

## Covert relative pronominal tense in Gitksan\*

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### 0. Background & Goals

#### Background

- Gitksan is a Tsimshianic language spoken in northern British Columbia, Canada
- Approx. 520 fluent speakers (Dunlop et al. 2018)
- VSO word order (Rigsby 1986)
- Morphologically tenseless. A simple matrix clause is compatible with both past and present interpretations (1, 2) (Jóhannsdóttir and Matthewson 2007, henceforth J&M 2007).

- (1) Luu am=hl      goot=s      Diana      (2) Gub-i=s      Noriko=hl      hon  
in happy=CN   heart=PN   Diana      eat-TR=PN   Noriko=CN      fish  
'Diana {is / was} happy.'      (stative)      'Noriko {is eating / ate} salmon.' (eventive)  
(J&M 2007: 2(1a, 3b))

- Future readings require an overt future marker *dim* (3).

- (3) #(Dim) yookw=t      James (ji tahlaakxw)  
FUT eat=CN      James IRR tomorrow  
'James will eat tomorrow.'      (J&M 2007: 3(7))

- The facts in (1-3) led J&M to propose a covert non-future tense (4).
  - (4) is an absolute pronominal tense (cf. Todorović 2020).

- (4)  $[[\text{NON-FUT}_i]]^{g,c}$  is only defined if no part of  $g(i)$  is after  $t$ . If defined,  $[[\text{NON-FUT}_i]]^{g,c} = g(i)$ .  
(J&M 2007: 5(13))

- The future marker *dim* (5) is analogous to the English *will* (Abusch 1997).

- (5)  $[[\text{dim}]] = \lambda P_{\langle i, st \rangle}. \lambda t. \lambda w. \exists t' [t < t' \ \& \ P(t')(w)]$       (J&M 2007: 6(14))

#### Goals

- Refine the denotations of the covert non-future tense and *dim* based on their behaviours across subordinate clauses.
- Gitksan non-future tense is pronominal.
  - Deictic, anaphoric, and bound readings
  - Occurrence in *before/after* clauses
- Gitksan non-future tense is relative.
  - Past/present-in-the-future reading of temporally unmarked attitude complements and relative clauses
  - Future-in-the-past readings of future-marked relative clauses
- Note: This talk assumes that there is a covert non-future tense in every clause.

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## 1. The non-future tense is pronominal

- Partee (1973) recognized that similarly to personal pronouns (6-8, a examples), temporal interpretations contributed by tense can be deictic, anaphoric, and bound (6-8, b examples).

(6) a. *Context: Possibly accompanied by a pointing gesture.*  
**He** shouldn't be here. (Partee 1973: 602(2))

b. *Context: Driving on a highway, you suddenly realize and say:*  
 I **didn't** turn off the stove. (Partee 1973: 602(3))

(7) a. Sam took the car yesterday and Sheila took **it** today. (Partee 1973: 605(9))

b. Sheila had a party last Friday and Sam **danced**. (adapted from Partee 1983: 605(10))

(8) a. Every student spoke to the student in front of **them**.

b. When you eat fast food, you'**re** always hungry an hour later. (adapted from Partee 1973: 606(20))

- Unmarked sentences in Gitksan also allow deictic (9), anaphoric (10), and bound (11) readings.

(9) *Context: You're driving on a highway, suddenly you realize and say:*

Nee=dii=n      ts'eg=ehl      an-mehl-i=hl      lek'w  
 NEG=FOC=1SG.I    extinguish=CN    NMLZ-burn-T=CN    fire  
 'I didn't turn off the stove.'  
 ≠I never turned off a stove (in my life). (adapted from Partee 1973: 602(3))

(10) Li'ligit    Sheila    gadoo'o=hl      ganuutxw    [ii      miiluxw=s    Sam]  
 feast    Sheila    DSTR-ROOT=CN    week      [CCNJ    dance=PN    Sam]  
 'Sheila had a party last week, and Sam danced.'  
 (adapted from Partee 1973: 605(10))

(11) Ligi    nda    win    mokw-t=hl      hun    [si-mi'yen-din-t]  
 DWID    WH    COMP    catch-3SG.II=CN    fish    [CAUS1-smoke-CAUS2-3SG.II]  
 'Whenever he catches fish, he makes smoked fish.'

- While some authors argue that deictic uses are compatible with an existential tense with a contextual restriction (Ogihara 1996; Kusumoto 1999; von Stechow 2009), anaphoric and bound uses seem to require a temporal pronoun corresponding to the reference time (RT).

## 2. The non-future tense is relative: Attitude complements and relative clauses

### 2.1 Attitude complements

- Non-future-under-non-future constructions (12, 13) are compatible with both back-shifted (12a, 13a) and simultaneous (12b, 13b) readings. No forward-shift (12c, 13c). (see Appendix C for storyboards)

(12) Ha'niigoot=s    Lisa    [luu    getxw=hl    goots=s    Michael]  
 think=PN      Lisa    [in    difficult=CN    heart=PN    Michael]  
 'Lisa thought that Michael was sad.'

a. Back-shifted    subordinateET(sad) < matrixET(think)    <    UT  
*Context: When Lisa saw Michael earlier, he was covering his face. Looking back, Lisa thought "Maybe Michael was sad."*

b. Simultaneous    subordinateET(sad) = matrixET(think)    <    UT  
*Context: Lisa saw Michael covering his face and thought, "Maybe Michael is sad."*

(13) Ha'niigoot=s Lisa [yukw wiyitxw=s Michael]  
 think=PN Lisa [PROG cry=PN Michael]  
 'Lisa thought that Michael was crying.'

- a. Back-shifted sET(cry) < mET(think) < UT  
 b. Simultaneous sET(cry)=mET(think) < UT

- Todorović (2020) takes the simultaneous and back-shifted readings of non-future-under-non-future constructions (12, 13) to be evidence that the non-future tense is relative.
- However, these data don't rule out the absolute approach.

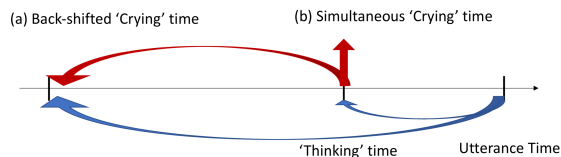


Fig. 1 Relative and absolute approaches to (2a-b)

- Absolute non-future + Abusch's (1997) Upper Limit Constraint (14) is also compatible with the data.

(14) [T]he local evaluation time is an upper limit for the denotation of tenses. (Abusch 1997: 25))

- Unambiguous evidence that the non-future tense is relative comes from non-future-under-future constructions, which are also compatible with both back-shifted (15a, 16a) and simultaneous (15b, 16b) readings.

(15) Dim wilaax-i=s nox-'m [win yukw hahla'lst-n]  
 FUT know-TR=PN mother-3PL.II [COMP PROG work-2SG.II]  
 'Your mother will know that you were/are working.' (modelled on Chen et al. 2020: (21-22))

- a. Back-shifted UT < sET(working) < mET(know)  
 Context: *Your sister doesn't want to work, so you encourage her to finish her work before your mother gets home.*
- b. Simultaneous UT < sET(working)=mET(know)  
 Context: *Your sister doesn't want to work, so you encourage her to show herself working when your mother gets home.*

(16) Dim ha'niigoot-t [(#dim) siipxw-'y]  
 FUT think-3SG.II [(#FUT) sick-1SG.II]  
 'She (the teacher) will think that I am/was sick.'

- a. Back-shifted sET(sick) < UT < mET(think)  
 Context: *Failing to finish homework, Mary is calling her teacher to lie that she was sick yesterday:*
- b. Simultaneous UT < sET(sick)=mET(think)  
 Context: *Wanting to skip school today, Mary is calling her teacher to fake her sickness. She says to herself:*

## 2.2 Relative clauses

- Temporal interpretations of relative clauses are more flexible than attitude complements.
- Non-future under non-future relative clauses are three-way ambiguous between back-shifted (17a), simultaneous (17b), and forward-shifted (17c) readings.

(17)a. Back-shifted sET(run) < mET(see) < UT

Gaa=s Michael=hl git ky'oots [baχ-at ga-doo'o=hl ky'oots]  
 see=PN Michael=CN man yesterday [run-SX DSTR-ROOT=CN yesterday]  
 'Michael saw a man yesterday who ran the day before yesterday.'

b. Simultaneous sET(running)=mET(see) < UT

Gaa=s Michael=hl git [yukw baχ-at]  
 see=PN Michael=CN man [PROG run-SX]  
 'Michael saw a man who was running.'

c. Forward-shifted mET(see) < sET(running) < UT Context: *Today is Thursday.*

Gaa=s Michael=hl git lax ha'niigilbilsa [(yukw) baχ-at ky'oots]  
 see=PN Michael=CN man on Tuesday [(PROG) run-SX yesterday]  
 'Michael saw a man on Tuesday who was running/ran yesterday.'

- In the forward-shifted reading (17c), the subordinate non-future tense must be taking the UT as its EvalT.
- In the simultaneous and back-shifted readings (17a, b), the EvalT could be either the UT or the matrix ET.

- Support for the relative denotation of the non-future tense comes from
  - Present/past-in-the-future reading of an unmarked relative clause under future (18, 19)
  - Future-in-the-past reading of a future-marked relative clause (20)

(18) Present-in-the-future UT < sET(alive)=mET(buy) Context: *Talking about buying a fish for dinner*

Dim giikw-'y=hl hun=hl [(#dim) didils-it]  
 FUT buy-1SG.II=CN fish=CN [(#FUT) alive-SX]

'I will buy a fish that is still alive.'

(adapted from Ogihara 1996: 8(14))

*Consultant: [On the version with dim in the RC] If you're not going to kill it, you can say it. If you're going to buy it for dinner, then no.*

(19)a. Past-in-the-future UT < sET(sick) < mET(not let in)

*Invitation for a party three months later. People who are sick at the time of the party can't enter.*

b. Present-in-the-future UT < sET(sick)=mET(not let in)

*... Those who were sick within two weeks before the party can't enter.*

Nee=dim=dii=dip ts'ilim anook=hl git=hl [(#dim) siipxw-it]  
 NEG=FUT=FOC=1PL.I in allow-3SG.II who=CN [(#FUT) sick-SX]

'We will not let in people who are/were sick.'

(20) Future-in-the-past mET(see) < sET(run) < UT

Gaa=s Michael=hl git ga-doo'o=hl ky'oots [dim baχ-at ky'oots]  
 see=PN Michael=CN man DSTR-ROOT=CN yesterday [FUT run-SX yesterday]

'Michael saw a man the day before yesterday who was going to run yesterday.'

- In sum, the EvalT of the non-future tense in a relative clause can be either the matrix ET or the UT. This optionality is predicted by the relative non-future tense, assuming that relative clauses can QR (e.g., Ogihara 1996).

### 3. *Before/after* clauses

#### 3.1 Distributions of the future marker *dim*

- *Before* clauses always require the future marker *dim* (21-22).
- Compatible with the relative non-future analysis.

(21) Daa'whl=t Alex [hlagook, xsgook} \*(dim) (k)'witxw=s Blake]  
 leave=PN Alex [before \*(FUT) arrive=PN Blake]  
 Lit: 'Alex left before Blake will arrive.'

- a. mET(Alex leaves) < sET(Blake arrives) < UT  
 b. mET(Alex leaves) < UT < sET(Blake arrives)

(22) UT < mET(Alex leaves) < sET(Blake arrives)  
 Dim {daa'whl, ha'w}=t Alex [hlagook, xsgook} \*(dim) (k)'witxw=s Blake]  
 FUT {leave, go.home}=PN Alex [before \*(FUT) arrive=PN Blake]  
 Lit: 'Alex will leave before Blake will arrive.'

- *After* clauses don't have *dim* if the sET precedes the UT (23-24).
- Compatible with both the relative and absolute analyses.

(23) sET(Alex leaves) < mET(Blake arrives) < UT  
 (K)'witxw=t Blake [hlis daa'whl=s Alex]  
 arrive=PN Blake [after leave=PN Alex]  
 'Blake arrived after Alex left.'

(24) sET(Alex leaves) < UT < mET(Blake arrives)  
 Dim (k)'witxw(=s) Blake [hlis daa'whl=s Alex]  
 FUT arrive=PN Blake [after leave=PN Alex]  
 Lit: 'Blake will arrive after Alex left.'

- But they do require *dim* if the sET follows the UT (25).
- Puzzling for the relative non-future analysis?

(25) UT < sET(Alex will leaves) < mET(Blake arrives)  
 Dim (k)'witxw=s Blake [hlis #(dim) daa'whl=s Alex]  
 FUT arrive=PN Blake [after #(FUT) leave=PN Alex]  
 Lit: 'Blake will arrive after Alex will leave.'

- It looks as if the non-future tense is relative in *before* clauses and absolute in *after* clauses.

		overt temporal marker	
		matrix	subordinate
before	mET<sET<UT	---	<i>dim</i>
	UT<mET<sET	<i>dim</i>	<i>dim</i>
	mET<UT<sET	---	<i>dim</i>
after	sET<mET<UT	---	---
	UT<sET<mET	<i>dim</i>	<b><i>dim</i></b>
	sET<UT<mET	<i>dim</i>	---

Table 1. Distributions of the future marker *dim* in Gitksan *before/after* clause

- One way to unify *before* and *after* clauses: the non-future tense in *before/after* clauses always takes the RT of the matrix non-future tense as its EvalT.



Fig. 2 Visualizing (25)

- Assumption: When combined with *dim*, the non-future tense is always ‘relative present’. This is similar to how *woll* + past in English doesn’t have a future-in-the-past reading without a rich discourse context (26) (see Matthewson 2006; Toosarvandani 2020).

(26) John would become president. (no temporal *would*-reading) (Matthewson 2006: 692(40a))

- The need for *dim* in some *after* clauses above is a consequence of having a ‘split’ system in which the temporal interpretations are determined by the combination of the non-future tense and the future *dim*
  - Indirect evidence for having a covert temporal pronoun in the first place.
  - The Gitksan system contrasts with a relative tense system without *woll* (e.g., Japanese) (Table 2).

		Japanese		Gitksan	
Anteriority of ETs		matrix	subordinate	matrix	subordinate
<b>before</b>	mET < sET < UT	past	non-past	---	fut
	UT < mET < sET	non-past	non-past	fut	fut
	mET < UT < sET	past	non-past	---	fut
<b>after</b>	sET < mET < UT	past	past	---	---
	UT < sET < mET	non-past	past	fut	fut
	sET < UT < mET	non-past	past	fut	---

Table 2. Comparing *before/after* clauses in Japanese and Gitksan

- Occurrences of the non-future tense and *dim* in *before* clauses demonstrate that they are not existential because existential temporal markers cause a presupposition failure with the EARLIEST operator (Beaver and Condoravdi’s 2003) in the denotation of *before* (von Stechow 2009; Sharvit 2014, see Appendix B).
  - Further confirms that the non-future tense is pronominal.
  - Revising J&M’s denotation of *dim* (27) to a non-existential one (28).

(27)  $[[dim]] = \lambda P_{\langle i, s \rangle}. \lambda t. \lambda w. \exists t' [t < t' \ \& \ P(t')(w)]$  (J&M 2007: 6(14))

(28)  $[[dim]] = \lambda P_{\langle i, s \rangle}. \lambda t'. \lambda t. \lambda w. t < t' \ \& \ P(t')(w)$

### 3.3 *Before/after* clauses are full CPs

- How do we know that *before/after* clauses include the non-future tense if it is covert?
- Evidence 1: Geis’s ambiguity (29, 30) shows that *before* clauses involve a *wh*-movement and are therefore full CPs (Geis 1970; Larson 1990; Arregui and Kusumoto 1998).

(29)

- a. (upstairs) Context: At a party. Michael suddenly left without telling anyone that he was leaving.  
b. (downstairs) Context: At a party. Michael said “I will leave at 9” but he actually left at 7.

Ha’w(=t) Michael [hlagook/xsgook dim mehl-d-i-t loo-’m ta [dim ha’w-it tb]]  
go.home(=PN) Michael [before FUT tell-T-TR-3SG.II OBL-1PL.II [FUT go.home-3SG.II ]]  
Lit: ‘Michael went home before he would tell us that he would go home’

(30)

a. (upstairs) Context: *You're at a party. John didn't tell you if he's coming, but he usually shows up unannounced. You predict that he will show up without saying that he is coming.*

Dim 'witxw=t John [hlagook dim he-t t<sub>a</sub> [win dim 'witxw-t]]  
 FUT arrive=PN John [before FUT say-2SG.II [COMP FUT arrive-2SG.II]]  
 Lit: 'John will arrive before he will say that he will arrive.'

b. (downstairs) Context: *You're thinking of getting lunch with John. His close friend is telling you that he's always early.*

Dim (k)'witxw=t John [hlagook/xsgook dim he-t [win sgi=dim (k)'witxw-t t<sub>b</sub>]]  
 FUT arrive=PN John [before FUT say-2SG.II [COMP CIRC.NEC=FUT arrive-2SG.II ]]  
 Lit: 'John will arrive before he will say that he will have to arrive.'

- Evidence 2: *Wh*-movement out of a *before/after* clause is rejected (31).
  - This is like English *before/after* clauses and unlike the Japanese counterparts, which are argued to be TPs (Arregui and Kusumoto 1998) and allow *wh*-movement.

(31) Context: *Michael went to a dance recital, but he had to leave early.*

a. *Whose performance did Michael miss?*

\*Naa daa'whl=t Micahel [hlagook/xsgook dim miilux-it]?  
 who leave=PN Michael [before FUT dance-SX]  
 Lit: \*Who did Michael leave before they danced?

b. *Whose performance was Michael able to see?*

\*Naa daa'whl=t Micahel [hlis dim miilux-it]?  
 who leave=PN Michael [after FUT dance-SX]  
 Lit: \*Who did Michael leave after they danced?

#### 4. Analysis: Relative pronominal non-future tense

- Adapting Heim's (2015) analysis of the English past. The EvalT is set by a shiftable index *i* (33).

(32) T head

- $[[\text{NON-FUT}]]^{e,i} \langle i, i \rangle = \lambda t: t \leq t_i. t$
- $[[\text{tpro}_n]]^g \ i = g(n)$

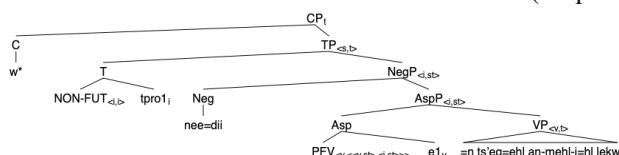
(33) Asp head

- $[[yukw]] \langle \langle v, st \rangle, \langle v, \langle i, \langle s, t \rangle \rangle \rangle \rangle = \lambda e. \lambda Q \langle v, st \rangle. \lambda t. \lambda w. [t \subseteq \tau(e) \ \& \ Q(e)(w)]$
- $[[PFV]] \langle \langle v, st \rangle, \langle v, \langle i, \langle s, t \rangle \rangle \rangle \rangle = \lambda e. \lambda Q \langle v, st \rangle. \lambda t. \lambda w. [\tau(e) \subseteq t \ \& \ Q(e)(w)]$
- $e_1$

#### Deictic reading

(34) Context: *You're driving on a highway, suddenly you realize and say:*

Nee=dii=n ts'eg=ehl an-mehl-i=hl lek w  
 NEG=FOC=1SG.I extinguish=CN NMLZ-burn-T=CN fire  
 'I didn't turn off the stove.' (adapted from Partee 1973: 602(3))



$[[\text{Nee}=\text{dii}=\text{n ts'eg}=\text{ehl an-mehl-i}=\text{hl lek w}]]^{\text{g},\text{c},\text{i}}$   
=  $[[\text{w}^* \text{NON-FUT tpro1 NEG PFV } e_1 \text{ I-turn-off-the-stove}]]^{\text{g},\text{c},\text{i}}$   
=  $[\text{w}^* \lambda t: t \leq t_i. t](\text{g}(1)) \text{ NEG } [\lambda e. \lambda Q_{\langle v, st \rangle}. \lambda t. \lambda w. \tau(e) \subseteq t \ \& \ Q(e)(w)](e_1) [\text{I-turn-off-the-stove}]$   
=  $\text{w}^* \text{g}(1) \text{ NEG } \lambda t. \lambda w. [\tau(e_1) \subseteq t \ \& \ \text{I-turn-off-the-stove}(e_1)(w)]$  where  $\text{g}(1) \leq s^*$   
=  $\neg[\tau(e_1) \subseteq \text{g}(1) \ \& \ \text{I-turn-off-the-stove}(e_1)(\text{w}^*)]$  where  $\text{g}(1) \leq s^*$

(see Appendix A for attitude complements and *before/after* clauses)

## 5. Conclusion

- Gitksan non-future tense is pronominal.
  - Deictic, anaphoric, and bound readings
  - *Before/after* clauses are full CPs, and the tense inside a *before* clause can't be existential (von Stechow 2009; Sharvit 2014).
- Gitksan non-future tense is relative.
  - Attitude complements and relative clauses in which the subordinate ET falls between the UT and the matrix ET
- The apparent disparity between the distributions of the future marker *dim* in *before* and *after* clauses is a consequence of having a 'split system' of *dim* + tense and is therefore indirect evidence for the covert tense.
- Future work:
  - *When* clauses
  - Comparison with other morphologically tenseless languages (e.g., Tonhauser 2011 on *before* clauses in Paraguayan Guaraní).



Appendix

A. Compositional analysis

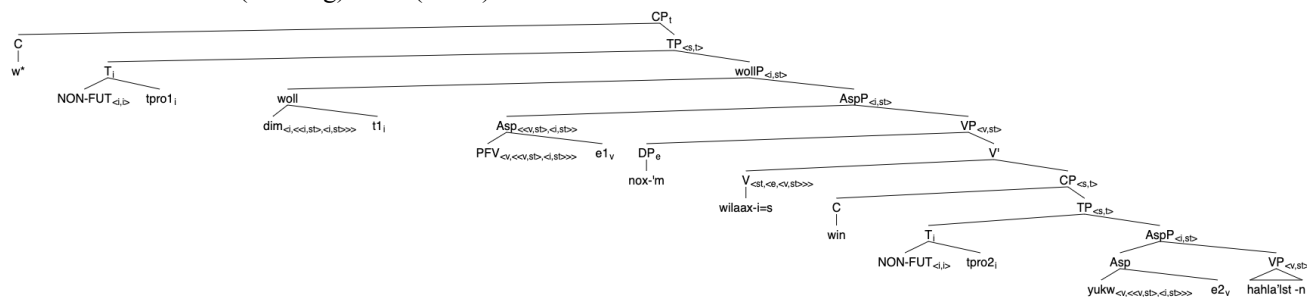
Attitude complements

(1) *woll* head: only present when there is an overt *dim*

- a.  $[[dim]]_{\langle\langle i, st \rangle, \langle i, \langle i, st \rangle \rangle\rangle} = \lambda P_{\langle i, st \rangle}. \lambda t'. \lambda t. \lambda w. t < t' \ \& \ P(t')(w)$
- b.  $t_1$

(2) Dim    *wilaax-i=s*    *nox-'m*                    *win*    *yukw*    *hahla'lst-n*  
 FUT    know-TR=PN mother-3PL.II            COMP    PROG    work-2SG.II  
 'Your mother will know that you were/are working.' (modelled on Chen et al. 2020: (21-22))

- a. UT        <    sET(working)    <mET(know)
- b. UT        <    sET(working)=mET(know)



$[[w^* \text{ NON-FUT } tpro1 \text{ dim } t_1 \text{ PFV } e_1 \text{ wilaax-i=s } nox-'m \text{ win NON-FUT } tpro2 \text{ yukw } e_2 \text{ hahla'lst-n}]]_{g,c,i}$   
 $= g(1) < t_1 \ \& \ \tau(e_1) \subseteq t_1 \ \& \ \forall w'[w' \in \text{KNOW}(she, e_1, w^*) \rightarrow [g(2) \subseteq \tau(e_2) \ \& \ \text{Work}(you)(e_2)(w')]]$   
 where  $g(1) \leq s^*$ ,  $g(2) \leq \tau(e_1)$

Before/after clauses

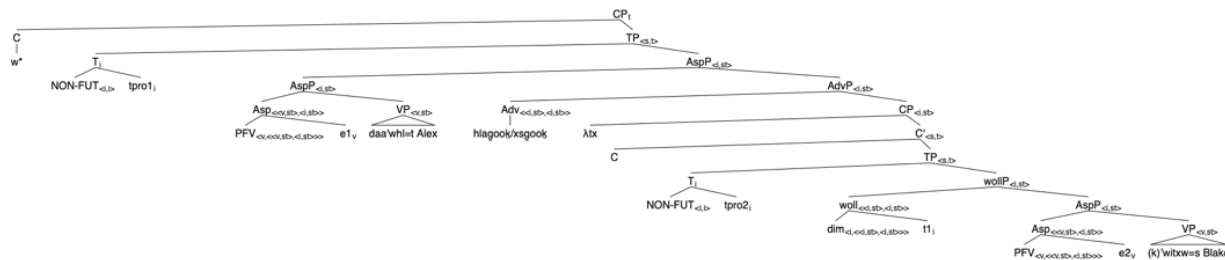
- *hlagook/xsgook* 'before' and *hlis* 'after' include Beaver and Condoravdi's (2003) EARLIEST operator (3).

- (3) a.  $[[hlagook/xsgook]] = \lambda P_{\langle i, st \rangle}. \lambda t. \lambda w. t < \text{EARLIEST}(P)(w)$
- b.  $[[hlis]] = \lambda P_{\langle i, st \rangle}. \lambda t. \lambda w. t > \text{EARLIEST}(P)(w)$
- c.  $[[\text{EARLIEST}]] = \lambda P_{\langle i, st \rangle}. \lambda w. \text{the } t \text{ such that } P(t)(w) \ \& \ \forall t'[t' \neq t \ \& \ P(t')(w) \rightarrow t < t']$

- Recall that *before* clauses always require *dim* (2).

(4) mET(Alex left) < sET(Blake arrived) < UT,      mET(Alex left) < UT < sET(Blake arrived)

Daa'whl=t    Alex    {hlagook, xsgook}    \*(dim) (k)'witxw=s Blake  
 leave=PN    Alex    before                    \*(FUT) arrive=PN    Blake  
 Lit: 'Alex left before Blake will arrive.'



a. *Before* clause

$[[hlagook/xsgook \dim (k)'witxw=s \text{ Blake}]^{g,c,i}]$   
 $= [[hlagook/xsgook \lambda t_x \text{ NON-FUT tpro}_2 \dim t_2 \text{ PFV } e_2 (k)'witxw=s \text{ Blake } t_x]^{g,c,i}]$   
 $= [\lambda P_{\langle i, st \rangle}. \lambda t. \lambda w. t < \text{EARLIEST}(P)(w)] \quad [\lambda t_x. \text{ NON-FUT tpro}_2 \dim t_2 \text{ PFV } e_2 (k)'witxw=s \text{ Blake } t_x]$   
 $= [\lambda P_{\langle i, st \rangle}. \lambda t. \lambda w. t < \text{EARLIEST}(P)(w)] \quad [\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w) \ \& \ t_2 = t_x]$  where  $g(2) \leq t_i$   
 $= \lambda t. \lambda w. t < \text{EARLIEST}([\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w) \ \& \ t_2 = t_x])$  where  $g(2) \leq t_i$

b. Predicate Modification

$[[_{\text{ASP}} \text{Daa}'whl=t \text{ Alex}] \lambda t. \lambda w. t < \text{EARLIEST}([\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w) \ \& \ t_2 = t_x])]$   
 $= [\text{PFV } e_1 \text{ Alex-leave}] \lambda t. \lambda w. t < \text{EARLIEST}([\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w) \ \& \ t_2 = t_x])]$   
 $= \lambda t. \lambda w. \tau(e_1) \subseteq t \ \& \ \text{Alex-leave}(e_1)(w) \ \& \ t < \text{EARLIEST}([\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w) \ \& \ t_2 = t_x])]$   
 where  $g(2) \leq t_i$

c. Whole sentence

$w^* [[\text{NON-FUT tpro}_1]^{g,c,i} \lambda t. \lambda w. \tau(e_1) \subseteq t \ \& \ \text{Alex-leave}(e_1)(w) \ \& \ t < \text{EARLIEST}([\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w) \ \& \ t_2 = t_x])]$  where  $g(2) \leq \tau(e_1)$   
 $= \tau(e_1) \subseteq g(1) \ \& \ \text{Alex-leave}(e_1)(w^*) \ \& \ g(1) < \text{EARLIEST}([\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w^*) \ \& \ t_2 = t_x])]$   
 where  $g(1) \leq s^*$   $g(2) \leq g(1)$

- Assuming that the subordinate NON-FUT operator takes the reference of the matrix temporal pronoun,  $g(1)$ , explains why an *after* clause in (5) requires the future marker *dim*.

(5) UT < sET(Alex will leave) < mET(Blake will arrive)

Dim (k)'witxw=s Blake hlis #(dim) daa'whl=s Alex  
 FUT arrive=PN Blake after #(FUT) leave=PN Alex  
 Lit: 'Blake will arrive after Alex will leave.'

$[[\text{NON-FUT tpro}_1 \text{ Dim } t_1 \text{ PFV } e_1 (k)'witxw=s \text{ Blake hlis NON-FUT tpro}_2 \dim t_2 \text{ PFV } e_2 \text{ daa}'whl=s \text{ Alex}]^{g,c,i}]$   
 $= g(1) < t_1 \ \& \ \tau(e_1) \subseteq t_1 \ \& \ \text{Alex-leave}(e_1)(w^*) \ \& \ t_1 > \text{EARLIEST}([\lambda t_x. \lambda w. g(2) < t_2 \ \& \ \tau(e_2) \subseteq t_2 \ \& \ \text{Blake-arrive}(e_2)(w^*) \ \& \ t_2 = t_x])]$   
 where  $g(1) \leq s^*$   $g(2) \leq g(1)$

**B. Incompatibility of an existential temporal marker with a *before* clause**

(6)  $[[\textit{before}] = \lambda P. \lambda t. t < \text{EARLIEST}(P) \text{ where } [[\text{EARLIEST}] = \lambda P. \text{ the } t \text{ such that } P(t) \ \& \ \forall t' [P(t') \rightarrow t < t']]$

- Sharvit (2014) argues that, assuming that the time axis is dense, when P contains an existential tense, the earliest P time cannot be identified.
- E.g., in (7), for any time  $t'$  such that there is a time  $t''$  preceding  $t'$  and Taro sees Hanako at ( $t''$ ), there is always another time between  $t''$  and  $t'$  that better qualifies as the earliest time that is preceded by  $t''$  (8). Therefore, having an existential tense results in a presupposition failure.

(7) mET < sET < UT, mET < UT < sET

\*Taro-wa Hanako-ni a-tta maeni denwa-o shi-ta  
 Taro-top Hanako-dat meet-pst before phone-acc do-pst  
 intended: 'Taro called Hanako before he saw her.'

(8)  $\exists t < s^* [\text{Taro-call-Hanako}(t) \ \& \ t < \text{EARLIEST}(\{t' | \exists t'' [t'' < t' \ \& \ \text{Taro-see-Hanako}(t'')\})]$

(modelled on Sharvit 2014: 272(26b))

**C. Selected storyboards**  
**C.1 Attitude complements**

(12) ‘Lisa thought that Michael was sad.’

a. Back-shifted subordinateET(sad) < matrixET(think) < UT

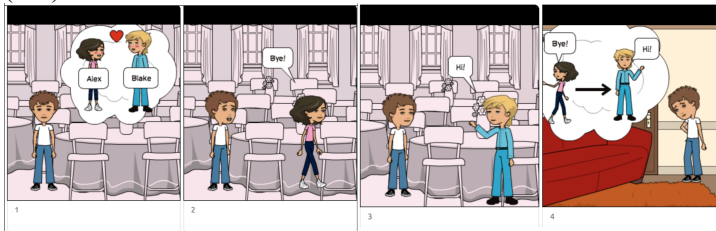


b. Simultaneous subordinateET(sad) = matrixET(think) < UT



**C.2 Before/after clauses**

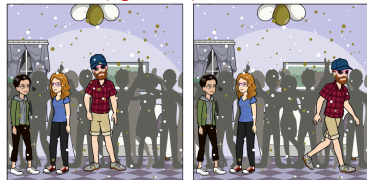
(21a) ‘Alex left before Blake arrived.’



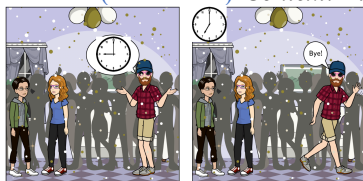
**Geis’s ambiguity**

(29) ‘Michael went home before he said he would go home.’

a. (upstairs) Context: At a party. Michael suddenly left without telling anyone that he was leaving.

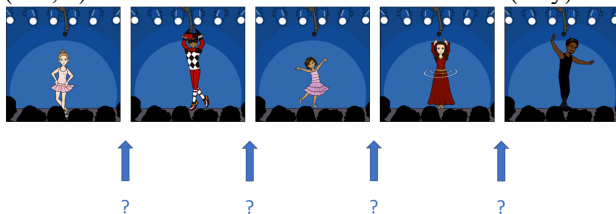


b. (downstairs) Context: At a party. Michael said ‘I will leave at 9’ but he actually left at 7.



**Wh-movement out of before/after clauses**

(31a, b) ‘\*Who did Michael leave before/after (they) danced?’



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