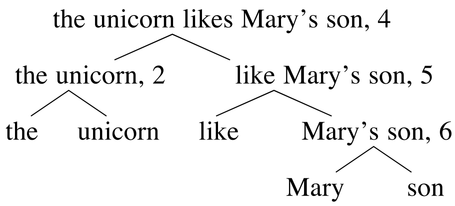
Notes on Karttunen 1973
Selective Filtering of Presupposition Sets

Note. In what follows we assume the K&P style formalization of Karttunen 1973 given in the APPENDIX.

1. FROM CONJOINED PRESUPPOSITIONS TO PRESUPPOSITION SETS

(a)



Basic meanings

$\mathbf{A}(\text{uni}) = \lambda y_e\, \lambda i\; uni_i\, y$
$\mathbf{P}(\text{uni}) = \lambda y_e\, \lambda r_{st}\, \bot$

$\mathbf{A}(\text{the}) = \lambda P'_{e(st)}\, \lambda P_{e(st)}\, \lambda i\, \exists x_e(P'xi \wedge \forall y_e(P'yi \rightarrow y = x) \wedge Pxi)$
$\mathbf{P}(\text{the}) = \lambda P'_{e(st)}\, \lambda P_{e(st)}\, \lambda r_{st}(r = \exists x_e(P'xi \wedge \forall y_e(P'yi \rightarrow y = x)))$

$\mathbf{A}(\text{Mary}) = \lambda P_{e(st)}\, P\, mary$
$\mathbf{P}(\text{Mary}) = \lambda P_{e(st)}\, \lambda r_{st}\, (r = \lambda i\, fem_i\, mary)$

$\mathbf{A}(\text{son}) = \lambda Q_{(e(st))(st)}\, \lambda P_{e(st)}\, (Q\, \lambda x_e \lambda i\, \exists y_e(son\_of_i(y, x) \wedge Pyi))$
$\mathbf{P}(\text{son}) = \lambda Q_{(e(st))(st)}\, \lambda P_{e(st)}\, \lambda r_{st}(r = Q\, \lambda x_e \lambda i\, \exists y_e\, son\_of_i(y, x))$

$\mathbf{A}(\text{like}) = \lambda Q'_{(e(st))(st)}\, \lambda Q_{(e(st))(st)}\, (Q\, \lambda x_e(Q'\, \lambda y_e\, \lambda i\, like_i(x, y)))$
$\mathbf{P}(\text{like}) = \lambda Q'_{(e(st))(st)}\, \lambda Q_{(e(st))(st)}\, \lambda r_{st}\, (r = Q\, \lambda x_e(Q'\, \lambda y_e\, \lambda i\, acq_i(x, y)))$

Semantic composition

By RULE 2 (T/CN + CN),

$\mathbf{A}(\text{the uni}) = \mathbf{A}(\text{the})\mathbf{A}(\text{uni})$
$= \lambda P_{e(st)}\, \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \rightarrow y = x) \wedge Pxi)$

$\mathbf{P}(\text{the uni}) = \lambda P_{e(st)}\, \lambda r_{st}(\mathbf{P}(\text{the})\mathbf{A}(\text{uni})Pr$
$\vee\; \exists x_e\, \mathbf{P}(\text{uni})xr)$
$= \lambda P_{e(st)}\, \lambda r_{st}(r = \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \rightarrow y = x)))$

By RULE 6 (*gen*(T) + T/T),

$\mathbf{A}(\text{Mary's son}) = \mathbf{A}(\text{son})\mathbf{A}(\text{Mary})$
$= \lambda P_{e(st)}\, \lambda i\, \exists y_e(son\_of_i(y, mary) \wedge Pyi)$

$\mathbf{P}(\text{Mary's son}) = \lambda P_{e(st)}\, \lambda r_{st}(\mathbf{P}(\text{son})\mathbf{A}(\text{Mary})Pr$
$\vee\; \exists P_{e(st)}\mathbf{P}(\text{Mary})Pr)$
$= \lambda P_{e(st)}\, \lambda r_{st}(r = \lambda i\, \exists y_e\, son\_of_i(y, mary)$
$\vee\; r = \lambda i\, fem_i\, mary)$

By RULE 5 (TV + *acc*(T)),

$\mathbf{A}(\text{like Mary's son}) = \mathbf{A}(\text{like})\mathbf{A}(\text{Mary's son})$
$= \lambda Q_{(e(st))(st)}\, (Q\, \lambda x_e\, \lambda i\, \exists y_e(son\_of_i(y, mary) \wedge like_i\, (x, y)))$

$\mathbf{P}(\text{like Mary's son}) = \lambda Q_{(e(st))(st)}\, \lambda r_{st}(\mathbf{P}(\text{like})\mathbf{A}(\text{Mary's son})Qr$
$\vee\; \exists P_{e(st)}\, \mathbf{P}(\text{Mary's son})Pr)$
$= \lambda Q_{(e(st))(st)}\, \lambda r_{st}(r = Q\, \lambda x_e \lambda i\, \exists y_e(son\_of_i(y, mary) \wedge acq_i(x, y))$
$\vee\; r = \lambda i\, \exists y_e\, son\_of_i(y, mary)$
$\vee\; r = \lambda i\, fem_i\, mary)$

By RULE 4 (T *prs*(IV)),

$$\begin{aligned}
\mathbf{A}(\text{the uni likes Mary's son}) &= \mathbf{A}(\text{like Mary's son})\mathbf{A}(\text{the uni}) \\
&= \lambda i\ \exists x_e(uni_i\ x \wedge \forall z_e(uni_i\ z \rightarrow z = x) \wedge \exists y_e(son_of_i(y, mary) \wedge like_i(x, y)))
\end{aligned}$$

$$\begin{aligned}
\mathbf{P}(\text{the uni likes Mary's son}) &= \lambda r_{st}\ (\mathbf{P}(\text{like Mary's son})\mathbf{A}(\text{the uni})r \\
&\qquad \vee \exists P_{e(st)}\ \mathbf{P}(\text{the uni})Pr) \\
&= \lambda r_{st}(r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall z_e(uni_i\ z \rightarrow z = x)) \\
&\qquad\qquad \wedge \exists y_e(son_of_i(y, mary) \wedge acq_i(x, y)) \\
&\qquad \vee r = \lambda i\ \exists y_e\ son_of_i(y, mary) \\
&\qquad \vee r = \lambda i\ fem_i\ mary \\
&\qquad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x)))
\end{aligned}$$

(b) the unicorn is pregnant too, TOO_0

the unicorn, 2 he$_0$ is pregnant, 4

the unicorn he$_0$ be_pregnant

<u>Basic meanings</u> (in addition to (a))

$\mathbf{A}(\text{he}_0) = \lambda P_{e(st)}\ P\ x_0$
$\mathbf{P}(\text{he}_0) = \lambda P_{e(st)}\ \lambda r_{st}\ \bot$

$\mathbf{A}(\text{be\_prg}) = \lambda Q_{(e(st))(st)}\ (Q\ \lambda x_e \lambda i\ prg_i\ x)$
$\mathbf{P}(\text{be\_prg}) = \lambda Q_{(e(st))(st)}\ \lambda r\ (r = Q\ \lambda x_e \lambda i\ fem_i\ x)$

<u>Semantic composition</u>

From PART 1(a),

$\mathbf{A}(\text{the uni}) = \lambda P_{e(st)} \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge Pxi)$

$\mathbf{P}(\text{the uni}) = \lambda P_{e(st)} \lambda r_{st}(r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x)))$

By RULE 4 (T + *prs*(IV)),

$$\begin{aligned}
\mathbf{A}(\text{he}_0 \text{ is prg}) &= \mathbf{A}(\text{be_prg})\mathbf{A}(\text{he}_0) \\
&= \lambda i\ prg_i\ x_0
\end{aligned}$$

$$\begin{aligned}
\mathbf{P}(\text{he}_0 \text{ is prg}) &= \lambda r_{st}\ (\mathbf{P}(\text{be_prg})\mathbf{A}(\text{he}_0)r \vee \exists P_{e(st)}\ \mathbf{P}(\text{he}_0)Pr) \\
&= \lambda r_{st}((r = \lambda i\ fem_i\ x_0) \vee \bot) \\
&= \lambda r_{st}(r = \lambda i\ fem_i\ x_0)
\end{aligned}$$

By TOO RULE$_0$,

$$\begin{aligned}
\mathbf{A}(\text{the uni is prg too}) &= \mathbf{A}(\text{the uni})\ \lambda x_0 \mathbf{A}(\text{he}_0 \text{ is prg}) \\
&= \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge prg_i\ x)
\end{aligned}$$

$$\begin{aligned}
\mathbf{P}(\text{the uni is prg too}) &= \lambda r_{st}(\mathbf{P}(\text{the uni})\ \lambda x_0 \mathbf{A}(\text{he}_0 \text{ is prg})\ r \\
&\qquad \vee r = (\mathbf{A}(\text{the uni})\ \lambda x_0 \cap \mathbf{P}(\text{he}_0 \text{ is prg})) \\
&\qquad \vee r = \lambda i\ \exists z_e(\lambda x_0 \mathbf{A}(\text{he}_0 \text{ is prg})\ zi \wedge (\mathbf{A}(\text{the uni})\ \lambda y_e \lambda i\ (y = z))i) \\
&= \lambda r_{st}(r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x)) \\
&\qquad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x) \\
&\qquad \vee r = \lambda i\ \exists z_e(prg_i\ z \wedge \neg\exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge x = z)))
\end{aligned}$$

Problem:

Though it works in (a) and (b), this theory has problems with **quantifiers**, e.g.,

- No unicorn is pregnant.
  Predicted presupposition: No unicorn is female.
- No teenager admires his father.
  Predicted presupposition: No teenager has a father.

2. SELECTIVE FILTERING OF PRESUPPOSITION SETS

Abbreviations:

S_0 := the unicorn is pregnant too
S_1 := Kim is right
S_{-1} := the centaur is pregnant
ctr := *centaur*

(a) if Kim is right then the unicorn is pregnant too, 11

Kim is right, 4 — the unicorn is pregnant too, PART 1(b)

Kim — be_right

presup set of conseq passed up w/o filtering by antec (√, **unlike** K&P 79)

<u>Basic meanings</u>

$$\mathbf{A}(\text{Kim}) = \lambda P_{e(st)}\, P\ kim$$
$$\mathbf{P}(\text{Kim}) = \lambda P_{e(st)}\, \lambda r_{st}\, \bot$$

$$\mathbf{A}(\text{be\_right}) = \lambda Q_{(e(st))(st)}\, (Q\ \lambda x_e \lambda i\ be\_right_i\ x)$$
$$\mathbf{P}(\text{be\_right}) = \lambda Q_{(e(st))(st)}\, \lambda r_{st}\, \bot$$

<u>Semantic composition</u>

By PART 1(b),

$$\mathbf{A}(S_0) = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge prg_i\ x)$$

$$\begin{aligned}\mathbf{P}(S_0) = \ & \lambda r_{st}(r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x)) \\ & \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x) \\ & \vee r = \lambda i\ \exists z_e(prg_i\ z \wedge \neg\exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge z = x)))\end{aligned}$$

By RULE 4 (T *prs*(IV)),

$$\begin{aligned}\mathbf{A}(S_1) &= \mathbf{A}(\text{be\_right})\mathbf{A}(\text{Kim}) \\ &= \lambda i\ be\_right_i\ kim\end{aligned}$$

$$\begin{aligned}\mathbf{P}(S_1) &= \lambda r_{st}\, (\mathbf{P}(\text{be\_right})\mathbf{A}(\text{Kim})r \\ &\qquad \vee \exists P_{e(st)}\, \mathbf{P}(\text{Kim})Pr) \\ &= \lambda r_{st}\, \bot\end{aligned}$$

By RULE 11, assuming that the set of contextual assumptions is empty, i.e, $v_{0,\,(st)t} = \lambda p_{st}\, \bot$

$$\begin{aligned}\mathbf{A}(\text{if } S_1 \text{ then } S_0) &= \lambda i\ (\mathbf{A}(S_1)i \rightarrow \mathbf{A}(S_0)i) \\ &= \lambda i\ (be\_right_i\ kim \rightarrow \exists y_e(uni_i\ y \wedge \forall z_e(uni_i\ z \rightarrow z = y) \wedge prg_i\ y)))\end{aligned}$$

$$\begin{aligned}\mathbf{P}(\text{if } S_1 \text{ then } S_0) &= \lambda r_{st}\, (\mathbf{P}(S_1)r \\ &\qquad \vee (\mathbf{P}(S_0)r \wedge (\mathbf{A}(S_1) \not\models r))) \\ &= \lambda r_{st}\, (\bot \\ &\qquad \vee ((r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x)) \\ &\qquad\quad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x) \\ &\qquad\quad \vee r = \lambda i\ \exists z_e(prg_i\ z \wedge \neg\exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge z = x)) \\ &\qquad\quad \wedge \lambda i\ be\_right_i\ kim \not\models r) \\ &= \lambda r_{st}\, (r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x)) \\ &\qquad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x) \\ &\qquad \vee r = \lambda i\ \exists z_e(prg_i\ z \wedge \neg\exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge z = x))\end{aligned}$$

(b) if the centaur is pregnant then the unicorn is pregnant too, 11 — *presup. set of consequent selectively filtered by antec* (√, **unlike** K&P 79)

the centaur is pregnant — the unicorn is pregnant too, PART 1(b)

<u>Semantic composition</u> (key point)

By RULE 11, assuming the contextual assumption that unicorns are distinct from centaurs, i.e,
$v_{0,\,(st)t} = \lambda p_{st}(p = \lambda i\ \forall x \forall y(uni_i\ x \wedge ctr_i\ y \rightarrow \neg\ x = y))$

$$
\begin{aligned}
\mathbf{A}(\text{if } S_{-1} \text{ then } S_0) &= \lambda i\ (\mathbf{A}(S_{-1})i \rightarrow \mathbf{A}(S_0)i)\\
&= \lambda i\ (\exists y_e(ctr_i\ y \wedge \forall z_e(ctr_i\ z \rightarrow z = y) \wedge prg_i\ y))\\
&\qquad \rightarrow \exists y_e(uni_i\ y \wedge \forall z_e(uni_i\ z \rightarrow z = y) \wedge prg_i\ y)))
\end{aligned}
$$

$$
\begin{aligned}
\mathbf{P}(\text{if } S_{-1} \text{ then } S_0) &= \lambda r_{st}\ (\mathbf{P}(S_{-1})r\\
&\qquad \vee (\mathbf{P}(S_0)r \wedge (\cap\lambda q_{st}(q = \mathbf{A}(S_{-1}) \vee q = \lambda i\ \forall x \forall y(uni_i\ x \wedge ctr_i\ y \rightarrow \neg\ x = y))) \not\models r))\\
&= \lambda r_{st}(r = \lambda i\ \exists x_e(ctr_i\ x \wedge \forall y_e(ctr_i\ y \rightarrow y = x))\\
&\qquad \vee r = \lambda i\ \exists x_e(ctr_i\ x \wedge \forall y_e(ctr_i\ y \rightarrow y = x) \wedge fem_i\ x)\\
&\qquad \vee ((r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x))\\
&\qquad\quad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x)\\
&\qquad\quad \vee r = \lambda i\ \exists z_e(prg_i\ z \wedge \neg\exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge z = x)))\\
&\qquad\quad \wedge (\cap\lambda q_{st}(q = \mathbf{A}(S_{-1}) \vee q = \lambda i\ \forall x \forall y(uni_i\ x \wedge ctr_i\ y \rightarrow \neg\ x = y))) \not\models r)\\
&= \lambda r_{st}(r = \lambda i\ \exists x_e(ctr_i\ x \wedge \forall y_e(ctr_i\ y \rightarrow y = x))\\
&\qquad \vee r = \lambda i\ \exists x_e(ctr_i\ x \wedge \forall y_e(ctr_i\ y \rightarrow y = x) \wedge fem_i\ x)\\
&\qquad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x))\\
&\qquad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x))
\end{aligned}
$$

(c) if the unicorn is pregnant too then Kim is right, 11 — *projection from antecedent* (√, **like** K&P 79)

the unicorn is pregnant too, PART 1(b) — Kim is right, 4

Kim — be_right

<u>Semantic composition</u> (key point)

By RULE 11, assuming that the set of contextual assumptions is empty, i.e, $v_{0,\,(st)t} = \lambda p_{st}\bot$

$$
\begin{aligned}
\mathbf{A}(\text{if } S_0 \text{ then } S_1) &= \lambda i\ (\mathbf{A}(S_0)i \rightarrow \mathbf{A}(S_1)i)\\
&= \lambda i\ (\exists y_e(uni_i\ y \wedge \forall z_e(uni_i\ z \rightarrow z = y) \wedge prg_i\ y) \rightarrow be\_right_i\ kim)
\end{aligned}
$$

$$
\begin{aligned}
\mathbf{P}(\text{if } S_0 \text{ then } S_1) &= \lambda r_{st}\ (\mathbf{P}(S_0)r\\
&\qquad \vee (\mathbf{P}(S_1)r \wedge \mathbf{A}(S_0) \not\models r))\\
&= \lambda r_{st}(r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x))\\
&\qquad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x)\\
&\qquad \vee r = \lambda i\ \exists z_e(prg_i\ z \wedge \neg\exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge z = x))\\
&\qquad \vee (\bot \wedge \ldots))\\
&= \lambda r_{st}(r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x))\\
&\qquad \vee r = \lambda i\ \exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge fem_i\ x)\\
&\qquad \vee r = \lambda i\ \exists z_e(prg_i\ z \wedge \neg\exists x_e(uni_i\ x \wedge \forall y_e(uni_i\ y \rightarrow y = x) \wedge z = x))
\end{aligned}
$$

3. HOLE FUNCTORS: NO FILTERING OF ARGUMENT PRESUPPOSITION SET

(a) perhaps the unicorn is pregnant too, 9

perhaps — the unicorn is pregnant too, PART 1(b)

Basic meanings

$\mathbf{A}$(perhaps) $= \lambda p_{st}\, \lambda i\, \exists j(v_{0,\,s(st)} ij \wedge pj)$

$\mathbf{P}$(perhaps) $= \lambda p_{st}\, \lambda r_{st}\, \bot$

Semantic composition

From PART 1(b),

$\mathbf{A}(S_0) = \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x) \wedge prg_i\, x)$

$\mathbf{P}(S_0) = \lambda r_{st}(r = \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x))$
$\vee\; r = \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x) \wedge fem_i\, x)$
$\vee\; r = \lambda i\, \exists z_e(prg_i\, z \wedge \neg\exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x) \wedge z = x)))$

So by RULE 9 (S/S + S),

$\mathbf{A}(\text{perhaps } S_0) = \mathbf{A}(\text{perhaps})\mathbf{A}(S_0)$
$= \lambda i\, \exists j(v_{0,\,s(st)} ij \wedge \exists y_e(uni_j\, y \wedge \forall z_e(uni_j\, z \to z = y) \wedge prg_j\, y))$

$\mathbf{P}(\text{perhaps } S_0) = \lambda r_{st}(\mathbf{P}(\text{perhaps})\mathbf{A}(S_0)r \vee \mathbf{P}(S_0)r)$
$= \mathbf{P}(S_0)$

(b) Kim knows that the unicorn is pregnant too, 4

Kim — know that the unicorn is pregnant too, 7.KNOW

know — the unicorn is pregnant too, PART 1(b)

Basic meanings

$\mathbf{A}$(know) $= \lambda p_{st}\, \lambda Q_{(e(st))st}\, (Q\lambda x_e \lambda i\;\; know_i(x, p))$

$\mathbf{P}$(know) $= \lambda p_{st}\, \lambda Q_{(e(st))st}\, \lambda r_{st}(r = p)$

Semantic composition (key point)

So by RULE 7.HOLE (IV/S that S),

$\mathbf{A}(\text{know that } S_0) = \mathbf{A}(\text{know})\mathbf{A}(S_0)$
$= \lambda Q_{(e(st))st}\, (Q\lambda x_e\, \lambda i\;\; know_i(x, \lambda j\, \exists y_e(uni_j\, y \wedge \forall z_e(uni_j\, z \to z = y) \wedge prg_j\, y)))$

$\mathbf{P}(\text{know that } S_0) = \lambda Q_{(e(st))st}\, \lambda r_{st}(\mathbf{P}(\text{know})\mathbf{A}(S_0)Qr$
$\vee\; \mathbf{P}(S_0)r)$
$= \lambda Q_{(e(st))st}\, \lambda r_{st}(r = \mathbf{A}(S_0)$
$\vee\; \mathbf{P}(S_0)r)$

Hence, by RULE 4 (T + *prs*(IV)),

$\mathbf{A}(\text{Kim knows that } S_0) = \mathbf{A}(\text{know that } S_0)\mathbf{A}(\text{Kim})$
$= \lambda i\;\; know_i(kim, \lambda j\, \exists y_e(uni_j\, y \wedge \forall z_e(uni_j\, z \to z = y) \wedge prg_j\, y))$

$\mathbf{P}(\text{Kim knows that } S_0) = \lambda r_{st}\, (\mathbf{P}(\text{know that } S_0)\mathbf{A}(\text{Kim})r$
$\vee\; \exists P_{e(st)}\, \mathbf{P}(\text{Kim})Pr)$
$= \lambda r_{st}(r = \mathbf{A}(S_0) \vee \mathbf{P}(S_0)r)$
$= \lambda r_{st}(r = \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x) \wedge prg_i\, x)$
$\vee\; r = \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x))$
$\vee\; r = \lambda i\, \exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x) \wedge fem_i\, x)$
$\vee\; r = \lambda i\, \exists z_e(prg_i\, z \wedge \neg\exists x_e(uni_i\, x \wedge \forall y_e(uni_i\, y \to y = x) \wedge z = x)))$

4. *f*-HOLE FUNCTORS: PRESUPPOSITION TRANSFORMING HOLES

Kim hopes that the unicorn is pregnant too, 4

Kim hope that the unicorn is pregnant too, 7.*f*HOLE

hope the unicorn is pregnant too, PART 1

<u>Basic meanings</u>

$\mathbf{A}(\text{hope}) = \lambda p_{st}\, \lambda Q_{(e(st))st}\, (Q\lambda x_e \lambda i\ hope_i(x, p))$

$\mathbf{P}(\text{hope}) = \lambda p_{st}\, \lambda Q_{(e(st))st}\, \lambda r_{st}\ \bot$

<u>Semantic composition</u> (key point)

So by RULE 7.HOPE (IV//S that S),

$$\begin{aligned}\mathbf{A}(\text{hope that } S_0) &= \mathbf{A}(\text{hope})\mathbf{A}(S_0)\\ &= \lambda Q_{(e(st))st}\, (Q\lambda x_e\, \lambda i\ hope_i(x, \lambda j\ \exists y_e(uni_j\, y \wedge \forall z_e(uni_j\, z \rightarrow z = y) \wedge prg_j\, y)))\end{aligned}$$

$$\begin{aligned}\mathbf{P}(\text{hope that } S_0) &= \lambda Q_{(e(st))st}\, \lambda r_{st}\, (\mathbf{P}(\text{hope})\mathbf{A}(S_0)Qr\\ &\qquad \vee \exists q_{st}(\mathbf{P}(S_0)q \wedge r = Q\lambda x_e\lambda i\ bel_i(x, q)))\\ &= \lambda Q_{(e(st))st}\, \lambda r_{st}\, \exists q_{st}(\mathbf{P}(S_0)q \wedge r = Q\lambda x_e\lambda i\ bel_i(x, q))\\ &= \lambda Q_{(e(st))st}\, \lambda r_{st}(r = Q\lambda x_e\lambda i\ bel_i(x, \lambda j\ \exists x_e(uni_j\, x \wedge \forall y_e(uni_j\, y \rightarrow y = x)))\\ &\qquad \vee r = Q\lambda x_e\lambda i\ bel_i(x, \lambda j\ \exists x_e(uni_j\, x \wedge \forall y_e(uni_j\, y \rightarrow y = x) \wedge fem_j\, x))\\ &\qquad \vee r = Q\lambda x_e\lambda i\ bel_i(x, \lambda j\ \exists z_e(prg_i z \wedge \neg\exists x_e(uni_j x \wedge \forall y_e(uni_j y \rightarrow y = x) \wedge x = z))))\end{aligned}$$

Hence, by RULE 4 (T + *prs*(IV)),

$\mathbf{A}(\text{Kim hopes that } S_0) = \lambda i\ hope_i(kim, \lambda j\ \exists y_e(uni_j\, y \wedge \forall z_e(uni_j\, z \rightarrow z = y) \wedge prg_j\, y))$

$$\begin{aligned}\mathbf{P}(\text{Kim hopes that } S_0) &= \lambda r_{st}(r = \lambda i\ bel_i(kim, \lambda j\ \exists x_e(uni_j\, x \wedge \forall y_e(uni_j\, y \rightarrow y = x)))\\ &\qquad \vee r = \lambda i\ bel_i(kim, \lambda j\ \exists x_e(uni_j\, x \wedge \forall y_e(uni_j\, y \rightarrow y = x) \wedge fem_j\, x))\\ &\qquad \vee r = \lambda i\ bel_i(kim, \lambda j\ \exists z_e(prg_j\, z \wedge \neg\exists x_e(uni_j\, x \wedge \forall y_e(uni_j\, y \rightarrow y = x) \wedge x = z))))\end{aligned}$$

5. PLUG FUNCTORS: TOTAL FILTERING OF ARGUMENT PRESUPPOSITION SET

Kim claims that the unicorn is pregnant too, 4

Kim claim that the unicorn is pregnant too, 7.PLUG

claim the unicorn is pregnant too, PART 1(b)

<u>Basic meanings</u>

$\mathbf{A}(\text{claim}) = \lambda p_{st}\, \lambda Q_{(e(st))st}\, (Q\lambda x_e\lambda i\ claim_i(x, p))$

$\mathbf{P}(\text{claim}) = \lambda p_{st}\, \lambda Q_{(e(st))st}\, \lambda r_{st} \bot$

<u>Semantic composition</u> (key point)

By RULE 7.CLAIM (IV///S that S),

$$\begin{aligned}\mathbf{A}(\text{claim that } S_0) &= \mathbf{A}(\text{claim})\mathbf{A}(S_0)\\ &= \lambda Q_{(e(st))st}\, (Q\lambda x_e\, \lambda i\ claim_i(x, \lambda j\ \exists y_e(uni_j\, y \wedge \forall z_e(uni_j\, z \rightarrow z = y) \wedge prg_j\, y)))\end{aligned}$$

$$\begin{aligned}\mathbf{P}(\text{claim that } S_0) &= \lambda Q_{(e(st))st}\, \lambda r_{st}\, \mathbf{P}(\text{claim})\mathbf{A}(S_0)Qr\\ &= \lambda Q_{(e(st))st}\, \lambda r_{st}\ \bot\end{aligned}$$

Hence, by RULE 4 (T + *prs*(IV)),

$\mathbf{A}(\text{Kim claims that } S_0) = \lambda i\ claim_i(kim, \lambda j\ \exists y_e(uni_j\, y \wedge \forall z_e(uni_j\, z \rightarrow z = y) \wedge prg_j\, y))$

$\mathbf{P}(\text{Kim claims that } S_0) = \lambda r_{st}\ \bot$

APPENDIX: KARTTUNEN 1973 FORMALIZED A LA KARTTUNEN & PETERS 1979

Assume the following *basic translations* for determiners and revise other basic translations as in the above sample derivations.

A(every) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda i\ \forall x_e(P'xi \rightarrow Pxi)$
P(every) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda r_{st}(r = \lambda i\ \exists x_e\ P'xi)$

A(no) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda i\ \neg\exists x_e(P'xi \wedge Pxi)$
P(no) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda r_{st}(q = \lambda i\ \exists x_e\ P'xi)$

A(a) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda i\ \exists x_e(P'xi \wedge Pxi)$
P(a) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda r_{st}\ \bot$

A(the) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda i\ \exists x_e(P'xi \wedge \forall z_e(P'zi \rightarrow z = x) \wedge Pxi)$
P(the) = $\lambda P'_{e(st)} \lambda P_{e(st)} \lambda r_{st}(r = \lambda i\ \exists x_e(P'xi \wedge \forall z_e(P'zi \rightarrow x = z))$

In each of the following *compositional rules* leave the syntax unchanged while revising the translation as follows. In the rules of function application, the functor α (syncategorematic in rules 4 and 11) is classified based on its effect on the presuppositions of the arguments as a HOLE (**P**(β) projects), f-HOLE (f(**P**(β)) projects, where f is a specified transformation), PLUG (**P**(β) cancelled) or FILTER (**P**(β) projects, while **P**(β') is filtered based on **A**(β)). Note the following *abbreviations*: $(\phi \models \psi)$ for $\forall i(\phi i \rightarrow \psi i)$, $(\phi \not\models \psi)$ for $\neg(\phi \models \psi)$, $\cap\alpha_{(st)t}$ for $\lambda i\ \forall p_{st}(\alpha p \rightarrow pi)$.

RULE 2 for $[\alpha_{T/CN}\ \beta_{CN}]_T$:

A($\alpha\ \beta$) = **A**(α)**A**(β)
P($\alpha\ \beta$) = $\lambda P_{e(st)} \lambda r_{st}(\mathbf{P}(\alpha)\mathbf{A}(\beta)Pr \vee \exists x_e \mathbf{P}(\beta)xr)$ (HOLE)

RULE 4 for $[\beta_T\ prs(\alpha_{IV})]_S$, $[\beta_T\ negprs(\beta'_{IV})]_S$:

A(β *prs*(α)) = **A**(α)**A**(β)
P(β *prs*(α)) = $\lambda r_{st}(\mathbf{P}(\alpha)\mathbf{A}(\beta)r \vee \exists P_{e(st)}\ \mathbf{P}(\beta)Pr)$ (HOLE)

A(β' *negprs*(β)) = $\lambda i\ \neg\mathbf{A}(\beta)\mathbf{A}(\beta')i$
P(β' *negprs*(β)) = $\lambda r_{st}(\mathbf{P}(\beta)\mathbf{A}(\beta')r \vee \exists P_{e(st)}\ \mathbf{P}(\beta')Pr)$ (HOLE)

RULE 5 for $[\alpha_{TV}\ acc(\beta_T)]_{IV}$:

A(α *acc*(β)) = **A**(α)**A**(β)
P(α *acc*(β)) = $\lambda Q_{(e(st))st} \lambda r_{st}\ (\mathbf{P}(\alpha)\mathbf{A}(\beta)Qr \vee \exists P_{e(st)}\ \mathbf{P}(\beta)Pr)$ (HOLE)

RULE 6 for $[gen(\beta_T)\ \alpha_{T/T}]_T$:

A(*gen*(β) α) = **A**(α)**A**(β)
P(*gen*(β) α) = $\lambda P_{e(st)} \lambda r_{st}(\mathbf{P}(\alpha)\mathbf{A}(\beta)Pr \vee \exists P_{e(st)}\ \mathbf{P}(\beta)Pr)$ (HOLE)

RULE 7.HOLE for $[\alpha_{IV/S} \text{ that } \beta_S]_{IV}$:

$\mathbf{A}(\alpha_{IV/S} \text{ that } \beta_S) = \mathbf{A}(\alpha)\mathbf{A}(\beta)$

$\mathbf{P}(\alpha_{IV/S} \text{ that } \beta_S) = \lambda Q_{(e(st))st}\, \lambda r_{st}\, (\mathbf{P}(\alpha)\mathbf{A}(\beta)Qr \vee \mathbf{P}(\beta)r)$ (HOLE)

RULE 7._HOLE for $[\alpha_{IV//S} \text{ that } \beta_S]_{IV}$:

$\mathbf{A}(\alpha_{IV//S} \text{ that } \beta_S) = \mathbf{A}(\alpha)\mathbf{A}(\beta)$

$\mathbf{P}(\alpha_{IV//S} \text{ that } \beta_S) = \lambda Q_{(e(st))st}\, \lambda r_{st}\, (\mathbf{P}(\alpha)\mathbf{A}(\beta)Qr \vee \exists q_{st}(\mathbf{P}(\beta)q \wedge r = Q\, \lambda x_e \lambda i\ believe_i(x, q)))$ (_-HOLE)

RULE 7.PLUG for $[\alpha_{IV///S} \text{ that } \beta_S]_{IV}$:

$\mathbf{A}(\alpha_{IV///S} \text{ that } \beta_S) = \mathbf{A}(\alpha)\mathbf{A}(\beta)$

$\mathbf{P}(\alpha_{IV///S} \text{ that } \beta_S) = \lambda Q_{(e(st))st}\, \lambda r_{st}\, (\mathbf{P}(\alpha)\mathbf{A}(\beta)Qr)$ (PLUG)

RULE 9 for $[\alpha_{S/S}\, \beta_S]_S$:

$\mathbf{A}(\alpha_{S/S}\, \beta_S) = \mathbf{A}(\alpha)\mathbf{A}(\beta)$

$\mathbf{P}(\alpha_{S/S}\, \beta_S) = \lambda r_{st}(\mathbf{P}(\alpha)\mathbf{A}(\beta)r \vee \mathbf{P}(\beta)r)$ (HOLE)

RULE 11 for [if β_S then β'_S], $[\beta_S \text{ and } \beta'_S]_S$, [either β_S or $\beta'_S]_S$:

$\mathbf{A}(\text{if } \beta \text{ then } \beta') = \lambda i\, (\mathbf{A}(\beta)i \rightarrow \mathbf{A}(\beta')i)$

$\mathbf{P}(\text{if } \beta \text{ then } \beta') = \lambda r_{st}(\mathbf{P}(\beta)r \vee (\mathbf{P}(\beta)r \wedge (\cap\lambda q_{st}(v_{0,\,(st)t}q \vee q = \mathbf{A}(\beta))) \not\models r))$ (FILTER)

$\mathbf{A}(\beta \text{ and } \beta') = \lambda i\, (\mathbf{A}(\beta)i \wedge \mathbf{A}(\beta')i)$

$\mathbf{P}(\beta \text{ and } \beta') = \lambda r_{st}(\mathbf{P}(\beta)r \vee (\mathbf{P}(\beta)r \wedge (\cap\lambda q_{st}(v_{0,\,(st)t}q \vee q = \mathbf{A}(\beta))) \not\models r))$ (FILTER)

$\mathbf{A}(\text{either } \beta \text{ or } \beta') = \lambda i\, (\mathbf{A}(\beta)i \vee \mathbf{A}(\beta')i)$

$\mathbf{P}(\text{either } \beta \text{ or } \beta') = \lambda r_{st}(\mathbf{P}(\beta)r \vee (\mathbf{P}(\beta)r \wedge (\cap\lambda q_{st}(v_{0,\,(st)t}q \vee q = \lambda i\, \neg\mathbf{A}(\beta)i)) \not\models r))$ (FILTER)

RULE 14.n for $[\beta_S[\alpha_T/\text{he}_n]]_S$:

$\mathbf{A}(\beta[\alpha/\text{he}_n]) = \mathbf{A}(\alpha)\, \lambda x_n \mathbf{A}(\beta)$

$\mathbf{P}(\beta[\alpha/\text{he}_n]) = \lambda r_{st}\, ((\mathbf{P}(\alpha)\, \lambda x_n \mathbf{A}(\beta))r \vee r = (\mathbf{A}(\alpha)\, \lambda x_n \cap\mathbf{P}(\beta)))$

TOO RULE$_n$ for $[\beta_S[\alpha_T/\text{he}_n] \text{ too}]_S$:

$\mathbf{A}(\beta[\alpha/\text{he}_n] \text{ too}) = \mathbf{A}(\alpha)\, \lambda x_n \mathbf{A}(\beta)$

$\mathbf{P}(\beta[\alpha/\text{he}_n] \text{ too}) = \lambda r_{st}\, ((\mathbf{P}(\alpha)\, \lambda x_n \mathbf{A}(\beta))r \vee r = (\mathbf{A}(\alpha)\, \lambda x_n \cap\mathbf{P}(\beta)) \vee r = \lambda i\, \exists z_e(\lambda x_n \mathbf{A}(\beta)zi \wedge \neg(\mathbf{A}(\alpha)\, \lambda y_e\, \lambda i\, (y = z))i))$