Higginbotham (1985) outlined a conception of semantics as part of the larger study of “systems of human linguistic knowledge that result from native endowment and the ambient environment.” This conception leads one to emphasize—with regard to data and explananda—facts about how competent speakers cannot understand certain strings of words. It also leads one to describe compositionality as a natural phenomenon whose character is to be discovered, not defined in advance.

Today, I want to revisit some aspects of Higginbotham’s strategy for specifying “human semantic knowledge” in terms of event variables and three combinatorial operations:

(i) **theta-marking**, akin to Frege’s notion of saturation
   (think of ’see Jupiter’)

(ii) a conjunctive operation of **modification**
    (think of ’bright planet’ or ‘see Jupiter now’)

(iii) **theta-binding**, akin to Tarski’s notion of quantification.
    (think of ’every planet’, or ‘which Galileo saw’)

Heim and Kratzer (1998) invoke three analogous operations: *Function Application*, in Church’s sense (“no unsaturateds”); a conjunctive operation of *Predicate Modification*; and Church-style *Predicate Abstraction*, via which an expression of type `<t>` can be converted into an expression of type `<e, t>`. But given some familiar assumptions about how grammatical form is related to logical form—assumptions shared by Higginbotham, Heim and Kratzer (though not everyone)—certain facts favor Jim’s formulation. These facts also invite attempts to unify **theta-marking** and **modification**.

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A. Linguistic Knowledge and Constrained Homophony

Davidson, Psychologized and Kaplanized

(1) for each human language $H$:
   each speaker of $H$ (tacitly) knows a theory $T$
   such that for each sentence $S$ of $H$,
   $T$ has a theorem of the form $\left[ \text{True}^* (S, c) \equiv K(c) \right]$

—$\text{True}^* (I\ saw\ jim, c) = \exists e: e < \text{TIME}(c) [\text{SEE}(e, \text{SPEAKER}(c), \text{JIM})]$

—$\text{True}^* (S, c): S$ is $\text{True-in-}H$ relative to $c$

(2) $T$ is not just any specification of truth relative to contexts:
   $\textit{human}$ specifications respect substantive constraints

Stress on “negative” facts

(3) the men told the women to vote for each other
   (a) The men told each woman to vote for the other woman.
   #(b) Each man told the women to vote for the other man.
   #(c) Each man told the women he would vote for the other man.

(4) Mary saw the boy walking towards the bus  (Chomsky ’64)
   (a) Mary saw the boy while walking towards the bus.
      $\Rightarrow$ Mary walked.
      $\times$ The boy walked.
   (b) Mary saw the boy who was walking towards the bus.
      $\Rightarrow$ The boy walked.
      $\times$ Mary saw the boy walk.
   (c) Mary saw the boy walk towards the bus.
      $\Rightarrow$ Mary saw the boy walk. $\Rightarrow$ The boy walked.

for each string: $n$ but not $n+1$ meanings, for some $n$

(5) this is the bus Mary saw the boy walking towards
   $\textit{This is the bus such that...}$
    #(a) Mary saw the boy while walking towards it.
    #(b) Mary saw the boy who was walking towards it.
    (c) Mary saw the boy walk towards it.

(6) what did Mary see the boy walking towards
   $\textit{Which thing is such that...}$
    # (a) Mary saw the boy while walking towards it?
    #(b) Mary saw the boy who was walking towards it?
    (c) Mary saw the boy walk towards it?

(7) a woman saw a man with a telescope
   $\textit{A woman saw a man, and...}$
    (a) the man had a telescope when she saw him.
    (b) the woman used a telescope to see him.
    #(c) the woman had a telescope when she saw him.

(8) every cat which Fido chased
    $\forall x: \text{CAT}(x) & \text{CHASED}(\text{FIDO}, x)$  Restricted Quantifier
    #(b) $\forall x: \text{CAT}(x) [\text{CHASED}(\text{FIDO}, x)]$  Complete Sentence

(9) *the child seems sleeping
    (a) the child seems to be sleeping
    #(b) the child seems sleepy
B. Event Positions and Thematic Relations

(10) Plum stabbed Mustard in the library with a candlestick
(11) Plum stabbed Mustard in the library
(12) Plum stabbed Mustard with a candlestick
(13) Plum stabbed Mustard

Davidson (1967a): (10) \(\Rightarrow\) (11) \(\Rightarrow\) (13)

(14) Plum stabbed Mustard in the library, and
Plum stabbed Mustard with a candlestick

Evans/Taylor (1983): (10) \(\Rightarrow\) (14); but (14) doesn’t imply (10)

\(\exists x (F_x \land G_x) \Rightarrow \exists x (F_x) \land \exists x (G_x)\)

(10a) \(\exists e [STABBED(e, PLUM, MUSTARD) \land IN-THE-LIBRARY(e) \land WITH-A-CANDLESTICK(e)]\)

If you don’t worry about nonimplications, capturing the actual implications is easy:
just say that each sentence implies every sentence.

(15) Peacock heard Mustard

\(\exists e [HEARD(e, PEACOCK, MUSTARD)]\)

(16) Peacock heard something

\(\exists e \exists x [HEARD(e, PEACOCK, x)]\)

(17) Peacock heard Mustard yell

\(\exists e \exists x [HEARD(e, PEACOCK, x) \land YELL(x, MUSTARD)]\)

(18) Peacock heard Mustard yell in the hall

(a) [Peacock [heard [Mustard [yell [in the hall]]]]]

\(\exists e \exists x [HEARD(e, P, x) \land YELL(x, M) \land IN-THE-HALL(e)]\)

(b) [Peacock [[heard [Mustard yell]] [in the hall]]]

\(\exists e \exists x [HEARD(e, P, x) \land YELL(x, M) \land IN-THE-HALL(e)]\)

(8) a woman saw a man with a telescope

A woman saw a man, and...

(a) ...the man had a telescope when she saw him.

[[a woman] [saw [a [man [with a telescope]]]]]

(b) ...the woman used a telescope to see him.

[[a woman] [[saw [a man]] [with a telescope]]]

#(c) ...the woman had a telescope when she saw him.

[[a woman] [[saw [a man]] [with a telescope]]]

If you don’t worry about nonambiguities, capturing the actual structure-meaning pairs is easy:
just say that each structured string has every meaning. But why can’t structure (8b) support interpretation (8c)?

(19) [[see a man] [with a telescope]]

(a) \(\exists y: MAN(y) [SEE(e, x, y) \land \exists z: SCOPE(z) [WITH(e, z)]]\)

#(b) \(\exists y: MAN(y) [SEE(e, x, y) \land \exists z: SCOPE(z) [WITH(x, z)]]\)

(20) [[a woman] [[see a man] [with a telescope]]]

(a) \(\exists y: W(x) [\exists y: M(y) [SEE(e, x, y) \land \exists z: SCOPE(z) [WITH(e, z)]]]\)

#(b) \(\exists y: W(x) [\exists y: M(y) [SEE(e, x, y) \land \exists z: SCOPE(z) [WITH(x, z)]]]\)
C. Combinatorial Operations, Types, and Overgeneration

(1) for each human language $H$; each speaker of $H$ (tacitly) knows a theory $T$ such that for each sentence $S$ of $H$, $T$ has a theorem of the form $\text{True}^*(S, c) = K(c)$

(21) The twenty-first example is not true.
(22) True('The twenty-first example is not true.') $\equiv$ $\sim$True(21)
(23) $\sim$True(21) $\equiv$ True('The twenty-first example is not true.')</br>

(24) White likes wheat, and Green hates grass. (Foster 1975)
(25) True('White likes wheat.') $\equiv$ White likes wheat.
(26) True('White likes wheat.') $\equiv$ Green hates grass.

(27) He is both eager to please us and eager that we please him.
(28) True('He is eager to please.') $\equiv$ He is eager to be a pleaser.
(29) True('He is eager to please.') $\equiv$ He is eager to be pleased.

Higginbotham's (1985) three modes of combination:

(i) $\Theta$-marking (saturation, allowing for event variables) $\implies$
(ii) modification (fundamentally conjunctive) $\implies$
(iii) $\Theta$-binding ($\exists$-closure, and overt quantification) $\implies$

(30) the verb 'stab' has the following $\Theta$-grid: STAB(e, 2, 1)

(31) [stab Mustard] $\approx$ STAB(e, 2, MUSTARD)
[Plum [stab Mustard]] $\approx$ STAB(e, PLUM, MUSTARD)

(32) [[Plum [stab Mustard]] today] $\triangleright$
STAB(e, PLUM, MUSTARD) & TODAY(e)

(33) [-ed [[Plum [stab Mustard]] today]] $\lessgtr$
$\exists e$:$PAST(e)$[STAB(e, PLUM, MUSTARD) & TODAY(e)]

(34) [brown dog] $\triangleright$ DOG(x) & BROWN-ONE(x)
DOG(x) & $\forall y$:DOGS(y)[BROWN-FOR[y, x]

DOG(x) is a Tarskian sentence satisfied by certain entities. But we could also introduce Churchy denoters of functions.

(35) $\|\text{dog}\| = \lambda x . \top$ if DOG(x), otherwise $\perp$
$\equiv \lambda x . \text{DOG}(x)$

(35a) $\|\text{brown}\| = \lambda x . \text{BROWN-ONE}(x)$

• (35b) UP: $\|\text{brown}\| = \lambda x . \lambda x . X(x) & \text{BROWN-ONE}(x)$

(36) $\|\text{brown dog}\| = \text{UP:} \|\text{brown}\| (\|\text{dog}\|)$
$\equiv \lambda x . \text{DOG}(x) & \text{BROWN-ONE}(x)$

(37) $\|\text{stab}\| = \lambda y . \lambda x . \lambda e . \text{STAB}(e, x, y)$

(38) $\|\text{stab Mustard}\| = \|\text{stab}\| (\|\text{Mustard}\|)$
$\equiv \lambda x . \lambda e . \text{STAB}(e, x, \text{MUSTARD})$

(39) $\|\text{Plum [stab Mustard]}\|$
$\equiv \|\text{stab Mustard}\| (\|\text{Plum}\|)$
$\equiv \lambda e . \text{STAB}(e, \text{PLUM}, \text{MUSTARD})$

(40a) $\|\text{today}\| = \lambda e . \text{TODAY}(e)$

• (40b) UP: $\|\text{today}\| = \lambda E . \lambda e . E(e) & \text{TODAY}(e)$

(41) $\|\text{Plum [stab Mustard]}\| \text{today}\|
$\equiv \text{UP:} \|\text{today}\| (\|\text{Plum [stab Mustard]}\|)$
$\equiv \lambda e . \text{STAB}(e, \text{PLUM}, \text{MUSTARD}) & \text{TODAY}(e)$

• (42) $\|\sim\text{ed}\| = \lambda E . \exists e$:$PAST(e)[E(e)]$
(43) Plum stabbed Mustard today

(44) ||-ed [[Plum [stab Mustard]] today] ||
= ||-ed ||( ||[Plum [stab Mustard]] today || )
= \exists e: PAST(e)[STAB(e, PLUM, MUSTARD) & TODAY(e)]

So if (43) can be described in terms of a type-lifting operation
and four applications of “Function Application,”
why invoke \( \Theta \)-marking and \( \Theta \)-binding?

Higginbotham: no unsaturated arguments; no higher types;
no lexical items that express “functionals”
(functionals: functions from functions to values)

(45) \( \langle e \rangle \) and \( \langle t \rangle \) are types;
if \( \langle \alpha \rangle \) and \( \langle \beta \rangle \) are types, then so is \( \langle \alpha, \beta \rangle \)

0. \( \langle e \rangle \quad \langle t \rangle \) (2)

1. \( \langle e, e \rangle \quad \langle e, t \rangle \quad \langle t, e \rangle \quad \langle t, t \rangle \) (4) of \( \langle 0, 0 \rangle \)

2. eight of \( \langle 0, 1 \rangle \) eight of \( \langle 1, 0 \rangle \)
   sixteen of \( \langle 1, 1 \rangle \)
   \( \langle e, et\rangle \) and \( \langle et, t \rangle \) (32), including

3. 64 of \( \langle 0, 2 \rangle \) 64 of \( \langle 2, 0 \rangle \)
   128 of \( \langle 1, 2 \rangle \) 128 of \( \langle 2, 1 \rangle \)
   1024 of \( \langle 2, 2 \rangle \)
   \( \langle e, et\rangle, \langle t \rangle \) (1408), including

4. 2816 of \( \langle 0, 3 \rangle \) 2816 of \( \langle 3, 0 \rangle \)
   5632 of \( \langle 1, 3 \rangle \) 5632 of \( \langle 3, 1 \rangle \)
   45,056 of \( \langle 2, 3 \rangle \) 45,056 of \( \langle 3, 2 \rangle \)
   1,982,464 of \( \langle 3, 3 \rangle \) (2,089,472)

(46*) \[ w赞同k \_1 [Plum __ Mustard] \] \( \lambda R \cdot R(PLUM, MUSTARD) \)

Theorists can posit semantic values of expressions in terms of
(45) and Church’s Lambda Calculus. But is this the vocabulary
that kids (tacitly) deploy in acquiring linguistic knowledge?

Given a human language \( H \), we can try to specify theories
knowledge of which would suffice for agreement (with speakers
of \( H \)) on the truth conditions of sentences. But if we want more
than this kind of “descriptive adequacy,” perhaps we should
reject (45) and ask which if any “functionals” can be human
semantic values.

D. Quantifiers as Functionals: To Raise or To Lift?

(47) Fido chased every cat
(48) Most of the dogs chased every cat

(47a) [[every cat] \_1 [Fido [chased t\_1]]]
(48a) [[most of the dogs] \_2 [[every cat] \_1 [t\_2 chased t\_1]]]

(47b) [Fido [chased [every cat]]]
(48b) [[most of the dogs] [chased [every cat]]]

For the moment, let’s ignore event variables.
Let \( 'X' \) be a variable of type \( \langle e, t \rangle \)
Let \( '\Phi' \) and \( '\Psi' \) be variables of type \( \langle et, t \rangle \)

\( \lambda x \cdot \Psi(t) \)

(49) || every cat || = \( \lambda X \cdot \forall y:CAT(y)[X(y)] \)

(50-LC) || chased || = \( \lambda y \cdot \lambda x \cdot CHASED(x, y) \)

(50-HC) || chased || = \( \lambda \Phi \cdot \lambda \Psi \cdot \Phi(\lambda w \cdot \Psi(\lambda z \cdot CHASED(w, z))) \)
High Church, Uplifting Derivations...

1. \( || \text{chased} || = \lambda \Psi \cdot \lambda \Phi \cdot \Phi(\lambda w \cdot \Psi(\lambda z \cdot \text{CHASED}(w, z))) \)

2. \( || \text{every cat} || = \lambda X \cdot \forall y: \text{CAT}(y)[X(y)] \)

3. \( || \text{chased} [\text{every cat}] || \\
= || \text{chased} (|| \text{every cat} ||) \\
= \text{Function-1(\text{Function-2})} \\
= \lambda \Psi \cdot \lambda \Phi \cdot (\lambda w \cdot \Psi(\lambda z \cdot \text{CHASED}(w, z))) (\lambda X \cdot \forall y: \text{CAT}(y)[X(y)]) \\
= \lambda \Phi \cdot (\lambda w \cdot \forall y: \text{CAT}(y)[X(y)](\lambda z \cdot \text{CHASED}(w, z)(y))) \\
= \lambda \Phi \cdot (\lambda w \cdot \forall y: \text{CAT}(y)[\text{CHASED}(w, y)]) \\
= \ll[e, t, t, t] \\

4. \( || \text{some dog} || = \lambda X \cdot \exists x: \text{DOG}(x)[X(x)] \)

5. \( || \text{some dog} [\text{chased every cat}] || \\
= \text{Function-3(\text{Function-4})} \\
= \lambda \Phi \cdot (\lambda w \cdot \forall y: \text{CAT}(y)[\text{CHASED}(w, y)]) (\lambda X \cdot \exists x: \text{DOG}(x)[X(x)]) \\
= \lambda X \cdot \exists x: \text{DOG}(x)[X(x)](\lambda w \cdot \forall y: \text{CAT}(y)[\text{CHASED}(w, y)]) \\
= \exists x: \text{DOG}(x)[\lambda w \cdot \forall y: \text{CAT}(y)[\text{CHASED}(w, y)][x]) \\
= \exists x: \text{DOG}(x)[\forall y: \text{CAT}(y)[\text{CHASED}(w, y)][x]) \\

6. \( || \text{Fido} || = \text{MONTY[FIDO]} = \lambda X \cdot X(\text{FIDO}) \)

6a. \( || \text{Fido} || = \lambda X \cdot \text{ix: FIDOIZER}(x)[X(x)] \)

7. \( || \text{Fido} [\text{chased every cat}] || \\
= \text{Function-3(\text{Function-6})} \\
= \lambda \Phi \cdot (\lambda w \cdot \forall y: \text{CAT}(y)[\text{CHASED}(w, y)]) (\lambda X \cdot X(\text{FIDO})) \\
= \lambda X \cdot X(\text{FIDO})(\lambda w \cdot \forall y: \text{CAT}(y)[\text{CHASED}(w, y)]) \\
= \lambda w \cdot \forall y: \text{CAT}(y)[\text{CHASED}(w, y)][\text{FIDO}] \\
= \forall y: \text{CAT}(y)[\text{CHASED}(\text{FIDO}, y)] \\

(51) \( \forall x \forall y \{ (x, y) = \forall X[X(x) = X(y)] \} \)

(52) \( || \text{Fido} || = \text{FIDO} \\
|| \text{Felix} || = \text{FELIX} \\
\downarrow || \text{chased} || = \lambda \Psi \cdot \lambda x. || \text{chased} (\text{MONTY}[x], \Psi) \\
\downarrow || \text{chased} || \downarrow = \lambda y \cdot \lambda \Phi \cdot || \text{chased} (\Phi, \text{MONTY}[y]) \\
\downarrow || \text{chased} || \downarrow \downarrow = \lambda y \cdot \lambda x. || \text{chased} (\text{MONTY}[x], \text{MONTY}[y]) \\

Adding event variables is not entirely trivial...

(53) \( || \text{chase} || = \lambda \Psi \cdot \lambda \Phi \cdot \lambda e \cdot \Phi(\lambda w \cdot \Psi(\lambda z \cdot \text{CHASE}(e, w, z))) \)

(54) \( || [\text{some dog}] [\text{chase every cat}] || \\
= \ldots \\
= \lambda e \cdot \exists x: \text{DOG}(x)[\forall y: \text{CAT}(y)[\text{CHASE}(e, x, y)]] \\

AWKWARD POINT: no ONE event is a chase of every cat; consider ‘Three dogs (together) chased every cat’

But even waiving such concerns...

can lexical items have Level Four semantic values of type
\(<e, t>, <e, t>, t>, t>, t>, <e, t>, t>, t>, t>, et>?\)

And if so, are semantic values of the other 2,089,470
Level Four types also available, at least in principle?
Less Uplifting Derivations (Heim and Kratzer)

(FA) \[ \langle\alpha\rangle^\wedge\langle\alpha, \beta\rangle \models A = \langle\alpha\rangle \models A (\langle\alpha\rangle^\wedge\langle\alpha\rangle) \]

(PM) \[ \langle e, t \rangle^\wedge\langle e', t' \rangle \models A = \text{UP:} \langle e, t \rangle \models A (\langle e, t \rangle) \]
\[ = \lambda x . \langle e', t' \rangle \models A (x) \& \langle e, t \rangle \models A (x) \]

(PA) \[ i^\langle t \rangle \models A = \text{ABSTR\'ACT}(i, \langle t \rangle, A) \]
\[ = \lambda x . \text{true} \text{ iff for some } A^* \text{ such that } A^*(i) = x, \]
\[ \text{and } A^* \text{ is an } i\text{-variant of } A: \langle t \rangle \models A^* = \text{T} \]

(47a) \[ [\text{every cat}]_1 [\text{Fido [chased } t_1]] \]
(47a') \[ [\text{every cat}] [1 [\text{Fido [chased } t_1]]] \]

1. \[ \langle \text{chased} \rangle \models A = \lambda y . \lambda x . \text{CHASED}(x, y) \]
2. \[ \langle \text{every cat} \rangle \models A = \lambda x . \forall y : \text{CAT}(y)[\text{X}(y)] \]
3. \[ \langle t_1 \rangle \models A = A[1] \]
4. \[ \langle \text{chased } t_1 \rangle \models A = \text{Function-1(Entity-3)} = \lambda x . \text{CHASED}(x, A[1]) \]
5. \[ \langle \text{Fido} \rangle \models A = \text{FIDO} \]
6. \[ \langle \text{Fido [chased } t_1] \rangle \models A = \text{Function-4(Entity-5)} \]
\[ = \text{CHASED}(\text{FIDO}, A[1]) \]
7. \[ \langle 1 [\text{Fido chased } t_1] \rangle \models A = \text{ABSTR\'ACT}(1, [\text{Fido chased } t_1], A) \]
\[ = \lambda x . \text{CHASED}(\text{FIDO}, x) \]

Step 7, via (PA), is syncategorematic: the upper index doesn’t indicate a function of any Frege-type; certainly not \( \langle t, e \rangle \);

cp. \( \langle T, \lambda x . x = A[1]\rangle \langle \perp, \lambda x . \sim(x = A[1])\rangle \)

8. \[ \langle \text{every cat} [1 [\text{Fido [chased } t_1]]] \rangle \models A \]
\[ = \langle \text{every cat} [\text{Function-7}] \rangle \]
\[ = \lambda x . \forall y : \text{CAT}(y)[\text{X}(y)](\lambda x . \text{CHASED}(\text{FIDO}, x)) \]
\[ = \forall y : \text{CAT}(y)[\lambda x . \text{CHASED}(\text{FIDO}, x)(y)] \]
\[ = \forall y : \text{CAT}(y)[\text{CHASED}(\text{FIDO}, y)] \]

(PA*) \[ \langle \text{Fido, } t \rangle^\wedge\langle t \rangle \models A = \langle \text{Fido, } t \rangle \models A (\text{ABSTR\'ACT}(i, \langle t \rangle, A)) \]

But is this really different than the High Church treatment?

(50b) \[ \langle \text{chased} \rangle = \lambda y . \lambda \Phi : \Phi(\lambda w . \Psi(\lambda z . \text{CHASED}(w, z))) \]

(48a) \[ [\text{most of the dogs}]_2 [\text{every cat}]_1 [t_2 \text{ chased } t_1] \]
\[ [\text{most of the dogs}] [2 [\text{every cat}] [1 [t_2 \text{ chased } t_1]]] \]
\[ \lambda y : \lambda w . \lambda \Psi : \lambda z . \text{CHASED}(w, z)] \]

And does ‘every cat’ really combine with an analog of a relative clause? If so, then why is the (9b) interpretation unavailable?

(9) every cat which Fido chased

(a) \forall x : \text{CAT}(x) \& \text{CHASED}(\text{FIDO, } x) \quad \text{Restricted Quantifier}

#(b) \forall x : \text{CAT}(x) [\text{CHASED}(\text{FIDO, } x)] \quad \text{Complete Sentence}

So do we really want to invoke...

(FA)

(PA)

and (TYPES) \( \langle e \rangle, \langle t \rangle, \text{ and } \langle \alpha, \beta \rangle \) if \( \langle \alpha \rangle \) and \( \langle \beta \rangle \) are types
E. Raising Without Lifting

Higginbotham (1985):

(i) Θ-marking (saturation, allowing for event variables)
(ii) modification (fundamentally conjunctive)
(iii) Θ-binding (∃-closure, and overt quantification)

I have no objection—and no alternative—to positing an operation like Θ-binding or PA, according to which instances of (55) are understood as instances of (56).

(55) [[every cat]₁ [...t₁...]]
(56) ∀x₁:CAT(x₁)[...x₁...]

Given quantificational direct objects (and relative clauses), some syncategorematicity is unavoidable. So the question is which other operations and categories/types we need to posit.

Higginbotham proposed Θ-marking and modification, but no “functionals.” Heim and Kratzer suggest (FA), (PM), and (TYPES). Others suggest (FA), (TYPES), and type-adjusting operations. But recall the absence of abstractions on relations.

(46*) [whonk₁ [Plum _→ Mustard]] λR. R(PLUM, MUSTARD)

Frege had to invent a language—governed by (FA) and (TYPES)—that allowed for abstraction over relations.

ANCESTRAL[λy.λx.PRECEDES(x, y), λy.λx.PREDECESSOR(x, y)]

But to handle the meaning of ‘chased every cat’?

Do we really need/want (TYPES), (FA), and (PA) along with LF-raising?

If human quantifiers raise, as in (47a),

(47a) [[every cat]₁ [Fido [chased t₁]]]

they seem to combine with open sentences, not relative clauses. So why think that [every cat] both raises and is of type <et, t>?

Given raising, the best overall account may well posit a syncategorematic operation according to which (47a) is true iff the cats are such that each one of them is such that Fido chased it.

In Tarski-ese: (47a) is satisfied by an assignment A, of values to variables, iff every cat is such that it is assigned to the index by some 1-variant of A that satisfies [Fido [chased t₁]]

If we want to say that ‘every’ and ‘cat’ are true of some things, we can say that (47a) is true relative to A iff there are some ordered pairs that meet three conditions:

(a) every one of their “internal elements” is one of their “external elements”;
(b) their internal elements are the cats; and
(c) their external elements are the internal elements that are assigned to the index by some 1-variant of A, A*, such that [Fido [chased t₁]] is true relative to A*.

But if we can handle (47a) with Θ-marking and Θ-binding, as opposed to (TYPES) and (FA), do we need the latter?

If some syncategorematicity is unavoidable, how much categorèmeaticity/typology do we need?
F. Some Remaining Questions, and a Possible Reduction

Should we posit (constrained) "covert raising" of quantifiers?

(57) It is false that every senator lied

#(57a) \(\forall x: \text{SENATOR}(x)[\neg \text{LIED}(x)]\)

(57b) \(\neg \forall x: \text{SENATOR}(x)[\text{LIED}(x)]\)

(58) Most of the dogs chased most of the cats

(58a) Most of the dogs were agents of events that were chasings (by those dogs) of most the cats.

(58b) Most of the cats were patients of events that were chasings (of those cats) by most of the dogs.

Which conjunction operation(s) do we want for modification?

(59) \(Fx \& Gx\)

(60) \(Fa \& Gb \& Gx \& Gy \& Ryz \& Rax \& Szvw\)

(61) \(F(\_)^G(\_)

(62) \(\exists x: \text{THE-ANTS}(x)[\text{BIG-FOR}(x, X)^\text{ANT}(x)]\)

(63) \(\exists x[\text{EXTERNAL}(e, x)^\text{FIDOIZER}(x)]\)

(64) \(\exists [\text{Dyadic}(\_, \_)^\text{Monadic}(\_)]\)

How many arguments can one verb really have?

(19) [[see a man] [with a telescope]]

(a) \(\exists y: \text{MAN}(y)[\text{SAW}(e, x, y) \& \exists z: \text{SCOPE}(z)[\text{WITH}(e, z)]]\)

(b) \(\exists y: \text{MAN}(y)[\text{SAW}(e, x, y) \& \exists z: \text{SCOPE}(z)[\text{WITH}(x, z)]]\)

"Severate" external participants: Castañeda, Schein, Kratzer

(20) [[a woman] [see a man]]

(20a) \(\exists x: \text{WOMAN}(x)[\text{EXTERNAL}(e, x)] \& \exists y: \text{MAN}(y)[\text{P-SEE}(e, y)]\)

(20-v) [[a woman] [v [see a man]]]

(57) \([\text{see a man}] = \lambda E. \exists y: \text{MAN}(y)[\text{P-SEE}(e, y)]\)

(58a) \([v] = \lambda E. \lambda x . \lambda e . \text{EXTERNAL}(e, x) \& E(e)\) Level Three

(58b) \([v] = \lambda E. \lambda \psi . \lambda e . \text{EXTERNAL}(e, \psi) \& E(e)\) Level Four

Suppose each verb \(\Theta\)-marks at most one argument: no \(\Theta\)-grids

(59) [[see a man] [with a telescope]]

Higgy 1987: ‘a’ as "grammatical grace note"

(59a) \(\exists y[\text{P-SEE}(e, y)^\text{MAN}(y)]^\exists z[\text{WITH}(e, z)^\text{TELESCOPE}(z)]\)

(59b) \(\exists [\text{P-SEE}(\_, \_)^\text{MAN}(\_)]^\exists [\text{WITH}(\_, \_)^\text{TELESCOPE}(\_)]\)

(60) [hear [a man fall]]

(60a) \(\exists y[\text{P-HEAR}(e, y)^\exists z[\text{FALL}(y, z)^\text{MAN}(z)]]\)

(60b) \(\exists [\text{P-HEAR}(\_, \_)^\exists [\text{FALL}(\_, \_)^\text{MAN}(\_)]\)

(61) [[a woman] [see a man]]

(61a) \(\exists x[\text{EXT}(e, x)^\text{WOMAN}(x)] \& \exists y[\text{P-SEE}(e, y)^\text{MAN}(y)]\)

(61b) \(\exists [\text{EXTERNAL}(\_, \_)^\text{WOMAN}(\_)]^\exists [\text{P-SEE}(\_, \_)^\text{MAN}(\_)]\)
**Three Packages**

**NC:** limited Θ-marking/modification
syncategorematic Θ-binding

**LF**

**HC:** (TYPES)
(FA)
a few kinds of type-adjustment

**LC:** (TYPES; though in practice, higher types are less exploited)
(FA)
(PM)

**LF**
syncategorematic (PA)

It will be useful to develop and compare...

(i) the sparsest versions of **NC** that have a prayer of approaching descriptive adequacy (i.e, not *under*generating)
without appeal to further syncategorematic principles

(ii) the most constrained versions of **HC** that have a prayer of approaching explanatory adequacy (i.e, not *over*generating)

**LC** invites reduction. Indeed, absent reduction, it isn’t clear what question **LC** is supposed to answer.

Higginbotham’s conception of semantics, as articulated in “On Semantics,” offered a substantive (though not yet adequate) answer to a relatively clear and very interesting question concerning “systems of human linguistic knowledge.”

**Some Further References**


Berwick, Pietroski, Yankama, and Chomsky 2011.


Castañeda 1967. Comments.
In *The Logic of Decision and Action* (Rescher, ed.)


Partee 2006. Do we need two basic types?

<table>
<thead>
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<th>Count</th>
<th>Animal</th>
<th>Agent(s)</th>
<th>Chased</th>
<th>Count</th>
<th>Animal</th>
<th>Agent(s)</th>
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<td>7 dogs</td>
<td>D1</td>
<td>C1-C5</td>
<td>five of the seven dogs</td>
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<td>C1-C5</td>
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<td></td>
<td>D3</td>
<td>C1-C5</td>
<td>but only three of the seven</td>
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<td>D4</td>
<td>C3-C7</td>
<td>cats were chased by</td>
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<td>slept</td>
<td>D5</td>
<td>C3-C7</td>
<td>more than three of the dogs</td>
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