Scope in English: Analysis in CCG+UC$_2$

Maria Bittner

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Plan

- Introduction:
  - scope prediction: SA vs BA
  - sample data: English (SA, BA) & Kalaallisut (BA)
- Analysis of English data (today)
- Analysis of Kalaallisut data (next time)

Scope prediction

- SA (syntactic argument):
  The scope of SA may be ambiguous

- BA (morphologically bound argument):
  The scope of BA and any modifiers is unambiguous

English SA

- (Last month Ole$^\top$ ordered three books$^\perp$.)

- <u>Transitive DO (direct object): ambiguous</u>
  He$_\top$ has n't received *one*$_\perp$ *book* yet.

  ∃¬. one book still missing
  ¬∃. hasn't received any

- <u>Passive SU (subject): wide only</u>
  One book has n't been received yet.

  ∃¬. one book still missing

English SA & BA

- (Ole^T has invited his students$^\perp$ to come and see him individually. But…)

- <u>Passive TV-CTR ('implicit agent'): narrow only</u>

  He$_T$ has**n't** been *approach*ed yet.

  ¬∃. none have come yet

- <u>Passive BY QP ('*by* phrase'): ambiguous</u>

  He$_T$ has**n't** been approached BY *one student* yet.

  ¬∃. none have come yet

  ∃¬. one hasn't come yet

Kalaallisut BA: Wide scope -pn

- (Last month Ole^T ordered three books$^\perp$.)

- <u>Transitive s$^+$…-*pn*$_\perp$: wide only</u>

  Suli   atuagaq   ataasiq   tigu-nngi(t)-la-a-Ø.

  still $^\perp$*book*$_\perp$ *one*$_\perp$ receive-*not*-DEC-3s$_{(T)}$-*3s$_{(\perp)}$*

  ∃¬. one book still missing

- <u>Passive s$^+$…-**pn**$_\perp$: wide only</u>

  Suli   atuagaq   ataasiq   tigu-niqa(r)-nngi(t)-la-q.

  still $^\top$*book*$_T$ *one*$_T$ receive-pssv-*not*-DEC-**3s$_{(T)}$**

  ∃¬. one book still missing

Kalaallisut BA: Narrow scope –*antip | cn-*

- (Last month Ole^T ordered three books$^\perp$.)

- <u>Antipassive s$^+$…-*antip*: narrow only</u>

  Suli   atuakka-mik   ataatsi-mik   tigu-si-nngi(t)-la-q.

  still   *book-$_\delta$*MOD   *one*-MOD$_\delta$ receive-*antip*-*not*-DEC-3s$_{(T)}$

  ¬∃. hasn't received any

- <u>'Incorporated' noun $^+$s…*cn-*: narrow only</u>

  Suli   ataatsimik   atuagar-si-nngi(t)-la-q.

  still   *one*-MOD$_\delta$ *book*-rcv-*not*-DEC-3s$_{(T)}$

  ¬∃. hasn't received any

Kalaallisut BA: [[$^+$s… *cn-*…] $^+$s] only

- (Yesterday I saw a bear near the village. And today…)

  Ole   alla-mik   nanu-si-pu-q   angisuu-mik.

  Ole   *other*-MOD$_\delta$ *bear*-see-DEC-3s$_{(T)}$ *big*-MOD$_\delta$

  big > other. Ole saw another bear, a big one.

- (Yesterday I saw a big bear near the village. And today…)

  Ole   angisuu-mik   nanu-si-pu-q   alla-mik.

  Ole   *big*-MOD$_\delta$ *bear*-see-DEC-3s$_{(T)}$ *other*-MOD$_\delta$

  other > big. Ole (too) saw a big bear, another one.

English SA & BA: Lexicon

- <u>lexical categories</u> (TV = $x_{[]}$/PN′ where $\mathbf{tp}(x_{[]}) = []$)

receive-	TV: $\lambda \underline{y}([e]^{\perp}; [rcv\langle \perp\varepsilon, \text{CTR} \perp\varepsilon, \underline{y}\rangle])$
have-	IV/IV$_{\text{pf}}$: $\lambda K.\,K$
be-	IV/IV$_{\text{ps}}$: $\lambda K(K^{\perp}; [e|\,e \subseteq_i \perp\varepsilon, \text{CTR}\,e =_i \text{BCK} \perp\varepsilon])$
book	CN: $\lambda x.\,bk\,x$
one	NP/CN: $\lambda P \lambda \underline{x}([P\langle ?\delta\rangle]; [\underline{x} \in ?\delta\|])$

- <u>grammatical categories</u> (VP = s\PN, QP$^{\top}$ = s/VP, QP$^{\perp}$ = $x_{[]}$\($x_{[]}$/PN′))

I, HE	QP$^{\top}$: $\lambda \underline{P}.\,P\,\text{CTR}\langle \top\varepsilon\rangle, \lambda \underline{P}.\,P\,?\delta$	($?\delta \in \{\top\delta, \perp\delta, \top\delta_2\}$)
ME, SLF	PN′: $\text{CTR}\langle \top\varepsilon\rangle, \text{CTR}\langle \perp\varepsilon\rangle$	
HIM	QP$^{\perp}$: $\lambda \underline{P}([?\delta \neq_i \text{CTR}\langle \perp\varepsilon\rangle]; \underline{P}\,?\delta)$	($?\delta \in \{\top\delta, \perp\delta, \top\delta_2\}$)
$\top$-	QP$^{\top}$/NP: $\lambda \underline{P}'\lambda \underline{P}(([\mathbf{x}]^{\top}; \underline{P}'\,\top\delta)^{\top}; \underline{P}\,\top\delta)$	
$\perp$-	QP$^{\perp}$/NP: $\lambda \underline{P}'\lambda \underline{P}(([y]^{\perp}; \underline{P}'\,\perp\delta)^{\perp}; \underline{P}\,\perp\delta)$	
BY	PP$_{\text{ps}}$/QP$^{\perp}$: $\lambda \underline{Q}\lambda K(Q\,\lambda \underline{x}(K^{\perp}; [\text{CTR} \perp\varepsilon =_i \underline{x}]))$	(PP$_{\text{ps}}$ = IV$_{\text{ps}}$\IV$_{\text{ps}}$)
	PP$_{\text{s}}$/QP$^{\perp}$: $\lambda \underline{Q}\lambda K(Q\,\lambda \underline{x}(K^{\perp}; [\perp\varepsilon \subseteq_i \perp\varepsilon_2, \text{CTR} \perp\varepsilon_2 =_i \underline{x}]))$	(PP$_{\text{s}}$ = s\s)
-PS	IV$_{\text{ps}}$\TV: $\lambda \underline{P}.\,P\,\text{BCK}\langle \perp\varepsilon\rangle$	
-PF	IV$_{\text{pf}}$\IV: $\lambda K.\,K$	
-TNS	VP\IV: $\lambda K \lambda \underline{x}(K^{\perp}; [\text{CTR} \perp\varepsilon =_i \underline{x}])$	
=N'T	VP\VP: $\lambda \underline{P}\lambda \underline{x}[\sim(\underline{P}\,x)]$	

English SA & BA: *have-TNS=n't*

have-	*-TNS*	*=N'T*

IV/IV$_{\text{pf}}$:	VP\IV:	VP\VP:
$\lambda K.\,K$	$\lambda K \lambda \underline{x}(K^{\perp}; [\text{CTR} \perp\varepsilon =_i \underline{x}])$	$\lambda \underline{P}\lambda \underline{x}[\sim(\underline{P}\,x)]$

  $>\mathbf{B_x}$

  VP/IV$_{\text{pf}}$: $\lambda K \lambda \underline{x}(K^{\perp}; [\text{CTR} \perp\varepsilon =_i \underline{x}])$

  $>\mathbf{B_x}$

  VP/IV$_{\text{pf}}$: $\lambda K \lambda \underline{x}.[\sim(K^{\perp}; [\text{CTR} \perp\varepsilon =_i \underline{x}])]$

English SA & BA: Passive copula

- *been*

be-	*-PF*
IV/IV$_{\text{ps}}$:	IV$_{\text{pf}}$\IV:
$\lambda K(K^{\perp}; [e|\,e \subseteq_i \perp\varepsilon, \text{CTR}\,e =_i \text{BCK} \perp\varepsilon])$	$\lambda K.\,K$

  $<\mathbf{B_x}$

  IV$_{\text{pf}}$/IV$_{\text{ps}}$: $\lambda K(K^{\perp}; [e|\,e \subseteq_i \perp\varepsilon, \text{CTR}\,e =_i \text{BCK} \perp\varepsilon])$

English SA & BA: Passive vs. Perfect

received

receive-	*-PF*
TV (= $x_{[]}$/PN′):	IV$_{\text{pf}}$\IV:
$\lambda \underline{y}([e]^{\perp}; [rcv\langle \perp\varepsilon, \text{CTR} \perp\varepsilon, \underline{y}\rangle])$	$\lambda K.\,K$

  $<\mathbf{B_x}$

  IV$_{\text{pf}}$/PN′: $\lambda \underline{y}([e]^{\perp}; [rcv\langle \perp\varepsilon, \text{CTR} \perp\varepsilon, \underline{y}\rangle])$

receive-	*-PS*
TV (= $x_{[]}$/PN′):	IV$_{\text{ps}}$\TV:
$\lambda \underline{y}([e]^{\perp}; [rcv\langle \perp\varepsilon, \text{CTR} \perp\varepsilon, \underline{y}\rangle])$	$\lambda \underline{P}.\,P\,\text{BCK}\langle \perp\varepsilon\rangle$

  $<$

  IV$_{\text{ps}}$: $[e|\,rcv\langle e, \text{CTR}\,e, \text{BCK}\,e\rangle]$

Ambiguous object QP$^\perp$: English data

- (Last month Ole$^\top$ ordered three books$^\perp$.)

- *He$_\top$ hasn't   received   one book yet.*
  HE   have-TNS=<u>N'T</u> receive-PF $^\perp$- *one book* yet

  - $\neg\exists$. hasn't received any
  - $\exists\neg$. one is still missing

Ambiguous object QP$^\perp$: Narrow scope (part 1)

- HE hasn't …

HE	have-TNS=<u>N'T</u>

QP$^\top$ (= s/VP):	VP/IV$_{pf}$:
$\lambda\underline{P}.\,\underline{P}\,\top\delta$	$\lambda K\lambda\underline{x}[\sim(K^\perp;[\text{CTR}\perp\varepsilon=_i\underline{x}])]$

$$\text{>}\mathbf{B}$$

s/IV$_{pf}$: $\lambda K[\sim(K^\perp;[\text{CTR}\perp\varepsilon=_i\top\delta])]$

Ambiguous object QP$^\perp$: Narrow scope (part 2)

- … receive-PF $^\perp$*one book* (yet).

  receive-PF

  $$<\mathbf{B_x}$$

  IV$_{pf}$/PN′: $\lambda\underline{y}([e]^\perp;[rcv\langle\perp\varepsilon,\text{CTR}\perp\varepsilon,\underline{y}\rangle])$

$^\perp$-	*one*	*book*

QP$^\perp$/NP:	NP/CN:	CN:
$\lambda\underline{P}'\lambda\underline{P}(([y]^\perp;\underline{P}'\perp\delta)^\perp;\underline{P}\perp\delta)$	$\lambda P\lambda\underline{x}([P\langle\perp\delta_2\rangle];[\underline{x}\in\perp\delta_2\text{II}])$	$\lambda x.\,bk\,x$

  $$\text{>}\mathbf{B}$$

  QP$^\perp$/CN: $\lambda\underline{P}'\lambda\underline{P}(([y]^\perp;([P'\langle\perp\delta_2\rangle];[\perp\delta\in\perp\delta_2\text{II}]))^\perp;\underline{P}\perp\delta)$

  $$\text{>}$$

  QP$^\perp$ (= $x_{[]}\backslash(x_{[]}/\text{PN}'))$: $\lambda\underline{P}(([y];[bk\langle\perp\delta_2\rangle];[\perp\delta\in\perp\delta_2\text{II}])^\perp;\underline{P}\perp\delta)$

  $$<$$

  IV$_{pf}$: $([y];[bk\langle\perp\delta_2\rangle];[\perp\delta\in\perp\delta_2\text{II}];[e|\,rcv\langle e,\text{CTR}\,e,\perp\delta\rangle])$

Ambiguous object QP$^\perp$: Narrow scope (conclusion)

- HE has**n't** [receive-PF $^\perp$*one book*] (yet).

  HE have-TNS=<u>N'T</u>

  $$\text{>}\mathbf{B}$$

  s/IV$_{pf}$: $\lambda K[\sim(K^\perp;[\text{CTR}\perp\varepsilon=_i\top\delta])]$

  receive-PF $^\perp$*one book*

  $$<$$

  IV$_{pf}$: $([y];[bk\langle\perp\delta_2\rangle];[\perp\delta\in\perp\delta_2\text{II}];[e|\,rcv\langle e,\text{CTR}\,e,\perp\delta\rangle])$

  $$\text{>}$$

  s: $[\sim(([y];[bk\langle\perp\delta_2\rangle];[\perp\delta\in\perp\delta_2\text{II}];[e|\,rcv\langle e,\text{CTR}\,e,\perp\delta\rangle])^\perp;[\text{CTR}\perp\varepsilon=_i\top\delta])]$
  s: $[\sim([y];[bk\langle\perp\delta_2\rangle];[\perp\delta\in\perp\delta_2\text{II}];[e|\,rcv\langle e,\text{CTR}\,e,\perp\delta\rangle,\text{CTR}\,e=_i\top\delta])]$
  s: $[\sim([y];[bk\langle\perp\delta_2\rangle];[\perp\delta\in\perp\delta_2\text{II}];[e|\,rcv\langle e,\top\delta,\perp\delta\rangle])]$

Ambiguous object QP$^\perp$: Wide scope (part 1)

- HE hasn't receive-PF…

HE	have-TNS=N'T	receive-PF
———————	———————	———————
QP$^\top$ (= s/VP):	VP/IV$_{pf}$:	IV$_{pf}$/PN′:
$\lambda \underline{P}.\ \underline{P}\ \top\delta$	$\lambda K\lambda\underline{x}[\sim(K^{\perp}; [\text{CTR}\ \perp\varepsilon =_i \underline{x}])]$	$\lambda\underline{y}([e]^{\perp}; [rcv\langle\perp\varepsilon, \text{CTR}\ \perp\varepsilon, \underline{y}\rangle])$

————————————————————————— >**B**
VP/PN′: $\lambda\underline{y}\lambda\underline{x}[\sim(([e]^{\perp}; [rcv\langle\perp\varepsilon, \text{CTR}\ \perp\varepsilon, \underline{y}\rangle])^{\perp}; [\text{CTR}\ \perp\varepsilon =_i \underline{x}])]$
VP/PN′: $\lambda\underline{y}\lambda\underline{x}[\sim([e|\ rcv\langle e, \text{CTR}\ e, \underline{y}\rangle]^{\perp}; [\text{CTR}\ \perp\varepsilon =_i \underline{x}])]$
VP/PN′: $\lambda\underline{y}\lambda\underline{x}[\sim[e|\ rcv\langle e, \underline{x}, \underline{y}\rangle]]$

————————————————————————— >**B**

s/PN′: $\lambda\underline{y}[\sim[e|\ rcv\langle e, \top\delta, \underline{y}\rangle]]$

Ambiguous object QP$^\perp$: Wide scope (part 2)

- …$^{\perp}$one book (yet).

$\perp$-	one	book
———————	———————	———
QP$^\perp$/NP:	NP/CN:	CN:
$\lambda\underline{P'}\lambda\underline{P}(([y]^{\perp}; \underline{P'}\perp\delta)^{\perp}; \underline{P}\perp\delta)$	$\lambda P\lambda\underline{x}([P\langle\perp\delta_2\rangle]; [\underline{x}\in\perp\delta_2\|])$	$\lambda x.\ bk\ x$

——————————————————— >**B**

QP$^\perp$/CN: $\lambda\underline{P'}\lambda\underline{P}(([y]^{\perp}; ([P'\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|]))^{\perp}; \underline{P}\perp\delta)$

————————————————————————————— >

QP$^\perp$ (= x$_{[]}$\(x$_{[]}$/PN′)): $\lambda\underline{P}(([y]; [bk\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|])^{\perp}; \underline{P}\perp\delta)$

Ambiguous object QP$^\perp$: Wide scope (conclusion)

- [HE hasn't receive-PF] $^{\perp}$one book (yet).

HE have-TNS=N'T receive-PF
————————————————————— >**B**

s/PN′: $\lambda\underline{y}[\sim[e|\ rcv\langle e, \top\delta, \underline{y}\rangle]]$

   $^{\perp}$one book
——————————————————————————— >

QP$^\perp$ (= x$_{[]}$\(x$_{[]}$/PN′)): $\lambda\underline{P}(([y]; [bk\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|])^{\perp}; \underline{P}\perp\delta)$

——————————————————————————— <

s: $(([y]; [bk\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|])^{\perp}; [\sim[e|\ rcv\langle\perp\varepsilon, \top\delta, \perp\delta\rangle]])$
s: $([y]; [bk\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|]; [\sim[e|\ rcv\langle\perp\varepsilon, \top\delta, \perp\delta\rangle]])$

Subject QP$^\top$: Wide scope only (part 1)

- (Last month $^\top$Ole ordered $^{\perp}$three books.)

- $^\top$One book hasn't been received yet.
  ∃¬. one book is still missing

- $^\top$One book …

$\top$-	one	book
———————	———————	———
QP$^\top$/NP:	NP/CN:	CN:
$\lambda\underline{P'}\lambda\underline{P}(([\mathbf{x}]^{\top}; \underline{P'}\top\delta)^{\top}; \underline{P}\top\delta)$	$\lambda P\lambda\underline{x}([P\langle\perp\delta\rangle]; [\underline{x}\in\perp\delta\|])$	$\lambda x.\ bk\ x$

——————————————————— >**B**
QP$^\top$/CN: $\lambda\underline{P'}\lambda\underline{P}(([\mathbf{x}]^{\top}; ([P'\langle\perp\delta\rangle]; [\top\delta\in\perp\delta\|]))^{\top}; \underline{P}\top\delta)$

————————————————————————————— >

QP$^\top$ (= s/VP): $\lambda\underline{P}(([\mathbf{x}]; [bk\langle\perp\delta\rangle]; [\top\delta\in\perp\delta\|])^{\top}; \underline{P}\top\delta)$

Subject QP^T: Wide scope only (part 2)

- … hasn't been received.

  have-TNS=N'T   be-PF
  _____   _____

  VP/IV$_{pf}$:
  $\lambda K\lambda\underline{x}[\neg(K^{\perp}; [\text{CTR } \perp\varepsilon =_i \underline{x}])]$ $\lambda K(K^{\perp}; [e| e \subseteq_i \perp\varepsilon, \text{CTR } e =_i \text{BCK } \perp\varepsilon])$
  _____ >**B**

  VP/IV$_{ps}$: $\lambda K\lambda\underline{x}[\neg(K^{\perp}; [e| e \subseteq_i \perp\varepsilon, \text{CTR } e =_i \text{BCK } \perp\varepsilon, \text{CTR } e =_i \underline{x}])]$

       receive-PS

       _____ <
       IV$_{ps}$: $[e| rcv\langle e, \text{CTR } e, \text{BCK } e\rangle]$
  _____ >

  VP: $\lambda\underline{x}[\neg([e| rcv\langle e, \text{CTR } e, \text{BCK } e\rangle]^{\perp}; [e| e \subseteq_i \perp\varepsilon, \text{CTR } e =_i \text{BCK } \perp\varepsilon, \text{CTR } e =_i \underline{x}])]$
  VP: $\lambda\underline{x}[\neg[e'e| rcv\langle e, \text{CTR } e, \text{BCK } e\rangle, e' \subseteq_i e, \text{CTR } e' =_i \text{BCK } e, \text{CTR } e' =_i \underline{x}]]$
  VP: $\lambda\underline{x}[\neg[e'e| rcv\langle e, \text{CTR } e, \underline{x}\rangle, e' \subseteq_i e, \text{CTR } e' =_i \underline{x}]]$

Subject QP^T: Wide scope only (conclusion)

- ^{T}One book …
  ^{T}-one book
  _____ >
  QP^T (= s/VP): $\lambda\underline{P}(([\mathbf{x}]; [bk\langle\perp\delta\rangle]); [\text{T}\delta \in \perp\delta||])^T; \underline{P}\,\text{T}\delta)$

- … hasn't been received.
       have-TNS=N'T   be-PF   receive-PS
       _____ >
       VP: $\lambda\underline{x}[\neg[e'e| rcv\langle e, \text{CTR } e, \underline{x}\rangle, e' \subseteq_i e, \text{CTR } e' =_i \underline{x}]]$

- ^{T}One book [hasn't been received].
  _____ >
  s: $((([\mathbf{x}]; [bk\langle\perp\delta\rangle]); [\text{T}\delta \in \perp\delta||])^T; [\neg[e'e| rcv\langle e, \text{CTR } e, \text{T}\delta\rangle, e' \subseteq_i e, \text{CTR } e' =_i \text{T}\delta]])$
  s: $(([\mathbf{x}]; [bk\langle\perp\delta\rangle]; [\text{T}\delta \in \perp\delta||]; [\neg[e'e| rcv\langle e, \text{CTR } e, \text{T}\delta\rangle, e' \subseteq_i e, \text{CTR } e' =_i \text{T}\delta]])$

Passive BA-CTR: Narrow scope only (data)

- (Ole^T has invited his students$^{\perp}$ to come and see him individually. But…)

- He hasn't [been *approach*ed] yet.
  $\neg\exists$. no students have approached him yet

Passive BA-CTR: Narrow scope only (analysis)

- HE hasn't …
  HE   have-TNS=N'T
  _____   _____

  QP^T (= s/VP):   VP/IV$_{pf}$:
  $\lambda\underline{P}. \underline{P}\,\text{T}\delta$ $\lambda K\lambda\underline{x}[\neg(K^{\perp}; [\text{CTR } \perp\varepsilon =_i \underline{x}])]$
  _____ >**B**
  s/IV$_{pf}$: $\lambda K[\neg(K^{\perp}; [\text{CTR } \perp\varepsilon =_i \text{T}\delta])]$

- … been approached
       be-PF   approach-PS
       _____   _____ <

       IV$_{pf}$/IV$_{ps}$:   IV$_{ps}$:
       $\lambda K(K^{\perp}; [e| e \subseteq_i \perp\varepsilon, \text{CTR } e =_i \text{BCK } \perp\varepsilon])$ $[e| approach\langle e, \text{CTR } e, \text{BCK } e\rangle]$
       _____ >

       IV$_{pf}$: $([e| approach\langle e, \text{CTR } e, \text{BCK } e\rangle]^{\perp}; [e| e \subseteq_i \perp\varepsilon, \text{CTR } e =_i \text{BCK } \perp\varepsilon])$
       IV$_{pf}$: $[e'e| approach\langle e, \text{CTR } e, \text{BCK } e\rangle, e' \subseteq_i e, \text{CTR } e' =_i \text{BCK } e]$

- s: $[\neg[e'e| approach\langle e, \text{CTR } e, \text{T}\delta\rangle, e' \subseteq_i e, \text{CTR } e' =_i \text{T}\delta]]$

Ambiguous BY-phrase: Data

- (Ole$^\top$ has invited his students$^\perp$ to come and see him individually. But…)

- He hasn't been approached *by one student* yet.
  - $\neg\exists$. no student has approached him yet
  - $\exists\neg$. one student still hasn't approached him

Ambiguous BY-phrase: Narrow scope (part 1)

- HE hasn't been…

HE	have-TNS=N'T be-PF

$$\rule{3cm}{0.4pt} \quad \rule{8cm}{0.4pt} > \mathbf{B}$$

QP$^\top$ (= s/VP): VP/IV$_{ps}$:

$\lambda \underline{P}.\ \underline{P}\ \top\delta$ $\qquad$ $\lambda K\lambda \underline{x}[\neg(K^{\perp};\ [e|\ e \subseteq_i \perp\varepsilon,\ \mathrm{CTR}\ e =_i \mathrm{BCK}\ \perp\varepsilon,\ \mathrm{CTR}\ e =_i \underline{x}])]$

$$\rule{11cm}{0.4pt} > \mathbf{B}$$

s/IV$_{ps}$: $\lambda K[\neg(K^{\perp};\ [e|\ e \subseteq_i \perp\varepsilon,\ \mathrm{CTR}\ e =_i \mathrm{BCK}\ \perp\varepsilon,\ \mathrm{CTR}\ e =_i \top\delta])]$

Ambiguous BY-phrase: Narrow scope (conclusion)

- … approached BY *one student* (yet).

  approach-PS

$$\rule{5cm}{0.4pt} <$$

IV$_{ps}$: $[e|\ approach\langle e,\ \mathrm{CTR}\ e,\ \mathrm{BCK}\ e\rangle]$

$\qquad$ BY $\qquad\qquad\qquad\qquad$ $\perp$-*one student*

$$\rule{12cm}{0.4pt} >$$

PP$_{ps}$/QP$^\perp$: $\qquad\qquad\qquad$ QP$^\perp$:

$\lambda \underline{Q}\lambda K(\underline{Q}\ \lambda \underline{x}(K^{\perp};\ [\mathrm{CTR}\ \perp\varepsilon =_i \underline{x}]))$ $\quad$ $\lambda \underline{P}(([y];\ [std\langle\perp\delta_2\rangle];\ [\perp\delta \in \perp\delta_2||])^{\perp};\ \underline{P}\ \perp\delta)$

$$\rule{12cm}{0.4pt}$$

PP$_{ps}$ (= IV$_{ps}$\IV$_{ps}$): $\lambda K(([y];\ [std\langle\perp\delta_2\rangle];\ [\perp\delta \in \perp\delta_2||])^{\perp};\ (K^{\perp};\ [\mathrm{CTR}\ \perp\varepsilon =_i \perp\delta]))$

$$\rule{13cm}{0.4pt} <$$

IV$_{ps}$: $([y];\ [std\langle\perp\delta_2\rangle];\ [\perp\delta \in \perp\delta_2||];\ [e|\ approach\langle e,\ \perp\delta,\ \mathrm{BCK}\ e\rangle])$

- HE hasn't been [approached BY *one student*] (yet).

$$\rule{13cm}{0.4pt} >$$

s: $[\neg([y];\ [std\langle\perp\delta_2\rangle];\ [\perp\delta \in \perp\delta_2||];\ [e'e|\ approach\langle e,\ \perp\delta,\ \top\delta\rangle,\ e' \subseteq_i e,\ \mathrm{CTR}\ e' =_i \top\delta])]$

Ambiguous BY-phrase: Wide scope (part 1)

- HE hasn't been approached …

HE	have-TNS=N'T be-PF

$$\rule{3cm}{0.4pt} \quad \rule{8cm}{0.4pt} > \mathbf{B}$$

QP$^\top$ (= s/VP): VP/IV$_{ps}$:

$\lambda \underline{P}.\ \underline{P}\ \top\delta$ $\qquad$ $\lambda K\lambda \underline{x}[\neg(K^{\perp};\ [e|\ e \subseteq_i \perp\varepsilon,\ \mathrm{CTR}\ e =_i \mathrm{BCK}\ \perp\varepsilon,\ \mathrm{CTR}\ e =_i \underline{x}])]$

$$\rule{11cm}{0.4pt} > \mathbf{B}$$

s/IV$_{ps}$: $\lambda K[\neg(K^{\perp};\ [e|\ e \subseteq_i \perp\varepsilon,\ \mathrm{CTR}\ e =_i \mathrm{BCK}\ \perp\varepsilon,\ \mathrm{CTR}\ e =_i \top\delta])]$

$\qquad\qquad\qquad\qquad\qquad\qquad$ approach-PS

$$\rule{6cm}{0.4pt} <$$

$\qquad\qquad\qquad\qquad\qquad$ IV$_{ps}$: $[e|\ approach\langle e,\ \mathrm{CTR}\ e,\ \mathrm{BCK}\ e\rangle]$

$$\rule{13cm}{0.4pt} >$$

s: $[\neg([e|\ approach\langle e,\ \mathrm{CTR}\ e,\ \mathrm{BCK}\ e\rangle]^{\perp};\ [e|\ e \subseteq_i \perp\varepsilon,\ \mathrm{CTR}\ e =_i \mathrm{BCK}\ \perp\varepsilon,\ \mathrm{CTR}\ e =_i \top\delta])]$

s: $[\neg[e'e|\ approach\langle e,\ \mathrm{CTR}\ e,\ \mathrm{BCK}\ e\rangle,\ e' \subseteq_i e,\ \mathrm{CTR}\ e' =_i \mathrm{BCK}\ e,\ \mathrm{CTR}\ e' =_i \top\delta])]$

s: $[\neg[e'e|\ approach\langle e,\ \mathrm{CTR}\ e,\ \top\delta\rangle,\ e' \subseteq_i e,\ \mathrm{CTR}\ e' =_i \top\delta]]$

Ambiguous BY-phrase: Wide scope (conclusion)

- HE hasn't been approached ...

  ——————————————————————————————— >

  s: $[\sim[e'\,e|\,approach\langle e, \text{CTR}\,e, \top\delta\rangle, e'\subseteq_i e, \text{CTR}\,e'=_i \top\delta]]$

- ... BY $one_\perp$ student (yet).

  BY $\perp$-one student

  ————————————————————————   ————————————————————————————— >

  $PP_s/QP^\perp$: $QP^\perp$:

  $\lambda Q\lambda K(Q\,\lambda\underline{x}(K^\perp; [\perp\varepsilon\subseteq_i \perp\varepsilon_2, \text{CTR}\,\perp\varepsilon_2 =_i \underline{x}]))$ $\lambda\underline{P}(([y]; [std\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|])^\perp; \underline{P}\perp\delta)$

  ——————————————————————————————————— >

  PP_s (= s\s): $\lambda K(([y]; [std\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|])^\perp; (K^\perp; [\text{CTR}\,\perp\varepsilon_2 =_i \perp\delta]))$

- HE hasn't been approached BY $one_\perp$ student (yet).

  s: $([y]; [std\langle\perp\delta_2\rangle]; [\perp\delta\in\perp\delta_2\|];$

  $([\sim[e'\,e|\,approach\langle e, \text{CTR}\,e, \top\delta\rangle, e'\subseteq_i e, \text{CTR}\,e'=_i \top\delta]]^\perp; [\perp\varepsilon\subseteq_i \perp\varepsilon_2, \text{CTR}\,\perp\varepsilon_2 =_i \perp\delta]))$

- **Oops!** The antecedent (e) for $\perp\varepsilon_2$ is trapped inside the scope of negation ($\sim$). So this background-elaboration sequence ($A^\perp; B$) denotes the absurd state--i.e. wide scope BY QP is wrongly ruled out. (See handout for the outline of a possible *solution*).