].3s sick	not clear: *state* & -PST] have conflicting implicatures
b. John say-PST.3s that Maria *be-IPF.PST*.3s sick	~ English (1_Eb)
(2_S)a. John say-PST].3s that Peter *write-PST*].3s a novel	~ English (2_Ea)
b. John say-PST.3s that Peter *write-IPF.PST*.3s a novel	~ English (2_Eb)
(3_S)a. John say-PST].3s that Peter slf *marry-PST*].3s	~ English (3_Ea)
b. John say-PST.3s that Peter slf *marry-IPF.PST*.3s	~ English (3_Eb)

Gennari 2001 on ***Japanese***

- Hypotheses about Japanese *tense* & *aspect*

i. PST TT < PT PT = speech time for matrix TNS,
NPST: ¬(TT < PT) attitude time for embedded TNS

ii. *state*-VP as in English
te iru-VP is a special case of a *state*-VP ('*prg-state* or *prf-state'*) i.e. $TT \subseteq ET_{prg}$
$^{I}(PT \subseteq ET_{prg})$

iii. *act*-VP, *acc*-VP, *ach*-VP: all as in English

- Consequences for (1_J)–(3_J) SG prediction

(1_J)a. John TOP [Mary NOM be.sick-PST_{ε}] that say-PST
b. Taro TOP [Hanako NOM Seattle OBL be-$NPST_{\varepsilon}$] that say-PST

(2_J)a. John TOP ['he' NOM book ACC read-PST] that say-PST
b. John TOP ['he' NOM book ACC read-TE be.$NPST_{\varepsilon}$] that say-PST

(3_J)a. John TOP [Mary NOM die-PST_{ε}] that say-PST
Taroo TOP [Hanako NOM work OBL come-$NPST_{\varepsilon}$] that say-PST

3. BITTNER 2006 (building on Kamp & Rohrer 1983, Partee 1984, Webber 1988, …)

• Indexical tenses: Sequence of tense (SOT) MB aspectual types

English

i-reality $^{\top}w_0$: • $^{\top}e_0$: e_0-agt speak up
| $t_0 = \vartheta_{w0}\ e_0$
|| $^{\top}t_{11}$: topical e_0-past (i.e. $^{\top}t_{11} < \vartheta_{w0}\ e_0$)

(1_P)a. (John said that…)
John say-PST that…

John (*subject*)
^{p}[| *name.of*$_{\mathbf{d}\omega}$(*John*, $d\alpha$)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [**a**| **a** =$_{\mathbf{d}\omega}$ $d\kappa^{\alpha}${**d**ε}];

say-
[*e p*| *e*: AGT *say*$_{\mathbf{d}\omega}$ *p*]; ^{I}[| AGT $d\varepsilon$ =$_{\mathbf{d}\omega}$ **d**α];

-PST
^{p}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε];
[| $d\varepsilon \subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES $d\varepsilon$];

that
[**k**$^{\tau}$| $d\Omega$ = Dom **k**$^{\tau}$];

i-reality $^{\top}w_0$: • $^{\top}e_0$: e_0-agt speak up
| $t_0 = \vartheta_{w0}\ e_0$
|| t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
• e_1: $^{\top}a_1$ (= john) says p_1 (= Dom $^{\top}k^{\tau}_2$)
|| $^{\top}t_{12} = \vartheta_{w0}\ \mathrm{RES}_{w0}\ e_1$

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$w_1 \in$ Dom $^{\top}k^{\tau}_2$ (e_1-report worlds)
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(…Mary had been sick.)

…Mary have$_{\varepsilon\varepsilon}$-PST be-PPF sick — *state*, PPF

Mary (*subject*)

$^{p}[|\ name.of_{\mathbf{d}\omega}(Mary, d\alpha_1)]; [k^{\alpha}|\ k^{\alpha} \sim d\alpha_1]; [\mathbf{a}|\ \mathbf{a} =_{\mathbf{d}\omega} d\kappa^{\alpha}\{\mathbf{d}\varepsilon\}];$

have$_{\varepsilon\varepsilon}$-
$[\underline{ee}|\ process\ \underline{ee}, (^{f}\underline{ee} =_{\mathbf{d}\kappa} d\varepsilon)];$
$[|\ \mathrm{EXP}\ ^{1}d\underline{\varepsilon\varepsilon} =_{\mathbf{d}\kappa} \mathbf{d}\alpha]$

$\forall w \in \mathrm{Dom}\ k^{\tau}{}_2$:
$\circ\ ^{f}\underline{ee}_2 w = e_1$
$\circ\ \mathrm{EXP}_w\ ^{1}\underline{ee}_2 w = a_2$

-PST$_{\kappa}$
$^{p}[|\ \mathbf{d}\kappa^{\tau}\{d\varepsilon\} \leq_{\mathbf{d}\kappa} \vartheta d\varepsilon <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon];$
$[|\ ^{1}d\underline{\varepsilon\varepsilon} \subseteq_{\mathbf{d}\kappa} \mathbf{d}\kappa^{\tau}\{d\varepsilon\}];$

$\circ\ k^{\tau}{}_2 w e_1 \leq \vartheta_w\ e_1 < \vartheta_{w0}\ e_0$
$\circ\ \vartheta_w\ ^{1}\underline{ee}_2 w \subseteq k^{\tau}{}_2 w e_1$

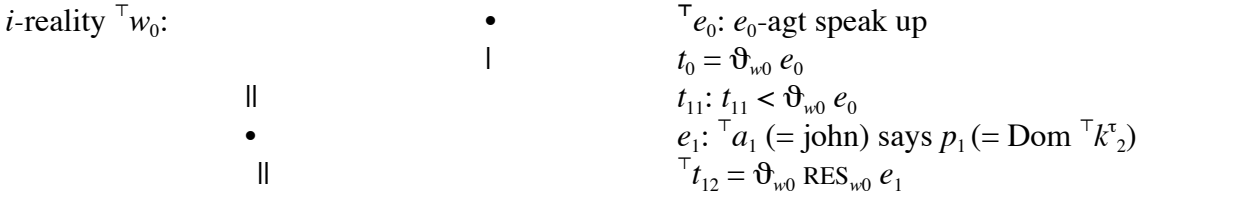
be-
$[\underline{s}\ k^{\alpha}|\ \mathrm{EXP}\ \underline{s} = k^{\alpha}\{\underline{s}\}];$
$[|\ \mathrm{EXP}\ d\underline{\sigma} = \mathbf{d}\alpha]$

$\forall w \in \mathrm{Dom}\ \underline{s}_2$:
$\circ\ \mathrm{EXP}_w\ \underline{s}_2 w = k^{\alpha}{}_3 w \underline{s}_2 w$
$\circ\ \mathrm{EXP}_w\ \underline{s}_2 w = a_2$

-PPF
$[|\ end\{^{1}d\underline{\varepsilon\varepsilon}, d\underline{\sigma}\}];$

$\forall w \in \mathrm{Dom}\ ^{1}\underline{ee}_2 = \mathrm{Dom}\ \underline{s}_2$:
$\mathrm{EXP}_w\ ^{1}\underline{ee}_2 w = \underline{s}_2 w$
$\wedge\ \vartheta_w\ ^{1}\underline{ee}_2 w \subseteq \vartheta_w\ \underline{s}_2 w$
$\wedge\ \neg(\vartheta_w\ \mathrm{RES}_w\ ^{1}\underline{ee}_2 w \circ \vartheta_w\ \underline{s}_2 w)$

sick
$[|\ sick\ d\kappa^{\alpha}]$



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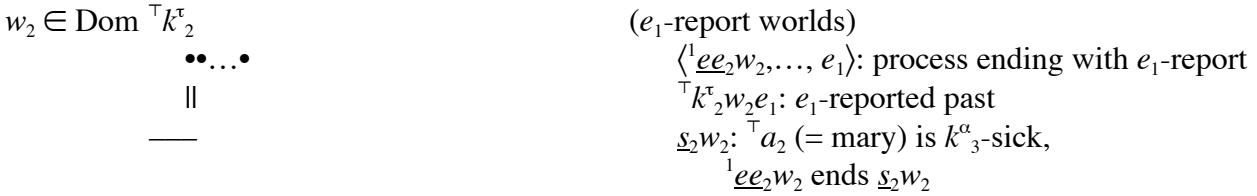
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(…Mary was sick.) *state*, PST

…Mary be-PST$_\kappa$ sick.

Mary (*subject*)

$^{P}[| \; name.of_{\mathbf{d}\omega}(Mary, d\alpha_1)]; [k^{\alpha}| \; k^{\alpha} \sim d\alpha_1]; [\mathbf{a}| \; \mathbf{a} =_{\mathbf{d}\omega} d\kappa^{\alpha}\{\mathbf{d}\varepsilon\}];$

be-

$[\underline{s} \; k^{\alpha}| \; \text{EXP} \; \underline{s} = k^{\alpha}\{\underline{s}\}];$

$[| \; \text{EXP} \; d\underline{\sigma} = \mathbf{d}\alpha]$

-PST$_\kappa$

$^{P}[| \; \mathbf{d}\kappa^{\tau}\{d\varepsilon\} \leq_{\mathbf{d}\kappa} \vartheta d\varepsilon <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega} \mathbf{d}\varepsilon];$

$[| \; \mathbf{d}\kappa^{\tau}\{d\varepsilon\} \subseteq_{\mathbf{d}\kappa} d\underline{\sigma}];$

$^{I}[| \; d\underline{\sigma} <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega} \mathbf{d}\varepsilon]$ $]_{\mathbf{d}\varepsilon}$-implicature

sick

$[| \; sick \; d\kappa^{\alpha}]$

Past-shifted reading: $k^{\tau}{}_2 w_2 e_1 < \vartheta_{w2} \; e_1$

i-reality $^{\top}w_0$: • $^{\top}e_0$: e_0-agt speak up

| $t_0 = \vartheta_{w0} \; e_0$

‖ t_{11}: $t_{11} < \vartheta_{w0} \; e_0$

• e_1: $^{\top}a_1$ (= john) says p_1 (= Dom $^{\top}k^{\tau}{}_2$)

‖ $^{\top}t_{12} = \vartheta_{w0} \; \text{RES}_{w0} \; e_1$

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$w_2 \in$ Dom $^{\top}k^{\tau}{}_2$ (e_1-report worlds)

‖ $^{\top}k^{\tau}{}_2 w_2 e_1 < \vartheta_{w2} \; e_1$ (e_1-reported past)

—— $\underline{s}_2 w_2$: $^{\top}a_2$ (= *mary*) is sick

Simultaneous reading: $k^{\tau}{}_2 w_2 e_1 = \vartheta_{w2} \; e_1$

i-reality $^{\top}w_0$: • $^{\top}e_0$: e_0-agt speak up

| $t_0 = \vartheta_{w0} \; e_0$

‖ t_{11}: $t_{11} < \vartheta_{w0} \; e_0$

• e_1: $^{\top}a_1$ (= john) says p_1 (= Dom $^{\top}k^{\tau}{}_2$)

‖ $^{\top}t_{12} = \vartheta_{w0} \; \text{RES}_{w0} \; e_1$

~~~~~~

$w_2 \in$ Dom $^{\top}k^{\tau}{}_2$ (e_1-report worlds)

| $^{\top}k^{\tau}{}_2 w_2 e_1 = \vartheta_{w2} \; e_1$ (e_1-reported now)

—— $\underline{s}_2 w_2$: $^{\top}a_2$ (= mary) is sick,

(2_E)a. (…Peter wrote a novel.)
…Peter write-PST_κ a novel
Peter
$^{\text{P}}$[| *name.of*$_{\mathbf{d}\omega}$(*Peter*, $d\alpha_1$)]; [k^α| $k^\alpha \sim d\alpha_1$]; [**a**| **a** =$_{\mathbf{d}\omega}$ $d\kappa^\alpha${**d**ε}];

write-
[*ee* k^β| (*ee*: AGT *write*), (BEG k^β = ^{f}*ee*)];
$^{\text{I}}$[| AGT $d\varepsilon\varepsilon$ = **d**α]

-PST_κ
$^{\text{P}}$[| **d**κ^τ{$d\varepsilon$} ≤$_{\mathbf{d}\kappa}$ ϑ$d\varepsilon$ <$_{\mathbf{d}\kappa}$ ϑ$_{\mathbf{d}\omega}$ **d**ε];
[| $^1d\varepsilon\varepsilon$ ⊆$_{\mathbf{d}\kappa}$ **d**κ^τ{$d\varepsilon$}];
[**k**$^\tau$| **k**$^\tau${$d\varepsilon$} = (ϑRES $^1d\varepsilon\varepsilon$| Dom **d**$\kappa^\tau$)];

a
[| *sg* $d\kappa^\beta$];
$^{\text{I}}$[*b*| *b* =$_{\mathbf{d}\kappa}$ $d\kappa^\beta${$^fd\varepsilon\varepsilon$}]; $^{\text{I}}$(*complete* process)

novel
[| *novel* $d\kappa^\beta$]

Past-shifted reading: $k^\tau{}_2 w_2 e_1 < \vartheta_{w2}\ e_1$

i-reality $^\top w_0$:	•	$^\top e_0$: e_0-agt speak up
	|	$t_0 = \vartheta_{w0}\ e_0$
||		t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
•		e_1: $^\top a_1$ (= john) says p_1 (= Dom $k^\tau{}_2$ = Dom $^\top k^\tau{}_3$)
||		$^\top t_{12} = \vartheta_{w0}\ \text{RES}_{w0}\ e_1$

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$w_2 \in$ Dom $^\top k^\tau{}_3$	(e_1-report worlds)	
||	$^{(\top)}k^\tau{}_2 w_2 e_1 < \vartheta_{w2}\ e_1$	(e_1-reported past)
••	$\langle {}^1\underline{ee}_2 w_2, \ldots {}^f\underline{ee}_2 w_2\rangle$:	
	$^\top a_2$ (= peter) writes $k^\beta{}_2$-novel $\underline{b}_2 w_2$	
	($\underline{b}_2 w_2 = k^\beta{}_2 w_2 {}^f\underline{ee}_2 w_2$)	
||	$^\top k^\tau{}_3 w_2 e_1 = \vartheta_{w2}\ \text{RES}_{w2}\ {}^1\underline{ee}_2 w_2$	

* *Simultaneous* reading: $k^\tau{}_2 w_2 e_1 = \vartheta_{w2}\ e_1$
$\vartheta_{w2}\ e_1$ is a *discourse-instant* (event-time). In English, discourse instants are not possible topic times for episodic events or processes, only for states and habits:

e.g.	(a)	✓ Peter *is* sick.	(state)
	(b)	?# Peter *writes* a novel.	(process)
	(b′)	✓ Peter *writes* novels.	(habitual process)
	(c)	?# Peter *gets* married right this instant.	(event)
	(c′)	✓ Peter *gets* married at least once a year	(habitual event)
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(2_P) b. (…Peter was writing a novel.
… Peter be-PST$_\kappa$ write-PRG a novel. PRG-*state* of *process*

Peter
$^{P}[|\ name.of_{\mathbf{d}\omega}(Peter, d\alpha_1)];\ [k^{\alpha}|\ k^{\alpha} \sim d\alpha_1];\ [\mathbf{a}|\ \mathbf{a} =_{\mathbf{d}\omega} d\kappa^{\alpha}\{\mathbf{d}\varepsilon\}];$

be-
$[\underline{s}|\ \text{EXP}\ \underline{s} = \mathbf{d}\alpha]$

-PST$_\kappa$
$^{P}[|\ \mathbf{d}\kappa^{\tau}\{d\varepsilon\} \leq_{\mathbf{d}\kappa} \vartheta d\varepsilon <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon];$
$[|\ \mathbf{d}\kappa^{\tau}\{d\varepsilon\} \sqsubseteq_{\mathbf{d}\kappa} d\underline{\sigma}];$
$^{I}[|\ d\underline{\sigma} <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$ $]_{\mathbf{d}\varepsilon}$-implicature

write-
$[\underline{ee}\ k^{\beta}|\ (\underline{ee}\text{: AGT } write), (\text{BEG } k^{\beta} = {}^{f}\underline{ee})];$
$^{I}[|\ \text{AGT}\ d\underline{\varepsilon\varepsilon} = \mathbf{d}\alpha]$

-PRG
$[|\ (d\underline{\sigma} = \text{RES}\ {}^{1}d\underline{\varepsilon\varepsilon}), (d\underline{\sigma} <_{d\underline{\varepsilon\varepsilon}} {}^{f}d\underline{\varepsilon\varepsilon})];$ process *in progress*

a
$[|\ sg\ d\kappa^{\beta}];$
~~$^{I}[\underline{b}|\ \underline{b} =_{\mathbf{d}\kappa} d\kappa^{\beta}\{{}^{f}d\underline{\varepsilon\varepsilon}\}];$~~ ^{I}(~~*complete* process~~)

novel
$[|\ novel\ d\kappa^{\beta}]$

Simultaneous reading: $k^{\tau}{}_2 w_2 e_1 = \vartheta_{w2}\ e_1$

i-reality $^{\top}w_0$:

•	$^{\top}e_0$: e_0-agt speak up
|	$t_0 = \vartheta_{w0}\ e_0$
‖	t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
•	e_1: $^{\top}a_1$ (= john) says p_1 (= Dom $^{\top}k^{\tau}{}_2$)
‖	$^{\top}t_{12} = \vartheta_{w0}\ \text{RES}_{w0}\ e_1$

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$w_2 \in \text{Dom}\ ^{\top}k^{\tau}{}_2 - \text{Dom}\ ^{f}\underline{ee}_2$ (e_1-report worlds where $\underline{ee}_2$ fails to be completed)

|	$^{\top}k^{\tau}{}_2 w_2 e_1 = \vartheta_{w2}\ e_1$ (e_1-reported now)
•	$^{1}\underline{ee}_2 w_2$: $^{\top}a_2$ (= peter) begins to write $k^{\beta}{}_2$-novel
–	$\underline{s}_2 w_2 = \text{RES}_{w2}\ {}^{1}\underline{ee}_2 w_2$: $\underline{ee}_2$-writing in progress since $w_2 \notin \text{Dom}\ ^{f}\underline{ee}_2$, no $k^{\beta}{}_2$-novel is created

~~~~~~

$w_3 \in \text{Dom}\ ^{\top}k^{\tau}{}_2 \cap \text{Dom}\ ^{f}\underline{ee}_2$ (e_1-report worlds where $\underline{ee}_2$ is completed)

|	$^{\top}k^{\tau}{}_2 w_3 e_1 = \vartheta_{w3}\ e_1$ (e_1-reported now)
•	$^{1}\underline{ee}_2 w_3$: $^{\top}a_2$ begins to write $k^{\beta}{}_2$-novel $\underline{b}_2 w_3$
–	$\underline{s}_2 w_3 = \text{RES}_{w3}\ {}^{1}\underline{ee}_2 w_3$: $\underline{ee}_2$-writing in progress $(\vartheta_{w3}\ \underline{s}_2 w_3 < \vartheta_{w3}\ {}^{f}\underline{ee}_2 w_3)$
•••	$\langle {}^{1}\underline{ee}_2 w_3, \ldots, {}^{f}\underline{ee}_2 w_3 \rangle$: $^{\top}a_2$ writes $k^{\beta}{}_2$-novel $\underline{b}_2 w_3$ (the novel $\underline{b}_2 w_3 = k^{\beta}{}_2 w_3{}^{f}\underline{ee}_2 w_3$ comes into existence in $^{f}\underline{ee}_2 w_3 = \text{BEG}_{w3}\ k^{\beta}{}_2 w_3$)

(3_E)a. (…Peter got married.)
…Pater get-PST_κ married.

Peter
$^{p}[|\ name.of_{\mathbf{d}\omega}(Peter, d\alpha_1)]; [k^{\alpha}|\ k^{\alpha} \sim d\alpha_1]; [\mathbf{a}|\ \mathbf{a} =_{\mathbf{d}\omega} d\kappa^{\alpha}\{\mathbf{d}\varepsilon\}];$

get-
$[\underline{e}\ k^{\alpha}|\ (\text{BEG}\{\text{RES}\ \underline{e}\} = \text{BEG}\ k^{\alpha}), (\text{EXP}\{\text{RES}\ \underline{e}\} = k^{\alpha}\{\text{RES}\ \underline{e}\})];$
$^{I}[|\ \text{EXP}\{\text{RES}\ \underline{e}\} = \mathbf{d}\alpha]$

$-\text{PST}_\kappa$
$^{p}[|\ \mathbf{d}\kappa^{\tau}\{d\varepsilon\} \leq_{\mathbf{d}\kappa} \vartheta d\varepsilon <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon];$
$[|\ d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\kappa}} \mathbf{d}\kappa^{\tau}\{d\varepsilon\}];$
$[\mathbf{k}^{\tau}|\ \mathbf{k}^{\tau}\{d\varepsilon\} = (\vartheta\text{RES}\ d\underline{\varepsilon}|\ \text{Dom}\ \mathbf{d}\kappa^{\tau})];$

married
$[|\ married\ d\kappa^{\alpha}]$

Past-shifted reading: $k^{\tau}_2 w_2 e_1 < \vartheta_{w2}\ e_1$

i-reality $^{\top}w_0$:	•	$^{\top}e_0$: e_0-agt speak up
	|	$t_0 = \vartheta_{w0}\ e_0$
||		t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
•		e_1: $^{\top}a_1$ (= john) says p_1 (= Dom k^{τ}_2 = Dom $^{\top}k^{\tau}_3$)
||		$^{\top}t_{12} = \vartheta_{w0}\ \text{RES}_{w0}\ e_1$

~~~~~~

$w_2 \in$ Dom $^{\top}k^{\tau}_3$		(e_1-report worlds)
||		$^{(\top)}k^{\tau}_2 w_2 e_1 < \vartheta_{w2}\ e_1$ (e_1-reported past)
•		$\underline{e}_2 w_2$: $^{\top}a_2$ (= peter) gets k^{α}_2-married
||		$^{\top}k^{\tau}_3 w_2 e_1 = \vartheta_{w2}\ \text{RES}_{w2}\ \underline{e}_2 w_2$

* ***Simultaneous*** reading: $k^{\tau}_2 w_2 e_1 = \vartheta_{w2}\ e_1$
As for eventive (2_E a).
~~~~~~

(3_P)b. (…that Peter was getting married.)
…Peter be-PST_κ get-PRG married — PRG-*state* of *event*

Peter
$^{\text{P}}[|\ \mathit{name.of}_{\mathbf{d}\omega}(\mathit{Peter}, d\alpha_1)]; [k^\alpha|\ k^\alpha \sim d\alpha_1]; [\mathbf{a}|\ \mathbf{a} =_{\mathbf{d}\omega} d\kappa^\alpha\{\mathbf{d}\varepsilon\}];$

be-
$[\underline{s}|\ \text{EXP}\ \underline{s} = \mathbf{d}\alpha]$

-PST_κ
$^{\text{P}}[|\ \mathbf{d}\kappa^\tau\{d\varepsilon\} \leq_{\mathbf{d}\kappa} \vartheta d\varepsilon <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon];$
$[|\ \mathbf{d}\kappa^\tau\{d\varepsilon\} \subseteq_{\mathbf{d}\kappa} d\underline{\sigma}];$
$^{\text{I}}[|\ d\underline{\sigma} <_{\mathbf{d}\kappa} \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$ — $]_{\mathbf{d}\varepsilon}$-implicature

get-
$[\underline{e}\ k^\alpha|\ (\text{BEG}\{\text{RES}\ \underline{e}\} = \text{BEG}\ k^\alpha), (\text{EXP}\{\text{RES}\ \underline{e}\} = k^\alpha\{\text{RES}\ \underline{e}\})];$
$^{\text{I}}[|\ \text{EXP}\{\text{RES}\ \underline{e}\} = \mathbf{d}\alpha]$

-PRG
$^{\text{P}}[\underline{ee}|\ ^f\underline{ee} = \text{BEG}\{\text{RES}\ d\underline{\varepsilon}\}];$ — *preparatory* process
$[|\ (d\underline{\sigma} = \text{RES}\ ^1d\underline{\varepsilon\varepsilon}), (d\underline{\sigma} <_{d\underline{\varepsilon\varepsilon}}\ ^f d\underline{\varepsilon\varepsilon})];$ — process *in progress*

married
$[|\ \mathit{married}\ d\kappa^\beta]$

Simultaneous reading: $k^\tau{}_2 w_2 e_1 = \vartheta_{w2}\ e_1$

i-reality $^\top w_0$:
- • — $^\top e_0$: e_0-agt speak up
- | — $t_0 = \vartheta_{w0}\ e_0$
- || — t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
- • — e_1: $^\top a_1$ (= john) says p_1 (= Dom $^\top k^\tau{}_2$)
- || — $^\top t_{12} = \vartheta_{w0}\ \text{RES}_{w0}\ e_1$

~~~~~~

$w_2 \in \text{Dom}\ ^\top k^\tau{}_2 - \text{Dom}\ ^f\underline{ee}_2$ — (e_1-report worlds where $\underline{ee}_2$ fails to be completed)
- | — $^\top k^\tau{}_2 w_2 e_1 = \vartheta_{w2}\ e_1$ (e_1-reported now)
- • — $^1\underline{ee}_2 w_2$: $^\top a_2$ begins prep's to get $k^\alpha{}_2$-married
- – — $\underline{s}_2 w_2 = \text{RES}_{w2}\ ^1\underline{ee}_2 w_2$: $\underline{ee}_2$-prep's in progress, since $w_2 \notin \text{Dom}\ ^f\underline{ee}_2$, no $k^\alpha{}_2$-mrr takes place

~~~~~~

$w_3 \in \text{Dom}\ ^\top k^\tau{}_2 \cap \text{Dom}\ ^f\underline{ee}_2$ — (e_1-report worlds where $\underline{ee}_2$ is completed)
- | — $^\top k^\tau{}_2 w_3 e_1 = \vartheta_{w3}\ e_1$ (e_1-reported now)
- • — $^1\underline{ee}_2 w_2$: $^\top a_2$ begins prep's to get $k^\alpha{}_2$-married
- – — $\underline{s}_2 w_3 = \text{RES}_{w3}\ ^1\underline{ee}_2 w_3$: $\underline{ee}_2$-prep's in progress ($\vartheta_{w3}\ \underline{s}_2 w_3 < \vartheta_{w3}\ ^f\underline{ee}_2 w_3$)
- ••• — $\langle ^1\underline{ee}_2 w_3, \ldots, ^f\underline{ee}_2 w_3\rangle$: $^\top a_2$ $\underline{ee}_2$-gets $k^\alpha{}_2$-married (k^α-married a_2, $k^\alpha{}_2 w_3\ ^f\underline{ee}_2 w_3$ comes into existence in $^f\underline{ee}_2 w_3 = \text{BEG}_{w3}\ k^\alpha{}_2 w_3$)

• Relative tenses: No SOT

Polish

i-reality $^{\top}w_0$: • $^{\top}e_0$: e_0-agt speak up
| $t_0 = \vartheta_{w0}\ e_0$
|| $^{\top}t_{11}$: topical e_0-past (i.e. $^{\top}t_{11} < \vartheta_{w0}\ e_0$)

(1_P)a. (John said that…)
John PFV.say-PST.3sm that…

John
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, $d\alpha$)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [**a**| **a** =$_{\mathbf{d}\omega}$ $d\kappa^{\alpha}${**d**ε}];

PFV.say-
[*e p*| *e*: AGT *say*$_{\mathbf{d}\omega}$ *p*];

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| $d\varepsilon \subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES $d\varepsilon$];

-3sm
^{P}[| *3sm*$_{\mathbf{d}\omega,\ \mathbf{d}\varepsilon}$ **d**α]; ^{I}[| AGT $d\varepsilon$ =$_{\mathbf{d}\omega}$ **d**α];

that
[**t**| $d\Omega$ = Dom **t**];

i-reality $^{\top}w_0$: • $^{\top}e_0$: e_0-agt speak up
| $t_0 = \vartheta_{w0}\ e_0$
|| t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
• e_1: $^{\top}a_1$ (= john) says p_1 (= Dom $^{\top}\underline{t}_2$)
|| $^{\top}t_{12} = \vartheta_{w0}\ \mathrm{RES}_{w0}\ e_1$

~~~~~~

$w_1 \in$ Dom $^{\top}\underline{t}_2$ (e_1-report worlds)
~~~~~~

(1_P) a. (…Mary had been sick)
…Mary IPF.be-PST_ε.3sf sick.

Mary
$^{P}[|\ name.of_{\mathbf{d}\omega}(Mary, d\alpha_1)]; [k^\alpha|\ k^\alpha \sim d\alpha_1]; [\mathbf{a}|\ \mathbf{a} =_{\mathbf{d}\omega} d\kappa^\alpha\{\mathbf{d}\varepsilon\}];$

IPF.be-
$[\underline{s}\ k^\alpha|\ \text{EXP}\ \underline{s} = k^\alpha\{\underline{s}\}];$

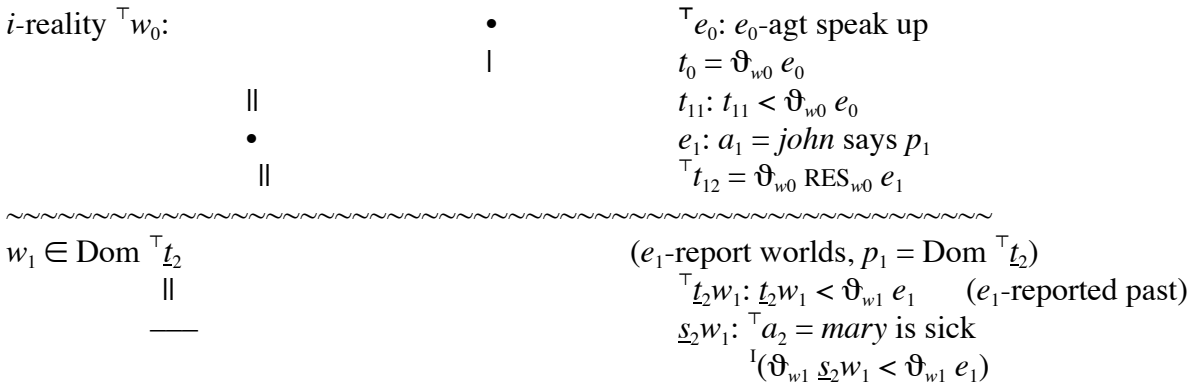
IPF-*state*

-PST_ε
$^{P}[|\ \mathbf{d}\underline{\tau} <_{\mathbf{d}\underline{\tau}} \vartheta d\varepsilon]; [|\ \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\underline{\sigma}];$
$^{I}[|\ d\underline{\sigma} <_{\mathbf{d}\underline{\tau}} d\varepsilon];$

PST_ε for *states*
$^{I}(d\varepsilon$-past *state*)

-3sf
$^{P}[|\ 3sf_{\mathbf{d}\omega,\ \mathbf{d}\varepsilon}\ \mathbf{d}\alpha]; [|\ \text{EXP}\ d\underline{\sigma} =_{\mathbf{d}\underline{\tau}} \mathbf{d}\alpha];$

sick
$[|\ sick\ d\kappa^\alpha]$



(1_P) b. (…Mary was sick.) ***simultaneous*** rdg.
…Mary IPF.be-NPST_ε.3sf sick.

Mary
$^{P}[|\ name.of_{\mathbf{d}\omega}(Mary, d\alpha_1)]; [k^{\alpha}|\ k^{\alpha} \sim d\alpha_1]; [\mathbf{a}|\ \mathbf{a} =_{\mathbf{d}\omega} d\kappa^{\alpha}\{\mathbf{d}\varepsilon\}];$

IPF.be- IPF-*state*
$[\underline{s}\ k^{\alpha}|\ \text{EXP}\ \underline{s} = k^{\alpha}\{\underline{s}\}];$

-NPST_ε
$^{P}[|\ \vartheta d\varepsilon \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]; [|\ \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\underline{\sigma}];$ -NPST_ε for *states*
~~$^{I}[|\ d\underline{\sigma} \prec_{\mathbf{d}\underline{\varepsilon}} d\underline{\varepsilon}];$~~ cancels $^{I}(\ldots)$

-3sf
$^{P}[|\ 3sf_{\mathbf{d}\omega,\ \mathbf{d}\varepsilon}\ \mathbf{d}\alpha]; {}^{I}[|\ \text{EXP}\ d\underline{\sigma} =_{\mathbf{d}\underline{\tau}} \mathbf{d}\alpha];$

sick
$[|\ sick\ d\kappa^{\alpha}]$

i-reality $^{\top}w_0$:
- • $^{\top}e_0$: e_0-agt speak up
- | $t_0 = \vartheta_{w0}\ e_0$
- || t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
- • e_1: a_1 = *john* says p_1
- || $^{\top}t_{12} = \vartheta_{w0}\ \text{RES}_{w0}\ e_1$

~~~~~~

$w_1 \in \text{Dom}\ ^{\top}\underline{t}_2$ (e_1-report worlds, $p_1 = \text{Dom}\ ^{\top}\underline{t}_2$)
- || $^{\top}\underline{t}_2 w_1$: $\vartheta_{w1}\ e_1 \subseteq \underline{t}_2 w_1$ (e_1-reported present)
- —— $\underline{s}_2 w_1$: $^{\top}a_2$ = *mary* is sick
~~~~~~

(2_P)a. (…he wrote a letter.)
…PFV_{na}.write-PST_{ε}.3sm letter.ACC_{sm}.

PFV_{na}. PFV-*end* of *process*
$[\underline{e}\ \underline{ee}|\ \underline{e} = {}^{f}\underline{ee}]$;

.write-
$[k^{\beta}|\ (d\underline{\varepsilon\varepsilon}: \text{AGT}\ \textit{write}), ({}^{f}d\underline{\varepsilon\varepsilon} = \text{BEG}\ k^{\beta})]$;

$-\text{PST}_{\varepsilon}$
${}^{P}[|\ \mathbf{d}\underline{\tau} <_{\mathbf{d}\underline{\tau}} \vartheta d\varepsilon]$; $[|\ d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}|\ \underline{\mathbf{t}} = (\vartheta\text{RES}\ d\underline{\varepsilon}|\ \text{Dom}\ \underline{\mathbf{d}}\tau)]$ PST_{ε} for *events*

-3sm
${}^{P}[|\ 3sm_{\mathbf{d}\omega,\,\mathbf{d}\varepsilon}\ \mathbf{d}\alpha]$; $[|\ \text{AGT}\ d\underline{\varepsilon\varepsilon} =_{\mathbf{d}\underline{\tau}} \mathbf{d}\alpha]$;

letter. $.\text{ACC}_{sm}$
$[|\ \textit{letter}\ d\kappa^{\beta}]$; ${}^{P}[|\ \textit{sg}\ d\kappa^{\beta}]$; $[\underline{b}|\ \underline{b} = d\kappa^{\beta}\{{}^{f}d\underline{\varepsilon\varepsilon}\}]$

i-reality ${}^{\top}w_0$:
- • ${}^{\top}e_0$: e_0-agt speak up
- | $t_0 = \vartheta_{w0}\ e_0$
- || t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
- • e_1: ${}^{\top}a_1$ = john says p_1
- || ${}^{\top}t_{12} = \vartheta_{w0}\ \text{RES}_{w0}\ e_1$

~~~~~~

$w_1 \in \text{Dom}\ {}^{\top}\underline{t}_2$ (e_1-report worlds, $p_1 = \text{Dom}\ {}^{\top}\underline{t}_2$)
- || ${}^{(\top)}\underline{t}_{21}w_1$: $\underline{t}_2w_1 < \vartheta_{w1}\ e_1$ (e_1-reported past)
- ••• $\langle {}^{1}\underline{ee}_2w_1, \ldots {}^{f}\underline{ee}_2w_1\rangle$: ${}^{\top}a_1$ writes $k^{\beta}{}_2$-letter $\underline{b}_2$
- • $\underline{e}_2w_1 = {}^{f}\underline{ee}_2w_1 = \text{BEG}_{w1}\ k^{\beta}{}_2w_1$: end of $\underline{ee}_2$-writing, letter $\underline{b}_2w_1 = k^{\beta}{}_2w_1(\underline{e}_2w_1)$ begins to exist
- || ${}^{\top}\underline{t}_{22}w_1 = \vartheta_{w1}\ \text{RES}_{w1}\ \underline{e}_2w_1$
~~~~~~

(2_P) b. (…he was writing a letter.) ***simultaneous*** rdg.
…IPF.write-NPST_ε.3sm letter.ACC_{sm}.

IPF. IPF-*state* of *process*
$[\underline{s}\ \underline{ee}|\ (\underline{s} = \text{RES}\ {}^1\underline{ee}),\ (\underline{s} <_{\underline{ee}}\ {}^f\underline{ee})]$;

.write-
$[k^\beta|\ (d\underline{\varepsilon\varepsilon}: \text{AGT}\ write),\ ({}^f d\underline{\varepsilon\varepsilon} = \text{BEG}\ k^\beta)]$;

-NPST_ε
${}^P[|\ \vartheta d\varepsilon \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}];\ [|\ \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\underline{\sigma}];$ NPST_ε for *states*

-3sm
${}^P[|\ 3sm_{\mathbf{d}\omega,\ \mathbf{d}\varepsilon}\ \mathbf{d}\alpha];\ [|\ \text{AGT}\ d\underline{\varepsilon\varepsilon} =_{\mathbf{d}\underline{\tau}} \mathbf{d}\alpha];$

letter. $.\text{ACC}_{sm}$
$[|\ letter\ d\kappa^\beta];\ {}^P[|\ sg\ d\kappa^\beta];\ [\underline{b}|\ \underline{b} = d\kappa^\beta\{{}^f d\underline{\varepsilon\varepsilon}\}]$

i-reality ${}^\top w_0$:
- • ${}^\top e_0$: e_0-agt speak up
- | $t_0 = \vartheta_{w0}\ e_0$
- || t_{11}: $t_{11} < \vartheta_{w0}\ e_0$
- • e_1: ${}^\top a_1$ (= john) says p_1 (= Dom ${}^\top \underline{t}_2$)
- || ${}^\top t_{12} = \vartheta_{w0}\ \text{RES}_{w0}\ e_1$

~~~~~~

$w_1 \in \text{Dom}\ {}^\top \underline{t}_2 - \text{Dom}\ {}^f\underline{ee}_2$ (e_1-report worlds where $\underline{ee}_2$ fails to be completed)
- || ${}^\top \underline{t}_{21} w_1$: $\vartheta_{w1}\ e_1 \subseteq \underline{t}_2 w_1$ (e_1-reported present)
- • ${}^1\underline{ee}_2 w_1$: ${}^\top a_1$ begins to write $k^\beta{}_2$-letter $\underline{b}_2$
- – $\underline{s}_2 w_1 = \text{RES}_{w1}\ {}^1\underline{ee}_2 w_1$: $\underline{ee}_2$-writing in progress
  since $w_1 \notin \text{Dom}\ {}^f\underline{ee}_2$, the letter concept $\underline{b}_2 = \langle k^\beta{}_2 w {}^f\underline{ee}_2 w: w \in \text{Dom}\ {}^f\underline{ee}_2\rangle$ fails to be realized

~~~~~~

$w_2 \in \text{Dom}\ {}^\top \underline{t}_2 \cap \text{Dom}\ {}^f\underline{ee}_2$ (e_1-report worlds where $\underline{ee}_2$ is completed)
- || ${}^\top \underline{t}_{21} w_2$: $\vartheta_{w1}\ e_1 \subseteq \underline{t}_2 w_2$ (e_1-reported present)
- • ${}^1\underline{ee}_2 w_2$: ${}^\top a_1$ begins to write $k^\beta{}_2$-letter $\underline{b}_2$
- – $\underline{s}_2 w_2 = \text{RES}_{w2}\ {}^1\underline{ee}_2 w_2$: $\underline{ee}_2$-writing in progress ($\vartheta_{w2}\ \underline{s}_2 w_2 < \vartheta_{w2}\ {}^f\underline{ee}_2 w_2$)
- ••• $\langle {}^1\underline{ee}_2 w_2, \ldots, {}^f\underline{ee}_2 w_2\rangle$: ${}^\top a_1$ writes $k^\beta{}_2$-letter $\underline{b}_2$
  since $w_2 \in \text{Dom}\ {}^f\underline{ee}_2$, the letter concept $\underline{b}_2 = \langle k^\beta{}_2 w {}^f\underline{ee}_2 w: w \in \text{Dom}\ {}^f\underline{ee}_2\rangle$ is realized (in w_2-future of e_1-report & $\underline{s}_2 w_2$-prg state)

(3_P)a. (…that Mary returned.)
…Mary PFV.return-PST_ε-3sf

Mary
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Mary*, $d\alpha_1$)]; [k^α| $k^\alpha \sim d\alpha_1$]; [**a**| **a** =$_{\mathbf{d}\omega}$ $d\kappa^\alpha${**d**ε}];

PFV.return- PFV-*event*
^{P}[| ($d\underline{\varepsilon\varepsilon}$: AGT *travel*), ($^1d\underline{\varepsilon\varepsilon} \subseteq d\pi$), ($^f d\underline{\varepsilon\varepsilon} \subseteq d\pi$)];
[$\underline{e}$| $\underline{e} = {}^f d\underline{\varepsilon\varepsilon}$];

-PST_ε PST_ε for *events*
^{P}[| **d**$\underline{\tau}$ <$_{\mathbf{d}\underline{\tau}}$ $\vartheta d\varepsilon$]; [| $d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}}$ **d**$\underline{\tau}$]; [**t**| **t** = (ϑRES $d\varepsilon$| Dom **d**$\underline{\tau}$)]

-3sf
^{P}[| *3sf*$_{\mathbf{d}\omega,\,\mathbf{d}\varepsilon}$ **d**α]; [| AGT $d\underline{\varepsilon}$ =$_{\mathbf{d}\underline{\tau}}$ **d**α];

i-reality $^\top w_0$: • $^\top e_0$: e_0-agt speak up
| $t_0 = \vartheta_{w0}\, e_0$
|| t_{11}: $t_{11} < \vartheta_{w0}\, e_0$
• e_1: $^\top a_1$ = john says p_1
|| $^\top t_{12} = \vartheta_{w0}$ RES$_{w0}$ e_1

~~~~~~

$w_1 \in$ Dom $^\top \underline{t}_2$ (e_1-report worlds, p_1 = Dom $^\top \underline{t}_2$)
|| $^{(\top)}\underline{t}_{21} w_1$: $\underline{t}_2 w_1 < \vartheta_{w1}\, e_1$ (e_1-reported past)
••• $\langle {}^1\underline{ee}_2 w_1, \ldots {}^f\underline{ee}_2 w_1\rangle$: Mary goes away & bck to l_1
• $\underline{e}_2 w_1 = {}^f\underline{ee}_2 w_1$: end of $\underline{ee}_2$-round.trip
~~~~~~

(3_P)b. (…that Mary would return.)
…Mary PFV.return-NPST_ε-3sf

Mary
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Mary*, $d\alpha_1$)]; [k^α| $k^\alpha \sim d\alpha_1$]; [**a**| **a** =$_{\mathbf{d}\omega}$ $d\kappa^\alpha${**d**ε}];

PFV.return- PFV-*event*
^{P}[| ($d\underline{\varepsilon\varepsilon}$: AGT *travel*), ($^{1}d\underline{\varepsilon\varepsilon} \subseteq d\pi$), ($^{f}d\underline{\varepsilon\varepsilon} \subseteq d\pi$)];
[$\underline{e}$| $\underline{e} = {}^{f}d\underline{\varepsilon\varepsilon}$];

-NPST_ε NPST_ε for *events*
^{P}[| $\vartheta d\varepsilon <_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}$]; [| $d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}$]; [$\underline{\mathbf{t}}$| $\underline{\mathbf{t}}$ = (ϑRES $d\underline{\varepsilon}$| Dom $\mathbf{d}\underline{\tau}$)]

-3sf
^{P}[| *3sf*$_{\mathbf{d}\omega,\,\mathbf{d}\varepsilon}$ **d**α]; [| AGT $d\underline{\varepsilon} =_{\mathbf{d}\underline{\tau}}$ **d**α];

i-reality $^{\top}w_0$: • $^{\top}e_0$: e_0-agt speak up
| $t_0 = \vartheta_{w0}\, e_0$
|| t_{11}: $t_{11} < \vartheta_{w0}\, e_0$
• e_1: $^{\top}a_1$ = john says p_1
|| $^{\top}t_{12} = \vartheta_{w0}\, \text{RES}_{w0}\, e_1$

~~~~~~

$w_1 \in$ Dom $^{\top}\underline{t}_2$ (e_1-report worlds, p_1 = Dom $^{\top}\underline{t}_2$)
|| $^{(\top)}\underline{t}_{21}w_1$: $\vartheta_{w1}\, e_1 < \underline{t}_2 w_1$ (e_1-reported future)
… •• $\langle {}^{1}\underline{ee}_2 w_1, \ldots {}^{f}\underline{ee}_2 w_1\rangle$: Mary goes away & bck to l_1
• $\underline{e}_2 w_1 = {}^{f}\underline{ee}_2 w_1$: end of $\underline{ee}_2$-round.trip
~~~~~~

Japanese (nominal anaphora a la Manna 2006 ms)

(1_J) a. John said that Mary had been sick.

John TOP
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, *d*α)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [$\mathbf{k}^{\alpha}$| $\mathbf{k}^{\alpha} = d\kappa^{\alpha}$]

Mary NOM
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Mary*, *d*α_1)]; [k^{α}| $k^{\alpha} \sim d\alpha_1$]; [**a**| **a** =$_{\mathbf{d}\omega}$ $d\kappa^{\alpha}${**d**ε}];

be.sick- *state*
[$\underline{s}$| $\underline{s}$: EXP *sick*]; ^{I}[| EXP $d\underline{\sigma}$ = **d**α];

-PST$_{\varepsilon}$ -PST$_{\varepsilon}$
[$\underline{\mathbf{t}}$ e| $\underline{\mathbf{t}} < \vartheta e$]; [| **d**$\underline{\tau}$ $\subseteq_{\mathbf{d}\underline{\tau}}$ $d\underline{\sigma}$]; ^{I}[| $d\underline{\sigma} <_{\mathbf{d}\underline{\tau}} d\varepsilon$];]$_{d\varepsilon}$-implicature

…that
[p| p = Dom **d**$\underline{\tau}$]

say-
[| $d\varepsilon$: AGT *say*$_{\mathbf{d}\omega}$ $d\Omega$]; ^{I}[| AGT $d\varepsilon$ =$_{\mathbf{d}\omega}$ **d**κ^{α}{$d\varepsilon$}]

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| $d\varepsilon \subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES $d\varepsilon$]

(1_J) b. John said that Hanako was in Seattle.

John TOP
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, *d*α)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [$\mathbf{k}^{\alpha}$| $\mathbf{k}^{\alpha} = d\kappa^{\alpha}$]

Hanako NOM
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Hanako*, *d*α_1)]; [k^{α}| $k^{\alpha} \sim d\alpha_1$]; [**a**| **a** =$_{\mathbf{d}\omega}$ $d\kappa^{\alpha}${**d**ε}];

Seattle OBL
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Seattle*, *d*π)]; [k^{α}| $k^{\alpha} \sim d\pi$]; [**l** $\underline{s}$| $\underline{s} \subseteq$ **l** $\subseteq_{\mathbf{d}\omega}$ $d\kappa^{\alpha}${**d**ε}];

be- *state*
[| EXP $d\underline{\sigma}$ = **d**α];

-NPST$_{\varepsilon}$ -NPST$_{\varepsilon}$ for *states*
[$\underline{\mathbf{t}}$ e| $\vartheta e \subseteq \underline{\mathbf{t}}$]; [| **d**$\underline{\tau}$ $\subseteq_{\mathbf{d}\underline{\tau}}$ $d\underline{\sigma}$];

…that
[p| p = Dom **d**τ]

say-
[| $d\varepsilon$: AGT *say*$_{\mathbf{d}\omega}$ $d\Omega$]; ^{I}[| AGT $d\varepsilon$ =$_{\mathbf{d}\omega}$ **d**κ^{α}{$d\varepsilon$}]

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| $d\varepsilon \subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES $d\varepsilon$];

(2_J) a. John said that he had read the book.

John TOP
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, *d*α)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [$\mathbf{k}^{\alpha}$| $\mathbf{k}^{\alpha} = d\kappa^{\alpha}$]

book ACC
[| *book* *d*κ^{β}]; [| *d*β =$_{\mathbf{d}\omega}$ *d*κ^{β}{**d**ε}]

read- *process*
[*ee* k^{β}| *ee*: AGT *read* k^{β}];
^{I}[| AGT *d*$\varepsilon\varepsilon$ = **d**κ{*d*$\varepsilon\varepsilon$}]; ^{I}[| $\cup_{d\varepsilon\varepsilon}$ *d*κ^{β}{ε} = *d*β];

-PST$_{\varepsilon}$ -PST$_{\varepsilon}$
[**t** *e*| **t** < ϑe]; [| $^{1}d\varepsilon\varepsilon \subseteq_{\mathbf{d}\tau}$ **d**τ]; [**t**| **t** = (ϑRES $^{1}d\varepsilon\varepsilon$| Dom **d**$\tau$)]
^{I}[| $^{f}d\varepsilon\varepsilon \subseteq_{\mathbf{d}\tau}$ **d**τ]; ^{I}(complete)

…that
[*p*| *p* = Dom **d**τ]

say-
[| *d*ε: AGT *say*$_{\mathbf{d}\omega}$ *d*Ω]; ^{I}[| AGT *d*ε =$_{\mathbf{d}\omega}$ **d**κ^{α}{*d*ε}]

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*$\varepsilon \subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES *d*ε]

(2_J) b. John said that he was reading a book.

John TOP
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, *d*α)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [$\mathbf{k}^{\alpha}$| $\mathbf{k}^{\alpha} = d\kappa^{\alpha}$]

book ACC
[| *book* *d*κ^{β}]; [| *d*β =$_{\mathbf{d}\omega}$ *d*κ^{β}{**d**ε}]

read- *process*
[*ee* k^{β}| *ee*: AGT *read* k^{β}];
^{I}[| AGT *d*$\varepsilon\varepsilon$ = **d**κ{*d*$\varepsilon\varepsilon$}]; ^{I}[| $\cup_{d\varepsilon\varepsilon}$ *d*κ^{β}{ε} = *d*β];

-RES (= Gennari 'PRG')
[*s*| *s* = RES $^{1}d\varepsilon\varepsilon$]; ^{I}[| *d*$\sigma$ <$_{fd\varepsilon\varepsilon}$ $^{f}d\varepsilon\varepsilon$] ^{I}(in progress)

be- *state*
[| EXP *d*σ = **d**α];

-NPST$_{\varepsilon}$ -NPST$_{\varepsilon}$ for *states*
[**t** *e*| $\vartheta e \subseteq$ **t**]; [| **d**$\tau \subseteq_{\mathbf{d}\tau}$ *d*σ];

…that
[*p*| *p* = Dom **d**τ]

say-
[| *d*ε: AGT *say*$_{\mathbf{d}\omega}$ *d*Ω]; ^{I}[| AGT *d*ε =$_{\mathbf{d}\omega}$ **d**κ^{α}{*d*ε}]

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*$\varepsilon \subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES *d*ε];

(2_J)b′. John said that Mary had come.

John TOP
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, *d*α)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [$\mathbf{k}^{\alpha}$| $\mathbf{k}^{\alpha} = d\kappa^{\alpha}$]

Mary NOM
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Mary*, *d*α_1)]; [k^{α}| $k^{\alpha} \sim d\alpha_1$]; [**a**| **a** =$_{\mathbf{d}\omega}$ *d*κ^{α}{**d**ε}];

come- *event*
^{P}[| *d*$\underline{\varepsilon\varepsilon}$: AGT *travel*]; [$\underline{e}$| $\underline{e} = {}^{f}d\underline{\varepsilon\varepsilon}$];
^{I}[| AGT *d*$\underline{\varepsilon}$ = **d**α];

-RES (= SG ‘PRG’)
[$\underline{s}$| $\underline{s}$ = RES *d*$\underline{\varepsilon}$]; result

be- *state*
[| EXP *d*$\underline{\sigma}$ = **d**α];

-NPST$_{\varepsilon}$ -NPST$_{\varepsilon}$ for *states*
[$\underline{\mathbf{t}}$ *e*| $\vartheta e \subseteq \underline{\mathbf{t}}$]; [| **d**$\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}}$ *d*$\underline{\sigma}$];

…that
[*p*| *p* = Dom **d**τ]

say-
[| *d*ε: AGT *say*$_{\mathbf{d}\omega}$ *d*Ω]; ^{I}[| AGT *d*ε =$_{\mathbf{d}\omega}$ **d**κ^{α}{*d*ε}]

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*$\varepsilon \subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES *d*ε]

(3_J)a. John said that Mary died.

John TOP
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, *d*α)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [$\mathbf{k}^{\alpha}$| $\mathbf{k}^{\alpha} = d\kappa^{\alpha}$]

Mary NOM
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Mary*, *d*α_1)]; [k^{α}| $k^{\alpha} \sim d\alpha_1$]; [**a**| **a** $=_{\mathbf{d}\omega}$ $d\kappa^{\alpha}${**d**ε}];

die- *event*
[*e*| *e*: EXP *die*];
^{I}[| EXP *d*$\underline{\varepsilon}$ = **d**α];

-PST$_{\varepsilon}$ -PST$_{\varepsilon}$
[**t** *e*| **t** < ϑe]; [| *d*$\underline{\varepsilon}$ $\subseteq_{\mathbf{d}\underline{\tau}}$ **d**$\underline{\tau}$]; [**t**| **t** = (ϑRES *d*$\underline{\varepsilon}$| Dom **d**$\underline{\tau}$)];

…that
[*p*| *p* = Dom **d**τ]

say-
[| *d*ε: AGT *say*$_{\mathbf{d}\omega}$ *d*Ω]; ^{I}[| AGT *d*ε $=_{\mathbf{d}\omega}$ **d**κ^{α}{*d*ε}]

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*ε $\subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** $=_{\mathbf{d}\omega}$ ϑRES *d*ε]

(3_J)b. John said that Hanako would come to work.

John TOP
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*John*, *d*α)]; [k^{α}| $k^{\alpha} \sim d\alpha$]; [$\mathbf{k}^{\alpha}$| $\mathbf{k}^{\alpha} = d\kappa^{\alpha}$]

Hanako NOM
^{P}[| *name.of*$_{\mathbf{d}\omega}$(*Hanako*, *d*α_1)]; [k^{α}| $k^{\alpha} \sim d\alpha_1$]; [**a**| **a** $=_{\mathbf{d}\omega}$ $d\kappa^{\alpha}${**d**ε}];

work OBL
[k^{α} *ee*| (*ee*: AGT *work*), (k^{α} = AGT *ee*)]; [*e*| *e* = BEG $d\kappa^{\alpha}$]

come- *event*
[*e* *ee*| (*ee*: AGT *travel*), (*e* = ^{f}*ee*), (*d*$\underline{\varepsilon}$ $\subseteq$ ϑ*e*)];
^{I}[| AGT *d*$\underline{\varepsilon}$ = **d**α];

-PST$_{\varepsilon}$ -NPST$_{\varepsilon}$ for *events*
[**t** *e*| ϑe < **t**]; [| *d*$\underline{\varepsilon}$ $\subseteq_{\mathbf{d}\underline{\tau}}$ **d**$\underline{\tau}$]; [**t**| **t** = (ϑRES *d*$\underline{\varepsilon}$| Dom **d**$\underline{\tau}$)];

…that
[*p*| *p* = Dom **d**τ]

say-
[| *d*ε: AGT *say*$_{\mathbf{d}\omega}$ *d*Ω]; ^{I}[| AGT *d*ε $=_{\mathbf{d}\omega}$ **d**κ^{α}{*d*ε}]

-PST
^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*ε $\subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** $=_{\mathbf{d}\omega}$ ϑRES *d*ε];

APPENDIX: BASIC MEANINGS FOR OU

- ***English*** (v. 3)

Form	*MB* gloss	Basic meaning
V-stem:		
think$_{\sigma}$		[*s p*| *s*: EXP *believe*$_{\mathbf{d}\omega}$ *p*]; [| EXP *d*σ =$_{\mathbf{d}\omega}$ **d**α]
say		[*e p*| *e*: AGT *say*$_{\mathbf{d}\omega}$ *p*]; [| AGT *d*ε =$_{\mathbf{d}\omega}$ **d**α]
hear		[*e p*| (*e*: AGT *say*$_{\mathbf{d}\omega}$ *p*), (EXP *e* =$_{\mathbf{d}\omega}$ EXP RES *e*)]; [| EXP *d*ε =$_{\mathbf{d}\omega}$ **d**α] ^{I}; [| RES *d*ε: EXP *believe*$_{\mathbf{d}\omega}$ *d*Ω]
Complementizer		
that		[**k**$^{\tau}$| *d*Ω = Dom **k**$^{\tau}$]
Indexical tense system:		
• **d**ε-past (matrix)		
-ed, …	-PST	^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*ε $\subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES *d*ε]
		^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| ^{1}*d*$\varepsilon\varepsilon$ $\subseteq_{\mathbf{d}\omega}$ **d**τ]; [**t**| **t** =$_{\mathbf{d}\omega}$ ϑRES ^{1}*d*$\varepsilon\varepsilon$]
		^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| **d**τ $\subseteq_{\mathbf{d}\omega}$ *d*σ];
		^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| **d**τ $\subseteq_{\mathbf{d}\omega}$ *d*η];
• **d**ε-present (matrix)		
-s …	-PRS	^{P}[| $\vartheta_{\mathbf{d}\omega}$ **d**ε $\subseteq$ **d**τ]; [| **d**τ $\subseteq_{\mathbf{d}\omega}$ *d*σ]
		^{P}[| **d**τ < $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| **d**τ $\subseteq_{\mathbf{d}\omega}$ *d*η]
• **d**ε-future (matrix), e.g.		
will	FUT	^{P}[| $\vartheta_{\mathbf{d}\omega}$**d**$\varepsilon$ < **d**$\underline{\tau}$]; [$\underline{e}$| $\underline{e}$ $\subseteq_{\mathbf{d}\underline{\tau}}$ **d**$\underline{\tau}$]; [$\underline{\mathbf{t}}$| $\underline{\mathbf{t}}$ = (ϑRES *d*$\underline{\varepsilon}$| Dom **d**$\underline{\tau}$)]
• (**d**ε, *d*ε)-past (embedded), e.g.		
-ed$_{\kappa}$	-PST$_{\kappa}$	^{P}[| **d**κ^{τ}{*d*ε} $\leq_{\mathbf{d}\kappa}$ ϑ*d*ε <$_{\mathbf{d}\kappa}$ $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*$\underline{\varepsilon}$ $\subseteq_{\mathbf{d}\kappa}$ **d**κ^{τ}{*d*ε}]; [**k**$^{\tau}$| **k**$^{\tau}${*d*ε} = (ϑRES *d*$\underline{\varepsilon}$| Dom **d**κ^{τ})]
• (**d**ε, *d*ε)-present (embedded), e.g.		
-s$_{\kappa}$	-PRS$_{\kappa}$	^{P}[| ϑ*d*ε $\subseteq_{\mathbf{d}\kappa}$ **d**κ^{τ}{*d*ε}, $\vartheta_{\mathbf{d}\omega}$ **d**ε $\subseteq_{\mathbf{d}\kappa}$ **d**κ^{τ}{*d*ε}]; [| **d**κ^{τ}{*d*ε} $\subseteq_{\mathbf{d}\kappa}$ *d*$\underline{\sigma}$];
• (**d**ε, *d*ε)-future (embedded), e.g.		
would	FUT$_{\kappa}$	^{P}[| ϑ*d*ε <$_{\mathbf{d}\kappa}$ **d**κ^{τ}{*d*ε}, ϑ*d*ε <$_{\mathbf{d}\kappa}$ $\vartheta_{\mathbf{d}\omega}$ **d**ε]; [| *d*$\underline{\varepsilon}$ $\subseteq_{\mathbf{d}\kappa}$ **d**κ^{τ}{*d*ε}] [**k**$^{\tau}$| **k**$^{\tau}${*d*ε} = (ϑRES *d*$\underline{\varepsilon}$| Dom **d**κ^{τ})]
Aspect system, e.g.:		
• past perfect		
have-	have$_{\varepsilon\varepsilon}$-	[$\underline{ee}$| *process* $\underline{ee}$, ($^{f}\underline{ee}$ =$_{\mathbf{d}\underline{\kappa}}$ *d*ε), (EXP $^{1}\underline{ee}$ =$_{\mathbf{d}\underline{\kappa}}$ **d**α)]
-en, …	-PPF	[| *end*{^{1}*d*$\underline{\varepsilon\varepsilon}$, *d*$\sigma$}]
• perfect		
have-	have$_{\sigma}$-	[*s*| EXP *s* =$_{\mathbf{d}\omega}$ **d**α]
-en, …	-PRF	[| *d*σ =$_{\mathbf{d}\omega}$ RES *d*ε]; ([**t**| **t** =$_{\mathbf{d}\omega}$ ϑ*d*σ]$_{if}$)
• progressive		
be	be-	[*s*| EXP *s* =$_{\mathbf{d}\omega}$ **d**α]
-ing	-PRG	[| *d*σ =$_{\mathbf{d}\omega}$ RES ^{1}*d*$\underline{\varepsilon\varepsilon}$]; ([**t**| **t** =$_{\mathbf{d}\omega}$ ϑ*d*σ]$_{if}$)

- ***Polish*** (v. 2)

MB gloss (stands for)	Basic meaning(s)
V-stem:	
IPF.think-	$[s\ p\vert\ s$: EXP $believe_{\mathbf{d}\omega}\ p]$; $[h^{\varepsilon}\ k^{\Omega}\vert\ h^{\varepsilon}$: AGT $think_{\mathbf{d}\omega}\ k^{\Omega}]$;
{PFV, PFV′, …}.think-	$\{[e\ p\vert\ e$: AGT $think_{\mathbf{d}\omega}\ p]$, $[e\ p\vert\ e$: AGT $think.up_{\mathbf{d}\omega}\ p]$, …$\}$ $\{[ee\ k^{\Omega}\vert\ ee$: AGT $think_{\mathbf{d}\omega}\ k^{\Omega}]$, $[ee\ k^{\Omega}\vert\ ee$: AGT $think.up_{\mathbf{d}\omega}\ k^{\Omega}]$, …$\}$
IPF.say-	$[s\ \underline{ee}\vert\ (\underline{ee}$: AGT $say_{\mathbf{d}\omega}\ d\kappa^{\Omega})$, $(s =_{\mathbf{d}\omega}$ RES $^{1}\underline{ee})]$ $[h^{\varepsilon}\ k^{\Omega}\vert\ h^{\varepsilon}$: AGT $say_{\mathbf{d}\omega}\ k^{\Omega}]$;
{PFV, PFV′, …}..say-	$\{[e\ p\vert\ e$: AGT $say_{\mathbf{d}\omega}\ p]$; $[e\vert\ e$: AGT $give.speech_{\mathbf{d}\omega}]$, …$\}$ $\{[ee\ k^{\Omega}\vert\ ee$: AGT $say_{\mathbf{d}\omega}\ k^{\Omega}]$, $[ee\vert\ ee$: AGT $give.speech_{\mathbf{d}\omega}]$,…$\}$
Complementizer	
that	$[\underline{\mathbf{t}}\vert$ Dom $\underline{\mathbf{t}} = d\Omega]$

Indexical matrix tense system:

• **d**ε-past

-PST	$^{p}[\vert\ \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\vert\ d\varepsilon \subseteq_{\mathbf{d}\omega} \mathbf{d}\tau]$; $[\mathbf{t}\vert\ \mathbf{t} =_{\mathbf{d}\omega} \vartheta$RES $d\varepsilon]$
	$^{p}[\vert\ \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\vert\ ^{1}d\varepsilon\varepsilon \subseteq_{\mathbf{d}\omega} \mathbf{d}\tau]$; $[\mathbf{t}\vert\ \mathbf{t} =_{\mathbf{d}\omega} \vartheta$RES $^{1}d\varepsilon\varepsilon]$
	$^{p}[\vert\ \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\vert\ \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\sigma]$;
	$^{p}[\vert\ \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\vert\ \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\eta]$;

• **d**ε-nonpast

-NPST	$^{p}[\vert\ \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon < \mathbf{d}\underline{\tau}]$; $[\vert\ d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\vert\ \underline{\mathbf{t}} = (\vartheta$RES $d\underline{\varepsilon}\vert$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\vert\ \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon < \mathbf{d}\underline{\tau}]$; $[\vert\ d\underline{\varepsilon\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\vert\ \underline{\mathbf{t}} = (\vartheta$RES $^{1}d\underline{\varepsilon\varepsilon}\vert$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\vert\ \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon \subseteq \mathbf{d}\tau]$; $[\vert\ \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\sigma]$;
	$^{p}[\vert\ \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon \subseteq \mathbf{d}\tau]$; $[\vert\ \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\eta]$;

Se-relative embedded tense system (SVO order)

• *se*'s past

-PST$_{se}$	$^{p}[\vert\ \mathbf{d}\underline{\tau} <_{\mathbf{d}\underline{\tau}} \vartheta d\varepsilon]$; $[\vert\ d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\vert\ \underline{\mathbf{t}} = (\vartheta$RES $d\underline{\varepsilon}\vert$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\vert\ \mathbf{d}\underline{\tau} <_{\mathbf{d}\underline{\tau}} \vartheta d\varepsilon]$; $[\vert\ ^{1}d\underline{\varepsilon\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\vert\ \underline{\mathbf{t}} = (\vartheta$RES $^{1}d\underline{\varepsilon\varepsilon}\vert$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\vert\ \mathbf{d}\underline{\tau} <_{\mathbf{d}\underline{\tau}} \vartheta d\varepsilon]$; $[\vert\ \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\sigma]$;
	$^{p}[\vert\ \mathbf{d}\underline{\tau} <_{\mathbf{d}\underline{\tau}} \vartheta d\varepsilon]$; $[\vert\ \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\eta]$;

• *se*'s nonpast

-NPST$_{se}$	$^{p}[\vert\ \vartheta d\varepsilon <_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\vert\ d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\vert\ \underline{\mathbf{t}} = (\vartheta$RES $d\underline{\varepsilon}\vert$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\vert\ \vartheta d\varepsilon <_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\vert\ d\underline{\varepsilon\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\vert\ \underline{\mathbf{t}} = (\vartheta$RES $^{1}d\underline{\varepsilon\varepsilon}\vert$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\vert\ \vartheta d\varepsilon \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\vert\ \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\sigma]$;
	$^{p}[\vert\ \vartheta d\varepsilon \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\vert\ \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\eta]$;

Case & Agreement system, e.g.:

NOM	$[\mathbf{a}\vert\ \mathbf{a} =_{\mathbf{d}\omega} d\kappa^{\alpha}\{d\varepsilon\}]$
ACC	$[a\vert\ a =_{\mathbf{d}\omega} d\kappa^{\alpha}\{d\varepsilon\}]$
-pm	$^{p}[\vert\ pm_{\mathbf{d}\omega}\ \mathbf{d}\alpha]$; $[\vert$ AGT $d\varepsilon =_{\mathbf{d}\omega} \mathbf{d}\alpha]$
=1p	$^{p}[\vert\ 1p_{\mathbf{d}\omega}\ \mathbf{d}\alpha]$;

- ***Japanese*** (v. 1, θ-role assignment a la Manna 2006 ms)

MB gloss (stands for)	Basic meaning(s)
V-stem:	
believe-	$[\mid d\sigma$: EXP *believe*$_{\mathbf{d}\omega}$ $d\Omega]$; $[\mid$ EXP $d\sigma =_{\mathbf{d}\omega} \mathbf{d}\alpha]$
say-	$[\mid d\varepsilon$: AGT *say*$_{\mathbf{d}\omega}$ $d\Omega]$; $[\mid$ AGT $d\varepsilon =_{\mathbf{d}\omega} \mathbf{d}\alpha]$
Complementizer	
that	$[p\mid p =$ Dom $\mathbf{d}\underline{\tau}$
Indexical matrix tense system:	
• **d**ε-past	
-PST	$^{p}[\mid \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\mid d\varepsilon \subseteq_{\mathbf{d}\omega} \mathbf{d}\tau]$; $[\mathbf{t}\mid \mathbf{t} =_{\mathbf{d}\omega} \vartheta$RES $d\varepsilon]$
	$^{p}[\mid \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\mid {}^{1}d\varepsilon\varepsilon \subseteq_{\mathbf{d}\omega} \mathbf{d}\tau]$; $[\mathbf{t}\mid \mathbf{t} =_{\mathbf{d}\omega} \vartheta$RES $^{1}d\varepsilon\varepsilon]$
	$^{p}[\mid \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\mid \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\sigma]$;
	$^{p}[\mid \mathbf{d}\tau < \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon]$; $[\mid \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\eta]$;
• **d**ε-nonpast	
-NPST	$^{p}[\mid \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon < \mathbf{d}\underline{\tau}]$; $[\mid d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\mid \underline{\mathbf{t}} = (\vartheta$RES $d\underline{\varepsilon}\mid$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\mid \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon < \mathbf{d}\underline{\tau}]$; $[\mid d\underline{\varepsilon\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\mid \underline{\mathbf{t}} = (\vartheta$RES $^{1}d\underline{\varepsilon\varepsilon}\mid$ Dom $\mathbf{d}\underline{\tau})]$
	$^{p}[\mid \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon \subseteq \mathbf{d}\tau]$; $[\mid \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\sigma]$;
	$^{p}[\mid \vartheta_{\mathbf{d}\omega}\ \mathbf{d}\varepsilon \subseteq \mathbf{d}\tau]$; $[\mid \mathbf{d}\tau \subseteq_{\mathbf{d}\omega} d\eta]$;
Se-relative embedded tense system (SOV order)	
• *se*'s past	
-PST$_{se}$	$[\underline{\mathbf{t}}\ e\mid \underline{\mathbf{t}} < \vartheta e]$; $[\mid d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\mid \underline{\mathbf{t}} = (\vartheta$RES $d\underline{\varepsilon}\mid$ Dom $\mathbf{d}\underline{\tau})]$
	$[\underline{\mathbf{t}}\ e\mid \underline{\mathbf{t}} < \vartheta e]$; $[\mid {}^{1}d\underline{\varepsilon\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\mid \underline{\mathbf{t}} = (\vartheta$RES $^{1}d\underline{\varepsilon\varepsilon}\mid$ Dom $\mathbf{d}\underline{\tau})]$
	$[\underline{\mathbf{t}}\ e\mid \underline{\mathbf{t}} < \vartheta e]$; $[\mid \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\sigma]$;
	$[\underline{\mathbf{t}}\ e\mid \underline{\mathbf{t}} < \vartheta e]$; $[\mid \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\eta]$;
• *se*'s nonpast	
-NPST$_{se}$	$[\underline{\mathbf{t}}\ e\mid \vartheta e < \underline{\mathbf{t}}]$; $[\mid d\underline{\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\mid \underline{\mathbf{t}} = (\vartheta$RES $d\underline{\varepsilon}\mid$ Dom $\mathbf{d}\underline{\tau})]$
	$[\underline{\mathbf{t}}\ e\mid \vartheta e < \underline{\mathbf{t}}]$; $[\mid d\underline{\varepsilon\varepsilon} \subseteq_{\mathbf{d}\underline{\tau}} \mathbf{d}\underline{\tau}]$; $[\underline{\mathbf{t}}\mid \underline{\mathbf{t}} = (\vartheta$RES $^{1}d\underline{\varepsilon\varepsilon}\mid$ Dom $\mathbf{d}\underline{\tau})]$
	$[\underline{\mathbf{t}}\ e\mid \vartheta e \subseteq \underline{\mathbf{t}}]$; $[\mid \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\sigma]$;
	$[\underline{\mathbf{t}}\ e\mid \vartheta e \subseteq \underline{\mathbf{t}}]$; $[\mid \mathbf{d}\underline{\tau} \subseteq_{\mathbf{d}\underline{\tau}} d\eta]$;
Aspect system, e.g.	
• resultative ('perfect'/'progressive')	
-RES	$[s\mid s =_{\mathbf{d}\omega}$ RES $d\varepsilon]$
	$[\underline{s}\mid \underline{s} =_{\mathbf{d}\omega}$ RES $^{1}d\underline{\varepsilon\varepsilon}]$
Case & Agreement system, e.g.:	
NOM	$[\mathbf{a}\mid \mathbf{a} =_{\mathbf{d}\omega} d\kappa^{\alpha}\{d\varepsilon\}]$
ACC	$[a\mid a =_{\mathbf{d}\omega} d\kappa^{\alpha}\{d\varepsilon\}]$