A A list of computations

This appendix contains all of the computations for *before* and *after* whose results are summarized in Tables 1 and 3.

A.1 *Before*

Summary of proposal: the complement of *before* must QR to some higher position for the adjunct tense to be non-contradictory/non-redundant. Here are the computations for each base position, landing site, and choice of adjunct past or future.

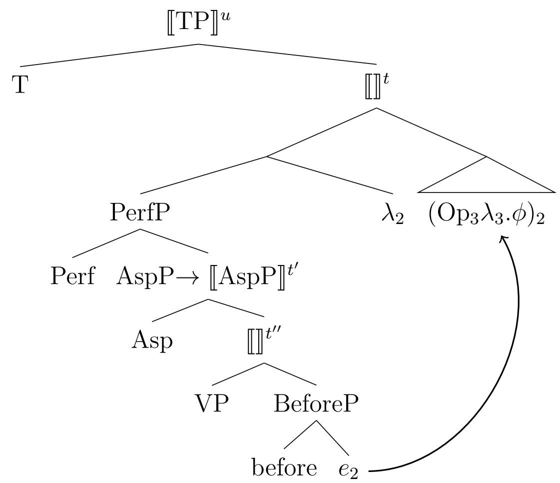

Figure 1: Schematic of proposal: complement of *before* raises to some higher position, e.g. PerfP

Assuming T's sister is evaluated wrt t, the perfect's sister is evaluated wrt t', and aspect's sister is evaluated wrt t'', the meanings of *before* for each adjunction position are in (1).

(1) a. Eventuality-level *before*: $[\![e_2]\!]^{t'',g(2/i)} > t''$
b. Perfect-level *before*: $[\![e_2]\!]^{t',g(2/i)} > t'$

The complement of *before* interpreted with adjunct past in different positions is in (3).

(2) a. QR to AspP: $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past}\ \textsc{pfv}$ K's brother get PhD at $e_3]]]\!]^{t',g}$
the τ s.t. $\exists i' < t'.\ \exists i'' \subseteq i'$. K's brother get PhD at $\tau \wedge \tau = i''$
b. QR to PerfP: $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past}\ \textsc{pfv}$ K's brother get PhD at $e_3]]]\!]^{t,g}$
the τ s.t. $\exists i' < t.\ \exists i'' \subseteq i'$. K's brother get PhD at $\tau \wedge \tau = i''$
c. QR to TP: $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past}\ \textsc{pfv}$ K's brother get PhD at $e_3]]]\!]^{u,g}$
the τ s.t. $\exists i' < u.\ \exists i'' \subseteq i'$. K's brother get PhD at $\tau \wedge \tau = i''$

The complement of *before* interpreted with adjunct future in different positions is in (3).

(3) a. QR to AspP: $[\![\text{Op}_3\ [\lambda_3\ [\ \text{FUT PFV K's brother get PhD at } e_3]]]\!]^{t',g}$
the τ s.t. $\exists i' > t'. \exists i'' \subseteq i'$. K's brother get PhD at $\tau \wedge \tau = i''$

b. QR to PerfP: $[\![\text{Op}_3\ [\lambda_3\ [\ \text{FUT PFV K's brother get PhD at } e_3]]]\!]^{t,g}$
the τ s.t. $\exists i' > t. \exists i'' \subseteq i'$. K's brother get PhD at $\tau \wedge \tau = i''$

c. QR to TP: $[\![\text{Op}_3\ [\lambda_3\ [\ \text{FUT PFV K's brother get PhD at } e_3]]]\!]^{u,g}$
the τ s.t. $\exists i' > u. \exists i'' \subseteq i'$. K's brother get PhD at $\tau \wedge \tau = i''$

The English sentences:

(4) If all goes according to plan, by the time she is 30, Katie will have gotten her PhD before her brother did/does.

Putting them together, starting with adjunct past:

(5) E-level *before*+QR to AspP: *adjunct past

a. $[\![\lambda_2\text{PFV Katie get PhD before } e_2]\!]^{t',g} =$
$\lambda i.\exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} > t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \text{PAST PFV I leave at } e_3]]]\!]^{t',g} =$
the τ s.t. $\exists i' < t'. \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t''$

ii. presupposition: $\tau < t'$ **contradiction!**

(6) E-level *before*+QR to PerfP: ✓adjunct past

a. $[\![\lambda_2\text{PERF PFV Katie get PhD before } e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} > t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \text{PAST PFV I leave at } e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' < t. \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t''$

ii. presupposition: $\tau < t = RB(t')$ **no contradiction!**

(7) E-level *before*+QR to TP: *adjunct past

a. $[\![\lambda_2\text{FUT PERF PFV Katie get PhD before } e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} > t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \text{PAST PFV I leave at } e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' < u. \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t''$

ii. presupposition: $\tau < u$ **contradiction!**

(8) P-level *before*+QR to PerfP: *adjunct past

a. $[\![\lambda_2\text{PERF PFV Katie get PhD before } e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} > t'$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \text{PAST PFV I leave at } e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' < t. \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t'$

ii. presupposition: $\tau < t = RB(t')$ **contradiction!**

(9) P-level *before*+QR to TP: *adjunct past

a. $[\![\lambda_2$Fut perf pfv Katie get PhD before $e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} > t'$

b. $[\![$Op$_3$ $[\lambda_3$ [past pfv I leave at $e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' < u.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t'$

ii. presupposition: $\tau < u$ **contradiction!**

And now for adjunct future:

(10) E-level *before*+QR to AspP: *adjunct future

a. $[\![\lambda_2$pfv Katie get PhD before $e_2]\!]^{t',g} =$
$\lambda i.\exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} > t''$

b. $[\![$Op$_3$ $[\lambda_3$ [fut pfv I leave at $e_3]]]\!]^{t',g} =$
the τ s.t. $\exists i' > t'.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t''$

ii. presupposition: $\tau > t'$ *entails the assertion:* **redundant!**

(11) E-level *before*+QR to PerfP: *adjunct future

a. $[\![\lambda_2$Perf pfv Katie get PhD before $e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} > t''$

b. $[\![$Op$_3$ $[\lambda_3$ [fut pfv I leave at $e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' > t.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t''$

ii. presupposition: $\tau > t = RB(t')$ *entails the assertion:* **redundant!**

(12) E-level *before*+QR to TP: ✓adjunct future

a. $[\![\lambda_2$Fut perf pfv Katie get PhD before $e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} > t''$

b. $[\![$Op$_3$ $[\lambda_3$ [fut pfv I leave at $e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' < u.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t''$

ii. presupposition: $\tau > u$ *does not entail the assertion:* **not redundant!**

(13) P-level *before*+QR to PerfP: *adjunct future

a. $[\![\lambda_2$Perf pfv Katie get PhD before $e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} > t'$

b. $[\![$Op$_3$ $[\lambda_3$ [fut pfv I leave at $e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' > t.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t'$

ii. presupposition: $\tau > t = RB(t')$ *entails the assertion:* **redundant!**

(14) P-level *before*+QR to TP: ✓adjunct future

a. $[\![\lambda_2\text{FUT PERF PFV Katie get PhD before } e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} > t'$

b. $[\![\text{Op}_3\ [\lambda_3\ [\text{ FUT PFV I leave at } e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' > u$. $\exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau > t'$
   ii. presupposition: $\tau > u$ *does not entail the assertion:* **not redundant!**

A.2 *After*

Everything is the same except for the asserted content.

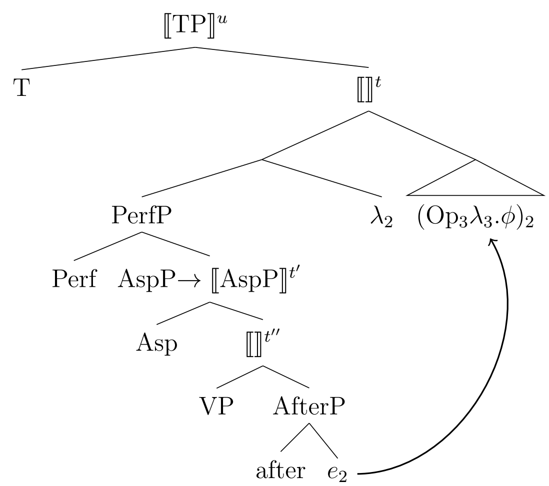

Figure 2: Schematic of proposal: complement of *after* raises to some higher position, e.g. PerfP

Assuming T's sister is evaluated wrt t, the perfect's sister is evaluated wrt t', and aspect's sister is evaluated wrt t'', the meanings of *after* for each adjunction position are in (15).

(15) a. Eventuality-level *after*: $[\![e_2]\!]^{t'',g(2/i)} < t''$

b. Perfect-level *after*: $[\![e_2]\!]^{t',g(2/i)} < t'$

The English sentences:

(16) If all goes according to plan, by the time she is 30, Katie will have gotten her PhD after her brother did/??does.

Putting them together, starting with adjunct past:

(17) E-level *after*+QR to AspP: *adjunct past

a. $[\![\lambda_2\text{PFV Katie get PhD after } e_2]\!]^{t',g} =$
$\lambda i.\exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} < t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past pfv}\ \text{I leave at } e_3]]]\!]^{t',g} =$
the τ s.t. $\exists i' < t'.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t''$

ii. presupposition: $\tau < t'$ *entails the assertion:* **redundant!**

(18) E-level *after*+QR to PerfP: ✓adjunct past

a. $[\![\lambda_2\textsc{Perf pfv}\ \text{Katie get PhD after } e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} < t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past pfv}\ \text{I leave at } e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' < t.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t''$

ii. presupposition: $\tau < t = RB(t')$ *does not entail the assertion:* **not redundant!**

(19) E-level *after*+QR to TP: *adjunct past

a. $[\![\lambda_2\textsc{Fut perf pfv}\ \text{Katie get PhD after } e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} < t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past pfv}\ \text{I leave at } e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' < u.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t''$

ii. presupposition: $\tau < u$ *entails the assertion:* **redundant!**

(20) P-level *after*+QR to PerfP: ✓adjunct past

a. $[\![\lambda_2\textsc{Perf pfv}\ \text{Katie get PhD after } e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} < t'$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past pfv}\ \text{I leave at } e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' < t.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t'$

ii. presupposition: $\tau < t = RB(t')$ *does not entail the assertion:* **not redundant!**

(21) P-level *after*+QR to TP: *adjunct past

a. $[\![\lambda_2\textsc{Fut perf pfv}\ \text{Katie get PhD after } e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} < t'$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{past pfv}\ \text{I leave at } e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' < u.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t'$

ii. presupposition: $\tau < u$ *entails the assertion:* **redundant!**

And now for adjunct future:

(22) E-level *after*+QR to AspP: *adjunct future

a. $[\![\lambda_2\textsc{pfv}\ \text{Katie get PhD after } e_2]\!]^{t',g} =$
$\lambda i.\exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} < t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{fut pfv}\ \text{I leave at } e_3]]]\!]^{t',g} =$
the τ s.t. $\exists i' > t'.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t''$

ii. presupposition: $\tau > t'$ **contradiction!**

(23) E-level *after*+QR to PerfP: *adjunct future

a. $[\![\lambda_2\textsc{Perf pfv}\ \text{Katie get PhD after } e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} < t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{fut pfv}\ \text{I leave at } e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' > t.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t''$

ii. presupposition: $\tau > t = RB(t')$ **contradiction!**

(24) E-level *after*+QR to TP: ✓adjunct future

a. $[\![\lambda_2\textsc{Fut perf pfv}\ \text{Katie get PhD after } e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t'',g(2/i)} < t''$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{fut pfv}\ \text{I leave at } e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' < u.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t''$

ii. presupposition: $\tau > u$ **no contradiction!**

(25) P-level *after*+QR to PerfP: *adjunct future

a. $[\![\lambda_2\textsc{Perf pfv}\ \text{Katie get PhD after } e_2]\!]^{t,g} =$
$\lambda i.\exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} < t'$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{fut pfv}\ \text{I leave at } e_3]]]\!]^{t,g} =$
the τ s.t. $\exists i' > t.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t'$

ii. presupposition: $\tau > t = RB(t')$ **contradiction!**

(26) P-level *after*+QR to TP: ✓adjunct future

a. $[\![\lambda_2\textsc{Fut perf pfv}\ \text{Katie get PhD after } e_2]\!]^{u,g} =$
$\lambda i.\exists t > u \wedge \exists t' : t = RB(t') \wedge \exists t'' : t'' \subseteq t'$. Katie get PhD at $t'' \wedge [\![e_2]\!]^{t',g(2/i)} < t'$

b. $[\![\text{Op}_3\ [\lambda_3\ [\ \textsc{fut pfv}\ \text{I leave at } e_3]]]\!]^{u,g} =$
the τ s.t. $\exists i' > u.\ \exists i'' \subseteq i'$. K's brother <get PhD> at $\tau \wedge \tau = i''$.

c. i. assertion: $\tau < t'$

ii. presupposition: $\tau > u$ **no contradiction!**