Aspect as eventuality centering: Mandarin

MARIA BITTNER

Abstract

Unlike English and Polish, Mandarin has no *grammatical tense* (TNS). Therefore, reference times are only introduced by temporal modifiers (contra Smith 1991/7, Wu 2003, Lin 2005, etc). In Mandarin discourse, the frequency of such modifiers ('today', 'last night', etc) is about the same (low) as in tensed languages (e.g. English, Polish) and plays a similarly marginal role in temporal discourse reference.

   This, however, does NOT mean that in tenseless Mandarin temporal relations between eventualities in discourse are in any way less precise than in tensed languages. Rather, the issue is HOW temporal relations are established: *indirectly*, via reference times (e.g. '$\vartheta e \sqsubseteq t \sqsubseteq \vartheta s$'), or *directly*, without mediating reference times (e.g. '$\vartheta e \sqsubseteq \vartheta s$', hereafter abbreviated to '$e \sqsubseteq_\vartheta s$'). Tensed English and Polish typically first introduce a *topic time* (by topic-setting TNS, e.g. $\mathrm{PST}^{\top t}$) and then locate verbal eventualities in relation to this temporal topic (by anaphoric TNS, e.g. $\mathrm{PST}_{\top \tau}$). In contrast, tenseless Mandarin typically first introduces a *topic state* (by topic-setting preverbal update) and then relates verbal eventualities directly to this aspectual topic (by anaphoric ASP-features, e.g. $\mathrm{E}_{\top \sigma}$/).

   Thus, Mandarin establishes temporal relations between eventualities in discourse directly, without any mediating reference times. Moreover, it treats temporal relations as just one facet of an integrated complex of possible relations that can relate eventualities to each other and to discourse referents of other types. In addition to temporal relations (e.g. $e \sqsubseteq_\vartheta s$), this complex also includes mereological part-whole relations (e.g. $^\triangledown e \sqsubseteq_i s$), cause-enable relations (e.g. $^\triangleright e =_i s$), phase relations (e.g. $e =_i {}^\blacktriangleleft s$ or $e =_i {}^\blacktriangleleft s$), participating individuals (e.g. $\uparrow e =_i x$). Temporal inclusion ($\sqsubseteq_\vartheta$) and precedence ($<$) instantiate just two of the relations that can hold between eventualities in discourse.

   Indeed, reversing the English/Polish pattern, Mandarin often introduces times via *reference eventualities* (e.g. $[t|\ t =_i \vartheta \top \sigma]$ or $[t|\ t =_i \vartheta^\triangleright \bot \varepsilon]$), instead of eventualities via *reference times* (e.g. $[e|\ \vartheta e \sqsubseteq_i \top \tau]$ or $[s|\ \bot \tau \sqsubseteq_i \vartheta s]$).

Outline
1. Centering *TAP*-universals revisited
2. Argument-filling *ASP*-features in Mandarin
3. Push-down *ASP*-inflections in Mandarin
4. *ASP*-based temporality in Mandarin

1 CENTERING *TAP*-UNIVERSALS REVISITED

Figure 1. Centering TAP-universals [Bittner 2012]
(*T*)   Tₙₛ fills, or pushes down, the verb's time argument with a dref anchored to a top-ranked time and/or event ($\top\tau$, $\bot\tau$, $\top\varepsilon$, $\bot\varepsilon$).
(*A*)   Asₚ fills, or pushes down, the verb's eventuality argument with a dref anchored to a top-ranked state and/or event ($\top\sigma$, $\bot\sigma$, $\top\varepsilon$, $\bot\varepsilon$).
(*P*)   Pʀₙ fills the verb's subject or object argument with a dref anchored to a top-ranked individual and/or event ($\top\delta$, $\bot\delta$, $\top\varepsilon$, $\bot\varepsilon$).

• For any language *L* and *TAMP*-category *X*, *L* is *X-prominent*,
  iff *L* has argument-filling *X*-markers or *X*-features

• Eɴɢʟɪsʜ (*T*-prominent)

X	*...u*	arg-filling *X*-infl./aux.	push-down *X*-aux.
T	$\lambda\underline{t}$	PST (*-ed*), PRS (∅), FUT (*will*)	$\text{PRF}_{\top\tau}{}^{t}$ (*had*$_{\top\tau}{}^{t}$ *been*^{s} *here and left yst.*)
A	$[e|$	–	$\text{PRF}_{\bot\varepsilon}{}^{s}$ (*hv*), PRG (*be*), PRE (*be gonna*)
	$[s|$	–	*$\text{PRF}_{\bot\varepsilon}{}^{s}$ (*hv*), *PRG (*be*), PRE (*be gonna*)
P	$\lambda\underline{x}$	–	–
	$\lambda\underline{y}(\lambda\underline{x}$	–	–

• Pᴏʟɪsʜ (*TAP*-prominent)

X	*...u*	arg-filling *X*-features/infl.	push-down *X*-infl.
T	$\lambda\underline{t}$	-PST, -PRS, -FUT	–
A	$\lambda\underline{e}$	v\P, v\I	v\P-PRF, v\I-DUR
	$\lambda\underline{s}$	v\P, v\I	v\P-PRF, v\I-DUR
P	$\lambda\underline{x}$	-1SM, -2PL, -3SF, …	–
	$\lambda y\lambda\underline{x}$	–	–

• Mᴀɴᴅᴀʀɪɴ (*AP*-prominent)

X	*...u*	arg-filling *X*-features	push-down *X*-infl.
T	$\lambda\underline{t}$	–	–
A	$\lambda\underline{e}$	E/v, E^{1}/v	E^{1}/v-PNC, E/v-PNC, E/v-DUR, *E^{1}/v-DUR
	$\lambda\underline{s}$	S/v, S^{1}/v	S^{1}/v-PNC, S/v-PNC, S/v-DUR, S^{1}/v-DUR
P	$\lambda\underline{x}$	$_{\top}$v, $_{\bot}$v	–
	$\lambda\underline{y}(\lambda\underline{x}$	v$_{\top}$, v$_{\bot}$	–

2 ARGUMENT-FILLING ASP-FEATURES IN MANDARIN

Figure 2. Mandarin ASP-*features*

n E/: ***n****-atom event ('action')*
  ^{1}v^e: $^{a)}$*xué* 'study/learn', *măi* 'shop/buy'
  $^{b)}$*zhàn^e* 'stand/stop', *kāi^e* 'open, drive'
  ^{2}v^e-v^e: *gòu-măi* (purchase-buy) 'buy'
  ^{3}v^e-n: *kàn-shū* (read-book) 'read'

  S/: ***n****-degree state ('quality stative')*
  ^{1}v^s: $^{a)}$*hăo* 'good', *xìn* 'believe', *ài* 'love',
  $^{b)}$*lèi* 'tired', *qīng* 'pure', *yŏu* 'have'
  ^{2}v^s-v^s: *qīng-chŭ* (pure-clear) 'clear'
  ^{3}v^s-n: *ài-guó* (love-country) 'patriotic'

1 E^1/: **1**-*atm. evt. ('resultative action')*
  ^{1}v$^{e•}$: $^{a)}$*qù* 'go', *lái* 'come', *chū* 'exit',
  $^{b)}$*sĭ* 'die', *wán* 'finish', *yíng* 'win'
  ^{2}v^e+v^e: *kànkàn* 'take a look, read a bit'
  ^{3}v-v$^{e•}$: *dă-sĭ* (beat-die) 'beat to death'
  ^{4}v$^{e(•)}$-v$^{s(•)}$: *xiě-cuò* 'write-wrong'

  S^1/: **1**-*degree state ('other stative')*
  ^{1}v$^{s•}$: $^{a)}$*zhàn^s* 'stand', *kāi^s* 'be open',
  $^{b)}$*zài* 'be in/on/in.prg', *méiyŏu* 'have no'
  ^{2}v^s+v^s: *qīngqīngchŭchŭ* 'perfectly clear'
  ^{3}v^s-v$^•$: *lèi-sĭ* (tired-die) 'dead tired'
  ^{4}v^e-v$^{s•}$: *zhù-zài* (live-be.in) 'live in'

Figure 3. Diagnostic tests for Mandarin ASP-*features*

	_*n*-M$_e$ '*n* events'	phase-verb	_ degree.modifier _
E/	✓	✓	*
E^1/	✓	*	*
S/	*	*	✓
S^1/	*	*	*

(1) [± *event*]: (in)compatibility with event measure *ci* 'M$_e$'
  a. *Zhèi-ge zì,   Lisi {xiě | xiě.cuò}   sān-**cì** le.*
    this-CL   character Lisi {E/write | E^1/write.wrong} three-M$_e$ PNC
    'This character, Lisi has {written | written wrong} three times.'
  b.**Lisi {hĕn lèi | lèi.sĭ}   sān-**cì** (le).*
    Lisi {POS S/tired | S^1/tired.die} three-M$_e$ (PNC)

(2) [± *multi-stage e*]: (in)compatibility with phase-verbs, e.g. *zài* 'S^1/be.in.prg'
  a. *Lisi **zài**   {xiě | *xiě.cuò}   míngzi.*
    Lisi$^⊤$ S^1/*be.in.prg* {E/write | *E^1/write.wrong} $_⊤$name
    'Lisi$^⊤$ is {writing his$_⊤$ name | INTENDED: writing his$_⊤$ name wrong}.'
  b.**Lisi **zài**   {(hĕn) lèi | lèi.sĭ}.*
    Lisi S^1/*be.in.prg* {(POS) S/tired | S^1/tired.die}

(3) [± *multi-degree s*]: (in)compatibility with degree-modifiers, e.g. *hĕn* 'very'
  a.**Lisi **hĕn** {xiě | xiě.cuò}   míngzi le.*
    Lisi$^⊤$ *very* {E/write | E^1/write.wrong} $_⊤$name   PNC
  b. *Lisi **hĕn** {lèi |*lèi.sĭ}.*
    Lisi *very* {S/tired | S^1/tired.die}
    'Lisi is very {tired | *dead tired}.'

- SERIAL VERB CONSTRUCTIONS (SVC) AS EVENTUALITY ELABORATION
  - ◦ Mandarin '*sentence*' [A, B_1, …, $B_{n\circ}$] translates into $(((A'\ ^\top; B_1')\ ^\top; …)\ ^\top; B_n')$, where A′ introduces a **topical state** ($^\top[s|\ …]$) & B_1', …, B_n' comment (on $\top\sigma$)
  - ◦ In each *clause* B_1', one verb is anchored to the topical state (**main verb**, $\mathbf{v_{\top\sigma}}$)
  - ◦ In *SVC's*, other verbs are elaborate $v_{\top\sigma}$ (**serial verbs**, $\mathbf{v_{\perp\varepsilon}}$ or $\mathbf{v_{\perp\sigma}}$)

(4) When I refused, Lisi …

   Wǒ jù.jué-le   *, Lǐsī …*

   1SG $E_{\top\sigma}$/refuse-PNC

   $([e|\ e =_i {}^{\blacktriangle}\top\sigma, refuse\langle e, {\uparrow}\top\varepsilon\rangle];\ {}^\top[s|\ \perp\varepsilon =_\vartheta {}^{\blacktriangledown}s <_\vartheta \top\varepsilon])\ ^\top; ({}^\top[x|\ x =_i lisi]\ ^\top; …$

   {^{A}knelt dwn to beg me | ^{B}knelt dwn begging me | ^{C}knelt dwn & begged me}

   guì.xiàlai   qiú   wǒ.

   $E^1_{\top\sigma}$/kneel.down $E_{\perp\varepsilon}$/beg 1SG

   ^{A} $([e|\ e =_i {}^{\blacktriangle}\top\sigma, kneel.dwn\langle e, \top\delta\rangle]\ ^\perp; [beg\langle {}^{\blacktriangle\triangleright}\perp\varepsilon, {\uparrow}\perp\varepsilon, {\uparrow}\top\varepsilon\rangle]))$

   ^{B} $([e|\ e =_i {}^{\blacktriangle}\top\sigma, kneel.dwn\langle e, \top\delta\rangle]\ ^\perp; ![e|\ \perp\varepsilon =_i {}^{\blacktriangle\triangledown}e, beg\langle e, {\uparrow}e, {\uparrow}\top\varepsilon\rangle]))$

   ^{C} $([e|\ e =_i {}^{\blacktriangle}\top\sigma, kneel.dwn\langle e, \top\delta\rangle]\ ^\perp; ![e|\ {}^{\triangleright}\perp\varepsilon =_i {}^{\triangledown}e, beg\langle e, {\uparrow}e, {\uparrow}\top\varepsilon\rangle]))$

Model for (4) Topic-setting PNC-clause with SVC-comment

————————→ real time

Dref.		*Symbol*: Description	*Temporal cond.*	*Source*
——		$^\top s_0$: initial topic state		ctx
	●	$^\top e_0$: ${\uparrow}e_0$ speaks to ${\downarrow}e_0$		e_0
●		e_1: ${\uparrow}e_0$ refuses	$e_1 \sqsubseteq_\varepsilon {}^{\blacktriangle}s_0$	$E^1_{\top\sigma}$/
——		$^\top\mathbf{s_1}$: ***Lisi after*** e_1	$\vartheta e_1 = \vartheta {}^{\blacktriangle}s_1 < \vartheta e_0$	E^1/v-PNC
^{A} ●		e_2: Lisi kneels down	$e_2 = {}^{\blacktriangle}s_1$	$E^1_{\top\sigma}$/
(	●	${}^{\blacktriangle\triangleright}e_2$: Lisi begs ${\uparrow}e_0$		$E_{\perp\varepsilon}$/)
^{B} ●		e_2: Lisi kneels down	$e_2 = {}^{\blacktriangle}s_1$	$E^1_{\top\sigma}$/
(	●●●	e'_2: Lisi begs ${\uparrow}e_0$	$e_2 = {}^{\blacktriangle\triangledown}e'_2$	$E_{\perp\varepsilon}$/)
^{C} ●		e_2: Lisi kneels down	$e_2 = {}^{\blacktriangle}s_1$	$E^1_{\top\sigma}$/
(	●●	e'_2: Lisi begs ${\uparrow}e_0$	${}^{\triangleright}e_2 = {}^{\triangledown}e'_2$	$E_{\perp\varepsilon}$/)

(2′) 'Lisi is {a. writing his name | a′. INTENDED: writing his name wrong}.'

   a. Lisi$^\top$ $S^1_{\top\sigma}$/*be.in.prg* $E_{\perp\varepsilon}$/write $_\top$name

        $({}^\top[x|\ x =_i lisi];\ {}^\top[s|\ \top\delta =_i {\uparrow}s, \top\varepsilon \sqsubseteq_\vartheta s])\ ^\top; ([s|\ \top\sigma \sqsubseteq_i s, {\uparrow}\top\sigma =_i {\uparrow}s]\ ^\perp;$

        $![e|\ \perp\sigma =_i {}^{\triangledown}e, write\langle e, {\uparrow}e, {\downarrow}e\rangle, name\langle {\downarrow}e, {\uparrow}e, \vartheta {}^{\blacktriangle\triangledown}e\rangle])$

   a′.*Lisi$^\top$ $S^1_{\top\sigma}$/*be.in.prg* $E^1_{\perp\varepsilon}$/write.wrong $_\top$name

        $({}^\top[x|\ x =_i lisi];\ {}^\top[s|\ \top\delta =_i {\uparrow}s, \top\varepsilon \sqsubseteq_\vartheta s])\ ^\top; ([s|\ \top\sigma \sqsubseteq_i s, {\uparrow}\top\sigma =_i {\uparrow}s]\ ^\perp;$

        $![e|\ \perp\sigma =_i {}^{\triangledown}\boldsymbol{e}, write\langle {}^{\blacktriangleleft}\boldsymbol{e}, {\uparrow}e, {\downarrow}e\rangle, wrongly.written.name\langle {\downarrow}e, {\uparrow}e, \vartheta e\rangle])$

4

3 PUSH-DOWN ASP-INFLECTIONS IN MANDARIN

Figure 8 Mandarin ASP-features & ASP-inflections

	_-DUR (-*zhe*)	_-PNC (-*le*)	_-TRM (-*guo*)	
E^1/	*	✓	✓	
E/	✓	✓	✓	
S^1/	✓	(✓)	(✓)	
S/	✓	(✓)	(✓)	
	2.5%	**13.0%**	0.5%	% of verbs in discourse

*Figure 9 **Verifiable points** highlighted by -le* 'PNC' (a.k.a 'perfective')

	E^1/ (1-atom evt)	E/ (*n*-atom evt)	S^1/ (1-deg. state)	S/ (*n*-deg. state)
input	e	e	s	s or $s = {}^{\triangledown}e$
highlight	–	e or $e' = {}^{\blacktriangle}e$	–	${}^{\blacktriangleright}s$ or $e' = {}^{\blacktriangle}e$

(5) E^1. I finished writing a letter.

    *Wǒ xiě.wán-**le** xìn.*

    1SG E^1/write.finish-*PNC* letter

    $({}^{\top}[x|\ x =_i \uparrow \top \varepsilon];\ {}^{\top}[s|\ \top \delta =_i \uparrow s])\ {}^{\top};\ (([e|\ e =_i {}^{\blacktriangleright}\top \sigma,\ write\langle {}^{\blacktriangleleft}e,\ \top \delta,\ \downarrow e \rangle]\ {}^{\perp};$
    $[\perp \varepsilon =_i {}^{\blacktriangleright}\top \sigma <_\vartheta \top \varepsilon]);\ [letter\langle \downarrow \perp \varepsilon,\ \vartheta \perp \varepsilon \rangle])$

  E. I did a bit of letter writing (but didn't finish).

    *Wǒ xiě-**le** xìn (kěshì mei xiě.wán).*

    1SG E/write-*PNC* letter (but NOT E^1/write.finish)

    $({}^{\top}[x|\ x =_i \uparrow \top \varepsilon];\ {}^{\top}[s|\ \top \delta =_i \uparrow s])\ {}^{\top};\ (([e|\ {}^{\blacktriangle}e =_i {}^{\blacktriangleright}\top \sigma,\ write\langle e,\ \top \delta,\ \downarrow e \rangle]\ {}^{\perp};$
    $[{}^{\blacktriangle}\perp \varepsilon =_i {}^{\blacktriangleright}\top \sigma <_\vartheta \top \varepsilon]);\ [letter\langle \downarrow \perp \varepsilon,\ \vartheta {}^{\blacktriangle\triangledown}\perp \varepsilon \rangle])$

S^1. The shirt is a little small.

    *Chènshān xiǎo-**le** yì.diǎn.*

    shirt S/small-*PNC* $a.M_{bit}$

    (need UC with degrees to represent points on non-temporal scales)

  S. I got sick.

    *Wǒ bìng-**le.***

    1SG S/sick-*PNC*

    $({}^{\top}[x|\ x =_i \uparrow \top \varepsilon];\ {}^{\top}[s|\ \top \delta =_i \uparrow s])\ {}^{\top};\ ([s|\ \top \varepsilon \sqsubseteq_\vartheta s,\ sick\langle s,\ \top \delta \rangle]\ {}^{\perp};$
    $([e|\ e =_i {}^{\blacktriangleright}\perp \sigma];\ [\perp \varepsilon =_i {}^{\blacktriangleright}\top \sigma <_\vartheta \top \varepsilon]))$

    I was sick for three days.

    *Wǒ bìng-**le** sān-tiān.*

    1SG S/sick-*PNC* three-M_{day}

    $({}^{\top}[x|\ x =_i \uparrow \top \varepsilon];\ {}^{\top}[s|\ \top \delta =_i \uparrow s])\ {}^{\top};\ ([s|\ \top \sigma \sqsubseteq_i s,\ sick\langle s, \top \delta \rangle,\ \mathbf{3}\langle \mu_{day}\langle \vartheta s \rangle \rangle]\ {}^{\perp};$
    $([e|\ {}^{\triangledown}e =_i \perp \sigma];\ [{}^{\blacktriangle}\perp \varepsilon =_i {}^{\blacktriangleright}\top \sigma <_\vartheta \top \varepsilon]))$

4 ASP-BASED TEMPORALITY IN MANDARIN

OUTLINE:
- Mandarin '*sentence*' [A, B$_1$, …, B$_n$.] translates into $(((A'\ ^\top; B_1')\ ^\top; …)\ ^\top; B_n')$, where A′ introduces a **topical state** ($^\top[s|\ …]$) and B$_1'$, …, B$_n'$ comment on $\top\sigma$
- In each *clause* B$_1'$, one verb is anchored to $\top$-eventuality (**main v**: $\mathbf{v}_{\top\sigma}$ or $\mathbf{v}_{\top\varepsilon}$)
- *Infl/pcl* (-)*le* '(-)PNC' usually/always marks the **main verifiable point** ($\mathbf{v}_{\top\sigma,\top\varepsilon}$).
- In *SVC's*, other verbs are anchored to & elaborate $v_{\top\sigma}$ (**serial verbs**, $\mathbf{v}_{\bot\varepsilon}$ or $\mathbf{v}_{\bot\sigma}$)

(6) I'll go to bed when I finish writing one letter.

> *Wǒ   xiě.wán-le   yì-fēng xìn , ...*
> 1SG $E^l_{\top\varepsilon}$/write.finish-$PNC_{\top\varepsilon,\top\sigma}$ one-CL   letter
> $((^\top[x|\ x =_i \uparrow\top\varepsilon];\ ^\top[s|\ \top\delta =_i \uparrow s])\ ^\top;\ ([e|\ e \sqsubseteq_\vartheta\ ^\triangleright\top\varepsilon, write\langle{}^\blacktriangleleft e, \top\delta, \downarrow e\rangle];$
> $[\bot\varepsilon =_i\ ^\blacktriangle\top\sigma <_\vartheta\ ^{\blacktriangle\triangleright}\top\varepsilon];\ [letter\langle\downarrow\bot\varepsilon, \vartheta\bot\varepsilon\rangle]))\ ^\top;\ …$
>
> *jiù   qù   shuì.jiào.*
> then$_{\bot\varepsilon}^t$ $[E^l_{\top\sigma}$/go $E_{\bot\varepsilon}$/sleep   ]$_{then}$
> $([t|\ t \sqsubseteq_i \vartheta^\triangleright\bot\varepsilon];\ [e|\ e =_i\ ^\blacktriangle\top\sigma, go.fr\langle e,\top\delta, \pi\top\varepsilon\rangle, sleep\langle{}^{\blacktriangle\triangleright}e, \uparrow e\rangle];\ [\bot\varepsilon \sqsubseteq_i \bot\tau])$

Model for (6)

——————————→ real time

Dref.	Symbol: Description	Temporal condition	Source
●	$^\top e_0$: $\uparrow e_0$ speaks to $\downarrow e_0$		$^{st}e_0$
——	$^\top\mathbf{s_1}$: **speaker** $\uparrow e_0$ **after** e_1	$e_1 =\ ^\blacktriangle s_1 <_\vartheta\ ^{\blacktriangle\triangleright}e_0$	1SG…PNC$_{\top\varepsilon,\top\sigma}$
●	e_1: $\uparrow e_0$ finishes writing a letter	$e_1 =\ ^\blacktriangle s_1$	$E^l_{\top\varepsilon}$
■■	t_1: in the wake of e_1	$\vartheta e'_1 \subseteq t_1 \subseteq \vartheta^\triangleright e_1$	then$_{\bot\varepsilon}^t$
●	e'_1: $\uparrow e_0$ goes from e_0-here	$e'_1 =\ ^\blacktriangle s_1$	$E^l_{\top\sigma}$
(●	$^{\blacktriangle\triangledown}e'_1$: $\uparrow e'_1$ (= $\uparrow e_0$) sleeps		$E_{\bot\varepsilon}$

(7) Lisi fell asleep listening to the radio.

> *Lǐsi   tīng-zhe   shōuyīnjī, shuì.zháo-le.*
> Lisi $E_{\top\sigma}$/listen-$DUR_{\top\sigma}^{\top s}$ radio $E^l_{\top\sigma}$/fall.asleep-$PNC_{\top\sigma,\top\varepsilon}$
> $((^\top[x|\ x =_i lisi];\ ^\top[s|\ \top\delta =_i \uparrow s])\ ^\top;\ ([e|\ ^\triangledown e \sqsubseteq_i \top\sigma, listen.to\langle e, \uparrow e, \downarrow e\rangle, radio\langle\downarrow e\rangle];$
> $[^\triangledown\bot\varepsilon =_i \top\sigma]))\ ^\top;\ ([e|\ e =_i\ ^\blacktriangle\top\sigma, asleep\langle{}^\triangleright e, \top\sigma\rangle];\ [\bot\varepsilon =_i\ ^\blacktriangle\top\sigma <_\vartheta \top\varepsilon])$

Model for (7)

Dref.	Symbol: Description	Temporal condition	Source
———	$^\top s_0$: initial topic state		ctx
●	$^\top e_0$: $\uparrow e_0$ speaks to $\downarrow e_0$		$^{st}e_0$
——	$^\top\mathbf{s_1}$: **Lisi during** e_1	$s_1 =\ ^\triangledown e_1 \sqsubseteq_\sigma s_0$	Lisi…DUR$_{\top\sigma}$
●●●	e_1: Lisi listens to radio	$^\triangledown e_1 \sqsubseteq_\sigma s_0$	$E_{\top\sigma}$
●	e_2: Lisi falls asleep	$e_2 =\ ^\blacktriangle s_1 <_\vartheta e_0$	$E^l_{\top\sigma}$/V-PNC$_{\top\sigma,\top\varepsilon}$

6

(8) i. Jiajia$^\top$ is sick. She$_\top$ ran a fever last night.

Jiājiā
Jiajia$^\top$ [$_{vp}$
$((^\top[x|\, x =_i jiajia];\ ^\top[s|\, {\uparrow}s =_i \top\delta,\ \top\varepsilon \sqsubseteq_\vartheta s])\ ^\top;$

bìng   **le**   ,
$S_{\top\sigma}$/sick $PNC_{\top\sigma,\,\top\varepsilon}$
$([s|\, \top\sigma \sqsubseteq_i s,\ sick\langle s,\ \top\delta\rangle];\ [^{\blacktriangle}{\perp}\sigma =_i {}^{\blacktriangle}\top\sigma <_\vartheta \top\varepsilon]))\ ^\top;$

zuótiān wǎnshàng jiù   *fā.shāo.*
yesterday night^t then$_{\perp\tau}$ [$E_{\top\sigma}/_\top$run.a.fever   ]$_{then}$
$([t|\, t \sqsubseteq_i night^{of}\langle yst^{of}\langle \vartheta\top\varepsilon\rangle\rangle];\ [e|\, {}^{\blacktriangle}{}^\triangledown e =_i {}^{\blacktriangle}\top\sigma,\ run.fvr\langle e,\top\delta\rangle];\ [\vartheta{\perp}\varepsilon \sqsubseteq_i {\perp}\tau])$

ii. Lisi took her to see an ER doctor, and they gave [her] an injection.

Lisi
Lisi$^\top$ [$_{vp}$
$((((^\top[x|\, x =_i lisi];\ ^\top[s|\, {\uparrow}s =_i \top\delta,\ {}^{\blacktriangle}s \sqsubseteq_\vartheta {\perp}\varepsilon])\ ^\top;$

dài   *tā*   *qù*   *kàn-**le***   *jízhěn*
$E^1{}_{\top\sigma}/_\top$take   3SG$_{\top'}$ $E^1{}_{\perp\varepsilon}$/go $E_{\perp\varepsilon}$/see-$PNC_{\top\sigma,\,\top\varepsilon}$ ER(doctor)$^\perp$,
$([e|\, e =_i {}^{\blacktriangle}\top\sigma,\ take\langle e,\ \top\delta,\ \top'\delta\rangle];\ ((([e|\, e =_\vartheta {\perp}\varepsilon,\ go.from\langle e,\ \top'\delta,\ \pi{\perp}\varepsilon\rangle];$
$[x|\, see\langle {}^{\blacktriangle\triangleright}{\perp}\varepsilon,\ {\uparrow}{\perp}\varepsilon,\ x\rangle,\ {\perp}\varepsilon =_\vartheta {}^{\blacktriangle}\top\sigma <_\vartheta \top\varepsilon];\ [ER.doctor\langle {\perp}\delta\rangle])$

                        , *dǎ-**le***   *zhēn.*
                      $E_{\top\sigma}/_\perp$do-$PNC_{\top\sigma,\,\top\varepsilon}$ injection
                  $^\perp;\ [e|\, give.injection\langle e,\ {\perp}\delta\rangle,\ e =_\vartheta {}^{\blacktriangle}\top\sigma <_\vartheta \top\varepsilon]))$

Model for discourse (8i–ii)

Dref.	Symbol: Description	Temporal condition	Source
●	$^\top e_0$: ${\uparrow}e_0$ speaks up		$^{st}e_0$
——————	$^\top s_1$: $^\top$***Jiajia*** ✍ *at* $^\top e_0$-*now*	$\vartheta e_0 \subseteq \vartheta s_1$	[$_{vp}$
—————	s'_1: ✍ is sick	$s'_1 \sqsubseteq_\sigma s_1$	$S_{\top\sigma}$
		$^{\blacktriangle}s'_1 = {}^{\blacktriangle}s_1 <_\vartheta e_0$	S…PNC$_{\top\sigma,\,\top\varepsilon}$
■■■	t_1: part of e_0-yesterday.night		np$_\tau^t$
●●●	e_1: ✍ runs a fever	$^{\blacktriangle\triangledown}e_1 = {}^{\blacktriangle}s_1$	$E_\top$
		$\vartheta e_1 \subseteq t_1$	then$_{\perp\tau}$
——	$^\top s_2$: $^\top$***Lisi*** ☺ *at* e_1-*time*	$e_1 \sqsubseteq_\vartheta s_2$	[$_{vp}$
●	e_2: ☺ takes ✍	$e_2 = {}^{\blacktriangle}s_2$	$E^1{}_{\top\sigma}$
●	e'_2: ✍ goes away from e_2-loc	$e'_2 =_\vartheta e_2$	$E^1{}_{\top\sigma}$/take np $E^1{}_{\perp\varepsilon}$
		$e'_2 =_\vartheta {}^{\blacktriangle}s_2 <_\vartheta e_0$	E^1…PNC$_{\top\sigma,\,\top\varepsilon}$
●	$^{\blacktriangle\triangleright}e'_2$: ✍ sees ER-doctor 🚑		SVC
●	e''_2: 🚑 gives [✍] injection	$e''_2 =_\vartheta {}^{\blacktriangle}s_2 <_\vartheta e_0$	E…PNC$_{\top\sigma,\,\top\varepsilon}$

7