Prehistory of Opacity

1. Buridan (1350)

(1) *Debeo tibi equum.*
I owe you a horse.

I posit the case that for a good service you performed for me, I promised you a good horse. […] And since I owe you this, until I have paid that concerning the payment of which I have obligated myself […], you could rightly take action against me to bring about payment to you of a horse, which you could not do if I did not owe you. […] But the opposite is argued in a difficult way.

(J. Buridan, *Sophisms on Meaning and Truth*. Translated by Th. K. Scott. New York 1966. p. 137)

Let us then have our horse-coper arguing again. 'If I owe you a horse, then I owe you something. And if I owe you something, then there is something I owe you. And this can only be a thoroughbred of mine: you aren't going to say that in virtue of what I said there's something else I owe you. Very well, then: by your claim, there's one of my thoroughbreds I owe you. Please tell me which one it is.'

(P. Geach, 'A Medieval Discussion of Intentionality'. In: Y. Bar-Hillel (ed.): *Logic, Methodology and Philosophy of Science*. Amsterdam 1965, 425–33; p. 430)

(2a) *Equum tibi debeo.*
A horse is owed by me to you. [Scott]
There is a horse that I owe you. [Geach]
(34)Aliquem equum tibi debeo.
Some horse is owed by me to you. [Scott]
(35)Unum equum tibi debeo.
One horse is owed by me to you. [Scott]

(3a) There is something that I owe you as [under the concept (*ratio*) of] 'Horse'.
(b) $(\exists x)$ Owe(I, you, x, ^Horse)

(4a) There is some (actual) horse that I owe you under some concept.
☞ $(\exists x)$ $(\exists C)$ [Horse(x) & Owe(I,you,x,C)]

☞ Without further assumptions, (3b) ≠> (4b) and (4b) ≠> (3b).

(5a) *I owe you something.*
(b) $(\exists x)$ Owe(I, you, x, ^Thing)
(6a) *There is something that I owe you.*
(b) $(\exists x)$ $(\exists C)$ [Thing(x) & Owe(I,you,x,C)]

☞ If 'Thing' is a universal predicate, then (5) => (6).

2. Quine (1960)

a) Background

Basic assumptions of logical analysis (Frege, Russell etc.):

- There are two kinds of entities: individuals and propositions.

  People, animals, places, etc. are individuals; propositions are individuated by their truth-conditions
- Names and personal pronouns denote individuals.

  Given a context of utterance, *I* and *you* respectively denote speaker and hearer in that context; in any context of utterance, the name *Morellus* denotes the horse by that name.
- Sentences denote propositions.

  Given a context of utterance, *I give you a horse* denotes the proposition that is true iff there is a horse that the speaker in that context gives the hearer in that context).
- Verbs express relations between entities.

  Give expresses a relation between three individuals; *know* expresses a relation between an individual and a proposition.
- An atomic sentence (consisting of a verb and its non-quantified arguments) denotes the proposition which is true iff the denotations of the arguments stand in the relation expressed by the verb.

  I give you Morellus denotes the proposition that the speaker (in the given context) gives Morellus to the hearer (in that same context).
- Indefinites express existential quantification.

  A horse is neighing denotes the proposition that the set of horses that are neighing is non-empty; *I give you a horse* expresses the proposition that the set of horses that the speaker gives to the hearer is non-empty.

☞ Quine does not share all of these assumptions, but the difference between his and the classical position(s) are largely independent of his analysis of opacity.

1.2 Opaque verbs

(7) *The commissioner is <u>looking for</u> the chairman of the hospital board.*

(8) *Ernest is <u>hunting</u> lions.*

(9) *Ernest is <u>looking for</u> a lion.*

Three reasons why opaque verbs defy classical analysis:

- The construction is *ambiguous*: specific vs. non-specific reading.

  (9) may express the proposition that the set of lions sought by Ernest is non-empty (*specific reading*); but (9) may also be true if Ernest is not looking for any lion in particular (*unspecific reading*).
- On the non-specific reading, the object is *non-quantificational*: existential generalization is blocked.

  The sentence *Ernest is looking for a striped lion* may be true (on its non-specific reading) without there being any striped lions.
- The object position is *intensional*, i.e. substitution of extensionally equivalent objects is blocked.

  Even if all maned lions are male and vice versa, (10) could be true but (11) could be false:

(10) *Ernest is looking for a maned lion.*

(11) *Ernest is looking for a male lion.*

1.3 Propositional attitudes

(12) *Tom believes that someone denounced Catiline.*

(13) *Tom believes that someone is such that he denounced Catiline.*

(14) *Someone is such that Tom believes that he denounced Catiline.*

Scope ambiguity in (12) and (13):

- narrow scope reading: Tom stands in the relation expressed by *believe* to the proposition denoted by *Someone denounced Catiline*.
- wide scope reading, as in (14): The set of individuals that Tom believed to have denounced Catiline is non-empty.

☞ On both readings, the indefinite *someone* expresses existential quantification.

(15) *Tom is trying to read a book on Roman history.*

(16) *Tom is endeavoring (-to-cause) Tom to read a book on Roman history.*

Tom stands in the relation of endeavoring to the proposition expressed by *Tom reads a book on Roman history*.

(17) *A book on Roman history is such that Tom is endeavoring (-to-cause) Tom to read it.*

The set of books *b* on Roman history such that Tom stands in the relation of endeavoring to the proposition expressed by *Tom reads b*, is non-empty.

☞ Lexical decomposition: *x tries V* is analyzed as *x endeavors (-to-cause) x to V*.

1.4 'Opacity in certain verbs': Scope ambiguity and lexical decomposition

(W. V. O. Quine, *Word and Object*, Cambridge, Mass. 1960, §32, pp. 151–6)

(18) *Ernest is looking for Simba.*

(19) *Ernest is trying to find Simba.*

(20) *Ernest is endeavoring (-to-cause) Ernest to find Simba.*

(21) *Ernest is looking for a lion.* [= (9)]

(22) *Ernest is trying to find a lion.*

(23) *Ernest is endeavoring (-to-cause) Ernest to find a lion.*

(24) *A lion is such that Ernest is endeavoring (-to-cause) Ernest to find it.*

Lexical decompositions of opaque verbs:

x looks for y ≡ *x endeavors (-to-cause) x to find y*.

x owes y to z ≡ *x is obliged (-to-cause) x to give y to z*.

☞ Further opacity expected!

Explanation of odd behavior of opaque verbs in terms of lexical decomposition:

- *Ambiguity* between specific and non-specific reading is an ordinary scope ambiguity in attitude context.
- *Non-quantificationality* of indefinite is only superficial, due to its narrow scope.
- *Intensionality* is due to the meaning of the attitude verb.

3. Montague (1969, 1973)

Principle of (Surface) Compositionality

The meaning of a complex expression can be obtained by (suitably) combining the meanings of its immediate parts.

Context Principle

The meaning of an expression is its denotation or its contribution to the meanings of larger expressions in which it occurs.

Possible Worlds Semantics

The truth conditions of a sentence correspond to the set of world-time-points that the sentence truthfully describes.

(25) *Jones is approaching.*

(26) *A unicorn is approaching.*

(27) *Jones finds Corny.*

(28) *Jones finds a unicorn.*

(29) *Jones tries to find Corny.*

(30) *Jones seeks a unicorn.*

Expression	Meaning	Type
Jones is approaching	$\{(w,t) \mid$ Jones is approaching in w at $t\}$ [=: p_{Jones}]	*st*
Jones	Jones	*e*
is-approaching	" p_{Jones} minus Jones", i.e.: a function (or *property*) *App* assigning p_x to any individual x	*e(st)*
A unicorn is approaching	$\{(w,t) \mid \{u \mid u$ is a unicorn in w at $t\} \cap \{u \mid u$ is approaching in w at $t\} \neq \varnothing\}$ [=:q_{App}]	*st*
a unicorn	" q_{App} minus *App*", i.e.: a function assigning q_Q to any property Q, where q_Q is: $\{(w,t) \mid \{u \mid u$ is a unicorn in w at $t\} \cap \{u \mid (w,t) \in Q(u)\} \neq \varnothing\}$	*(e(st))(st)*
…	…	
find(s)	a function assigning to any individual y the property F_y that assigns to any x the proposition: $\{(w,t) \mid x$ finds y in w at $t\}$	*e(e(st))*

Jones tries to find Corny	{(*w*,*t*) | In *w* at *t*, Jones is endeavoring-to-cause Jones to find Corny}	*st*
tries	a function assigning to any proposition *p* the property T_p that assigns to any *x* the proposition: {(*w*,*t*) | in *w* at *t*, *x* is endeavoring-to-cause *p* to become true}	*((st)(e(st)))*
Jones tries to find a unicorn	{(*w*,*t*) | In *w* at *t*, Jones is endeavoring-to-cause *p* to be true}, where *p* = {(*w'*,*t'*) | {*u* | *u* is a unicorn in *w'* at *t'*} ∩ {y | *Jones finds* y *in* w' *at* t'} ≠ Ø}	*st*

Digression: Two-sorted Type Theory (Ty2)

<u>Definitions</u>

The set *T2* of *(two-sorted) types* is the smallest set containing *s*, *e*, and *t* as elements and every pair (*a b*) of elements *a* and *b*.

For $a \in T2$, the domain D_a of *objects of type a* is defined by induction on *a*'s length:

(i) D_s is the logical space of all world-time pairs; (ii) D_e is the set of all (possible) individuals; (iii) D_t is the set {0,1} of truth-values; (iv) D_{ab} is the set of functions with domain D_a and range included in D_b.

For any $a \in T2$, there is a (possibly empty) set Con_a of *constants of type a* and an infinite set Var_a of *variables of type a*. $Con := \bigcup_{a \in T2} Con_a$, $Var := \bigcup_{a \in T2} Var_a$.

For any $a \in T2$, the set $Ty2_a$ of *Ty2-expressions of type a* is defined by induction on the length of strings consisting of constants, variables and auxiliary symbols '(', ')', 'λ', and '=':

(a) $Con_a \subseteq Ty2_a$; (b) $Var_a \subseteq Ty2_a$; (c) '$\alpha(\beta)$'$\in Ty2_b$ whenever $\alpha \in Ty2_b$ and $\beta \in Ty2_a$; (d) '$(\lambda x\ \alpha)$' $\in Ty2_{ab}$ whenever $x \in Var_a$ and $\beta \in Ty2_b$; (e) '$(\alpha{=}\beta)$'$\in Ty2_t$ whenever $\alpha \in Ty2_a$ and $\beta \in Ty2_a$.

For any constant *c* of any type $a \in T2$, we take it that *c* denotes some fixed object $F(c) \in D_a$.

A *variable assignment g* is a function whose domain is *Con*, whose range is included in $\bigcup_{a \in T2} D_a$ and such that, for any $a \in T2$, $g(x) \in D_a$. If *g* is a variable assignment, $a \in T2$, $x \in Var_a$ and $u \in Dr_a$, then $g\left[x/u\right]$ is the assignment that differs from *g* at most in assigning *u* to *x*: $g\left[x/u\right] :=$ $(g \backslash \{(x,g(x))\}) \cup \{(x,u)\}$.

If *g* is a variable assignment, $a \in T2$, and $\alpha \in Ty2_a$, then the *denotation of* α *under g*, $\|\alpha\|^g \in D_a$ is defined by the following induction on α:

(a) $\|\alpha\|^g = F(\alpha)$ if $\alpha \in \mathrm{Con}$; (b) $\|\alpha\|^g = g(\alpha)$ if $\alpha \in \mathrm{Var}$; (c) $\|\beta(\gamma)\|^g = \|\beta\|^g(\|\gamma\|^g)$ if α = 'β(γ)' (for some β and γ); (d) $\|(\lambda x\ \beta)\|^g = \{(u, \|\beta\|^{g[x/u]}) \mid u \in D_a\}$, if α = '(λ*x* β)' (for some *x* and β); (e) $\|(\beta = \gamma)\|^g = 1$ **[**0**]** iff $\|\beta\|^g = \|\gamma\|^g$ **[**$\|\beta\|^g \neq \|\gamma\|^g$**]**, whenever α = '(β = γ)' (for some β and γ).

Notation

a) Conventions

- boldface: (non-logical) constants
- italics & fancy letters: variables
- Greek letters (other than 'λ'): meta-variables
- '*i*' designates the first variable of type *s* (standing for the actual world/time index); '*j*' and '*k*' designate (other) variables of type *s*

b) Abbreviations

Formula	*is short for*	
α_j	$\alpha(j)$	
$\alpha(\beta,\gamma)$	$\alpha(\gamma)(\beta)$	
$(Qx)\ \varphi$	$Q(\lambda x\ \varphi)$	
$(\forall x)\ \varphi$	$((\lambda x\ \varphi) = (\lambda x\ (x = x)))$	
$\neg\ \varphi$	$(\varphi = (\forall v)\ v)$	[where v is of type t]
$(\varphi \wedge \psi)$	$((\lambda R\ R(\varphi,\psi)) = (\lambda R\ R((\forall x)\ (x = x), (\forall x)\ (x = x))))$	[where R is of type $(t(tt))$]
$(\varphi \vee \psi)$	$\neg\ (\neg\varphi \wedge \neg\psi)$	
etc.		

Translating natural language into Ty2 (vs. IL)

English	Ty2	IL	Type
Jones is approaching	$\mathbf{A}_i(\mathbf{j})$	$\mathbf{A}(\mathbf{j})$	*t*
Jones	$\mathbf{j}$	$\mathbf{j}$	***e***
is-approaching	$\mathbf{A}_i$	$\mathbf{A}$	*et*
A unicorn is approaching	$(\exists x)[\mathbf{U}_i(x) \wedge \mathbf{A}_i(x)]$	$(\exists x)[\mathbf{U}(x) \wedge \mathbf{A}(x)]$	*t*
a unicorn	$[\lambda Q(\exists x)[\mathbf{U}_i(x) \wedge Q(x)]]$	$[\lambda Q(\exists x)[\mathbf{U}(x) \wedge Q(x)]]$	*(et)t*
find(s)	$\mathbf{F}_i$	$\mathbf{F}$	*e(et)*
Jones tries to find Corny	$\mathbf{T}_i(\mathbf{j},[\lambda j\mathbf{F}_j(\mathbf{j},\mathbf{c})])$	$\mathbf{T}(\mathbf{j},[\hat{}\,\mathbf{F}(\mathbf{j},\mathbf{c})])$	*t*
tries	$\mathbf{T}_i$	$\mathbf{T}$	*((st)(et))*
Jones tries to find a unicorn	$\mathbf{T}_i(\mathbf{j},[\lambda j(\exists y)[\mathbf{U}_j(y) \wedge \mathbf{F}_j(\mathbf{j},y)]])$	$\mathbf{T}(\mathbf{j},[\hat{}(\exists y)[\mathbf{U}(y) \wedge \mathbf{F}(\mathbf{j},y)]])$	*t*
tries to find a unicorn	$\lambda x\mathbf{T}_i(x,[\lambda j(\exists y)[\mathbf{U}_j(y) \wedge \mathbf{F}_j(x,y)]])$	$\lambda x\mathbf{T}(x,[\hat{}(\exists y)[\mathbf{U}(y) \wedge \mathbf{F}(x,y)]])$	*et*

MORE ON TY2 (AND ITS RELATION TO MONTAGUE'S IL) CAN BE FOUND IN THE NOTES ON *FORMAL SEMANTICS*

End of Digression

seeks = "*tries to find a unicorn* minus *a unicorn*":

$$\lambda x \mathbf{T}_i\Big(x, \big[\lambda j (\exists y)\big[\mathbf{U}_j(y) \wedge \mathbf{F}_j(x,y)\big]\big]\Big)$$

$$\equiv \quad \lambda x \mathbf{T}_i\Big(x, \big[\lambda j \big[\lambda Q (\exists y)\big[\mathbf{U}_j(y) \wedge Q(y)\big]\big]\big(\lambda y \mathbf{F}_j(x,y)\big)\big]\Big)$$

$$\equiv \quad \lambda x \mathbf{T}_i\Big(x, \big[\lambda j \big[\lambda k \lambda Q (\exists y)\big[\mathbf{U}_k(y) \wedge Q(y)\big]\big](j)\big(\lambda y \mathbf{F}_j(x,y)\big)\big]\Big)$$

$$\equiv \quad \underline{\underline{\Big[\lambda \mathfrak{Q}\, \lambda x \mathbf{T}_i\Big(x, \big[\lambda j\, \mathfrak{Q}_j\big(\lambda y \mathbf{F}_j(x,y)\big)\big]\Big)\Big]}}\underline{\big(\lambda k \lambda Q (\exists y)\big[\mathbf{U}_k(y) \wedge Q(y)\big]\big)}$$

The underlined formula denotes the intension of *a unicorn*; hence the doubly underlined formula (of type *((s((et)t))(et))*) must denote the extension of *seek*.

Translation of VP on non-specific (opaque/de dicto) reading: $\left(\mathrm{V}^{\mathrm{op}}_{\mathrm{tran}} + \mathrm{NP}\right)' = \mathrm{V}^{\mathrm{op}}_{\mathrm{tran}}{}' \left(\lambda i \mathrm{NP}\right)'$

Opaque verbs à la Montague

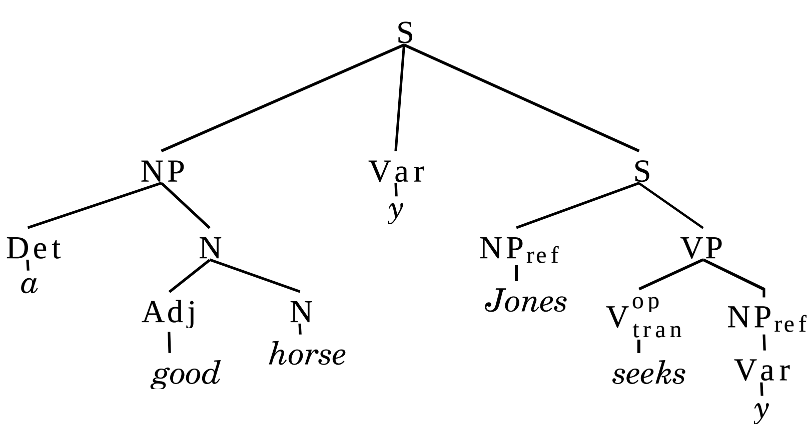
('On the Nature of Certain Philosophical Entities', *The Monist* 53 (1969); 'The Proper Treatment of Quantification in Ordinary English'. [= *PTQ*] In: J. Hintikka *et al.* (eds.), *Approaches to Natural Language*. Dordrecht 1973. Both reprinted in R. H. Thomason (ed.): *Formal Philosophy. Selected Papers of Richard Montague*, New Haven 1974.)

seeks	$\lambda \mathfrak{Q}\, \lambda x \mathbf{T}_i\Big(x, \big[\lambda j \big(\mathfrak{Q}_j y\big)\mathbf{F}_j(x,y)\big]\Big)$	$\big(\big(s((et)t)\big)(et)\big)$
owes	$\lambda \mathfrak{P}\, \lambda \mathfrak{Q} \lambda x \mathbf{O}_i\Big(x, \big[\lambda j \big(\mathfrak{P}_j y\big)\big(\mathfrak{Q}_j z\big)\mathbf{G}_j(x,y,z)\big]\Big)$	$\Big(\big(s((et)t)\big)\Big(\big(s((et)t)\big)(et)\Big)\Big)$
[or:	$\lambda \mathfrak{P}\, \lambda \mathfrak{Q} \lambda x \mathbf{O}_i\Big(x, \big[\lambda j \big(\mathfrak{Q}_j z\big)\big(\mathfrak{P}_j y\big)\mathbf{G}_j(x,y,z)\big]\Big)$	$\Big(\big(s((et)t)\big)\Big(\big(s((et)t)\big)(et)\Big)\Big)$
or:	$\lambda y\, \lambda \mathfrak{Q} \lambda x \mathbf{O}_i\Big(x, \big[\lambda j \big(\mathfrak{Q}_j z\big)\mathbf{G}_j(x,y,z)\big]\Big)$	$\Big(e\Big(\big(s((et)t)\big)(et)\Big)\Big)$]
appear	$\lambda \mathfrak{Q} \lambda P \mathbf{A}_i\big(\lambda j \mathfrak{Q}_j(P)\big)$	$\Big(\big(s((et)t)\big)\big((s(et))t\big)\Big)$
worships	$\mathbf{W}_i$ [Opacity without decomposition]	$\big(\big(s((et)t)\big)(et)\big)$
[cf. *kill*	$\lambda y\, \lambda x \mathbf{C}_i\Big(x, \big[\lambda j\, \mathbf{D}_j(y)\big]\Big)$ [Decomposition without opacity]	$\big(e(et)\big)$

Specific (transparent/de re) reading

Syntax:

Semantics:



y	$\big(\lambda P P(y)\big)$	$\big((et)t\big)$
seeks y	$\Big(\lambda \mathfrak{Q}\, \lambda x \mathbf{T}_i\Big(x, \big[\lambda j \big(\mathfrak{Q}_j y\big)\mathbf{F}_j(x,y)\big]\Big)\Big)\big(\lambda i \lambda P P(y)\big)$	(et)

$\equiv$	$\left(\lambda x \mathbf{T}_i\left(x,\left[\lambda j\left(\lambda i \lambda P P(y)\right)(j)\left(\lambda y \mathbf{F}_j(x,y)\right)\right]\right)\right)$	
$\equiv$	$\left(\lambda x \mathbf{T}_i\left(x,\left[\lambda j\left(\lambda P P(y)\right)\left(\lambda y \mathbf{F}_j(x,y)\right)\right]\right)\right)$	
$\equiv$	$\left(\lambda x \mathbf{T}_i\left(x,\left[\lambda j\left(\lambda y \mathbf{F}_j(x,y)\right)(y)\right]\right)\right)$	
$\equiv$	$\left(\lambda x \mathbf{T}_i\left(x,\left[\lambda j\, \mathbf{F}_j(x,y)\right]\right)\right)$	
Jones seeks y	$\mathbf{T}_i\left(\mathbf{j},\left[\lambda j\, \mathbf{F}_j(\mathbf{j},y)\right]\right)$	*t*
(a unicorn y) Jones seeks y	$\left[\lambda Q(\exists x)\left[\mathbf{U}_i(x) \wedge Q(x)\right]\right]\left(\lambda y \mathbf{T}_i\left(\mathbf{j},\left[\lambda j\, \mathbf{F}_j(\mathbf{j},y)\right]\right)\right)$	*t*
$\equiv$	$(\exists x)\left[\mathbf{U}_i(x) \wedge \left(\lambda y \mathbf{T}_i\left(\mathbf{j},\left[\lambda j\, \mathbf{F}_j(\mathbf{j},y)\right]\right)\right)(x)\right]$	
$\equiv$	$(\exists x)\left[\mathbf{U}_i(x) \wedge \mathbf{T}_i\left(\mathbf{j},\left[\lambda j\, \mathbf{F}_j(\mathbf{j},x)\right]\right)\right]$	

<u>Definiteness and opacity</u>

(31) Jones is looking for the headmaster.

the headmaster	$\left[\lambda P(1x)\left[\mathbf{H}_i(x), P(x)\right]\right]$	*((et)t)*
seeks the headmaster	$\left(\lambda \mathfrak{Q}\, \lambda x \mathbf{T}_i\left(x,\left[\lambda j\left(\mathfrak{Q}_j y\right)\mathbf{F}_j(x,y)\right]\right)\right)\left(\lambda i \lambda P(1x)\left[\mathbf{H}_i(x), P(x)\right]\right)$	*(et)*
$\equiv$	$\left(\lambda x \mathbf{T}_i\left(x,\left[\lambda j\left(\lambda P(1y)\left[\mathbf{H}_j(y), P(y)\right]\right)\left(\lambda y \mathbf{F}_j(x,y)\right)\right]\right)\right)$	
$\equiv$	$\left(\lambda x \mathbf{T}_i\left(x,\left[\lambda j\,(1y)\left[\mathbf{H}_j(y), \mathbf{F}_j(x,y)\right]\right]\right)\right)$	
(the headmaster y) Jones seeks y	$\left[\lambda P(1x)\left[\mathbf{H}_i(x), P(x)\right]\right]\left(\lambda y \mathbf{T}_i\left(\mathbf{j},\left[\lambda j\, \mathbf{F}_j(\mathbf{j},y)\right]\right)\right)$	*t*
$\equiv$	$(1x)\left[\mathbf{H}_i(x), \mathbf{T}_i\left(\mathbf{j},\left[\lambda j\, \mathbf{F}_j(\mathbf{j},x)\right]\right)\right]$	

<u>Montague's analysis: synopsis</u>

An opaque verb takes the intension of a quantified noun phrase as its argument, i.e. it expresses an intensional third-order relation.

Explanation of odd behavior of opaque verbs:

- *Ambiguity* between specific and non-specific reading is due to a general syntactic construction that allows the quantified object to outscope the verb.
- *Non-quantificationality* of object (on unspecific reading) is due to higher order of verb – the *(et)t* part of its type $\left(\left(s\underline{((et)t)}\right)(et)\right)$.
- *Intensionality* is part of the lexical meaning of the verb – reflected by the *s* in the extension type $\left(\left(\underline{\underline{s}}((et)t)\right)(et)\right)$ of *seek*.

☞ Intensionality and non-quantificationality are independent of each other and therefore not expected to co-occur.

- <u>Intensionality without higher order</u> (PTQ)

(32) *The temperature is ninety but it's rising.*

is-rising	$\mathbf{R}_i$	*(se)t*
the temperature	$[\lambda Q(1f)[\mathbf{T}_i(f), Q(f)]]$	*((se)t)t*
the temperature is-rising	$[\lambda Q(1f)[\mathbf{T}_i(f), Q(f)]](\mathbf{R}_i)$	*t*
$\equiv$	$[\lambda Q(1f)[\mathbf{T}_i(f), \mathbf{R}_i(f)]]$	
is	$(\lambda g\, \lambda f(f_i = g_i))$	*((se)((se)t))*
ninety	$(\lambda i\, \mathbf{n})$	*(se)*
is ninety	$(\lambda f(f_i = \mathbf{n}))$	*(et)*
the temperature is ninety	$[\lambda Q(1f)[\mathbf{T}_i(f), Q(f)]](\lambda f(f_i = \mathbf{n}))$	*t*
$\equiv$	$[(1f)[\mathbf{T}_i(f), (f_i = \mathbf{n})]]$	
ninety is-rising	$\mathbf{R}_i(\lambda i\, \mathbf{n})$	

• <u>Higher order without intensionality</u>

(M. Rooth, as quoted on p.152 of T. E. Zimmermann, 'On the Proper Treatment of Opacity in Certain Verbs'. *Natural Language Semantics* 1 (1993), 149–79)

(33) *Mats owns a stamp.*

I posit the case that for a good service Mats and I performed for you, you bestowed upon us two valuable stamps which are absolutely indistinguishable from one another. You handed the stamps over to us in a black box, which neither Mats nor I nor anyone else ever opened. And since you gave us this, it is true that both Mats and I now own a stamp. But the opposite is argued in an obvious way.

(E. Zimmermann, *Conversation with Roger Schwarzschild*. Starbucks New Brunswick Jan 26, 2000)

owns	$\mathbf{O}_i$	*(((et)t)(et))*
Mats owns a stamp	$\mathbf{O}_i(\mathbf{m}, [\lambda Q(\exists x)[\mathbf{S}_i(x) \wedge Q(x)]])$	*t*
(a stamp x) Mats owns x	$(\exists x)[\mathbf{S}_i(x) \wedge \mathbf{O}_i(\mathbf{m}, x^*)]$ (where 'x^*' abbreviates '$\lambda P\, P(x)$'	*t*

		unsp.	*spec.*
(34)	*Mats owns a stamp that Ede doesn't own.*	**T**	**F**
(35)	*Mats owns the stamp that Ede doesn't own.*	**F**	**F**

Specificity vs. Existence

1. Observations

(M. Bennett, *Some Extensions of a Montague Fragment of English*. UCLA dissertation 1974, 82ff., where S. Kripke is credited)

(1) *Julius worships a Greek goddess.*

Existential generalization fails:

(2a) *There is at least one Greek goddess.*

(2b) *There exists at least one Greek goddess.*

But there is no ambiguity:

(3a) *Julius worships a specific Greek goddess.* (ok)

(3b) *Julius worships an arbitrary Greek goddess.* (no)

Substitutivity fails too (but wait):

(4) *Julius worships a unicorn.*

Intuition

Worship is not really an opaque verb but as specific and extensional as *kick*, the only difference being that it may relate real people to (specific) non-existent objects.

Problem

How can it be that Julius is related to a specific (non-existent) object, without there being such an object?

Solution (T. Parsons, *Nonexistent Objects*. New Haven 1980)

Meinongian ontology – to be developed in 3 steps:

STEP A: MOTIVATION, i.e. criticism of non-Meinongian ontology

STEP B: FORMULATION of Meinongian ontology as a formal theory

STEP C: PROOF OF CONSISTENCY of that theory

2. Background: Meinong's Theory of Objects (simplified version)

[A. Meinong, 'Über Gegenstandsthorie'. In: R. Haller (ed.): *Alexius Meinong. Gesamtausgabe, Bd. II*. Graz 1971, 481 –535]

Context: Foundations of psychology, especially the psychology of perception (including 'inner perception of psychological processes) and judgement (knowledge, error,…)

Psychological processes can be dissected into their:

- act (of seeing, claiming, wondering,…)
- content (mental image, proposition, question,…)
- objects (whatever is seen, claimed, in question,…)

Kinds of objects:

- *higher* vs. *lower order*

properties and relations are of higher order than their bearers (because the they cannot be thought without the latter)

- *existing* vs. *non-existent*

Higher-order objects do not exist – the gold mountain being one of them (because it cannot be thought without the properties defining it)

- *complete* vs. *incomplete*

Existing objects are always complete in that they satisfy the Law of the Excluded Middle; the (generic) triangle is incomplete (because it is neither isosceles nor nor non-isosceles)

- *possible* vs. *impossible*

The flying horse and the gold mountain are possible objects because their defining properties do not contradict each other; the round square is impossible. Impossible objects never exist, some of them (including concepts and relations) do not even *subsist*, but they still have their specific *quality* [*Sosein*].

General principles about objects

Leibniz' Principle (or one of Leibniz' Principles)

No two distinct objects have exactly the same properties.

(If $x \neq y$, then x, but not y, has the property of being identical to x.)

Independence Principle (E. Mally)

Quality is independent of existence, i.e. objects can have properties without existing.

Quality principle
Every object has precisely the properties defined in its quality.

Principle of Non-Existence
Not all objects exist; some even *could not have* existed.
"Those who like paradoxical modes of expression could very well say: 'There are objects of which it is true that there are no such objects'." (Meinong quote found on the internet)

Principle of Combination
For any set X of properties there is an object whose properties are precisely the elements of X.
Due to the set {*being round*, *being square*}, there is an object that is both round and a square and has no other properties; this 'generic round square' is an impossible object.

Principle of Reification ['Vergegenständlichungsprinzip']
Descriptions of the form *the N* denote (possibly non-existent) objects with property N.
The gold mountain denotes an object that is both a mountain and of gold. The object denoted by *the gold mountain* does not exist.

Completeness Principle
An existing object has a property p iff it does not have the opposing property $\bar{p}$.
The generic gold mountain is indeterminate as to its size.

3. More Background: Russell's Theory of Descriptions

(5) *Heinz Schleußer has many hats.*
(6) *The former minister of finance has many hats.*

Naive Semantics of definite descriptions

(cf. G. Frege, 'Über Sinn und Bedeutung', *Zeitschrift für Philosophie und philosophische Kritik* 100 (1892), 25–50; tr.:'On Sense and Reference'. In: P. Geach, M. Black (eds.), *Translations from the Philosophical Writings of Gottlob Frege*. Oxford 1960, 56–78)

$$[\![the\ N]\!] = \begin{cases} u \text{ if } [\![N]\!] = \{u\} \\ \text{undefined otherwise} \end{cases}$$

Objections against naive semantics of definite descriptions

1. If a is identical with b, whatever is true of the one is true of the other, and either may be substituted for the other in any proposition without altering the truth or falsehood of that proposition. Now George IV wished to know whether Scott was the author of Waverley; and in fact Scott was the author of Waverley. Hence we may substitute Scott for the author of 'Waverley', and thereby prove that George IV wished to know whether Scott was Scott. Yet an interest in the law of identity can hardly be attributed to the first gentleman of Europe.

2. By the law of the excluded middle, either 'A is B' or 'A is not B' must be true. Hence either 'the present King of France is bald' or 'the present King of France is not bald' must be true. Yet if we enumerated the things that are bald, and then the things that are not bald, we should not find the present King of France in either list. Hegelians, who love a synthesis, will probably conclude that he wears a wig.

(B. Russell, 'On Denoting'. *Mind* 14 (1905), 479–93; p. 485. http://www.santafe.edu/~shalizi/Russell/denoting/)

Objections against Meinong

"Meinong is best known as the loser of the Russell-Meinong debate of 1905."

(T. Parsons, 'A Meinongian Analysis of Fictional Objects'. *Grazer Philosophische Studien* 1 (1975), 73-86, p. 73)

OBJECTION #1 (Russell):

According to the Principle of Reification, the description *the round square* denotes an object that is both round and square. This is absurd (contradicting logic); for any round object is not square.

Meinong: No problem, not even for the round square that is not round.

OBJECTION #2 (Quine):

Meinongian ontology poses unsolvable problems and meaningless questions like:

- *Is the possible fat man in the doorway identical with the possible thin man in the doorway?*
- *How many possible men are there standing in the doorway?*
- *Are there more possible fat men than possible thin men?*

('On what there is'. In: W. V. O. Quine, *From a Logical Point of View*. New York 1961, 1–19)

Meinong: These questions may be hard to answer but they do make sense.

OBJECTION #3 (Russell):

According to the Principle of Reification, the description *the existent gold mountain* denotes an existent object that is both a mountain and of gold. This is absurd (contradicting facts); for there are no gold mountains, they do not exist.

Meinong: ???

Conclusion (Russell 1905):
Definite descriptions do not denote objects; they quantify over objects.

Generalized quantifier formulation:
$[\![\ \textit{the}\ ]\!] = \{(A,B) \mid \overline{\overline{A}} = 1\ \&\ A \subseteq B\}$
$\textit{the}' = (\lambda P\ \lambda Q\ (1x)\ [P(x),Q(x)])$ $\quad\quad$ $\big[\equiv (\lambda P\ \lambda Q\ (\exists x)\ [(\forall y)\ [P(y) \leftrightarrow (x = y)] \wedge Q(x)])\ \big]$

(7) *The gold mountain is made of gold.*
(7*f*) $(\exists x)\ [(\forall y)\ [[[\,\mathbf{G}_i(y) \wedge \mathbf{M}_i(y)] \leftrightarrow (x = y)] \wedge \mathbf{G}_i(x)])$ **F**

(8a) *The gold mountain is not made of gold.*
(8*n*) $(\exists x)\ [(\forall y)\ [[[\,\mathbf{G}_i(y) \wedge \mathbf{M}_i(y)] \leftrightarrow (x = y)] \wedge \neg\mathbf{G}_i(x)])$ **F**
(8*w*) $\neg\ (\exists x)\ [(\forall y)\ [[[\,\mathbf{G}_i(y) \wedge \mathbf{M}_i(y)] \leftrightarrow (x = y)] \wedge \mathbf{G}_i(x)])$ **T**

Corollary
There is no evidence for Meinongian ontology. Hence (by Occam's Razor), there are no objects denoted or quantified over other than ordinary (existing) individuals.

4. A Problem for Russell's Theory of Descriptions (STEP A)

(9) *A certain continental philosopher (Sartre) is more famous than any analytic philosopher.*
(10) *A certain fictional Belgian (Poirot) is more famous than any real Belgian.*

Problem:
Like (9), (10) seems to existentially quantify over objects; but the objects cannot be ordinary existing individuals.

Ways out?
I: (10) is false, because there are no fictional detectives
II: (9) and (10) have completetly different logical forms:
a (10) involves intensionality
or: *b* (10) involves (purely) substitutional quantification
or: *c* (10) must be suitably paraphrased

Objections (Parsons):

I: gets the data wrong.

II*a*: (9) and (10) do not differ in their logical behavior:

(11) *Sartre is the author of 'Les mots'.*

(12) *The author of 'Les mots' is more famous than any analytic philosopher.*

(13) *Poirot is the Belgian hero in Agatha Christie's detective stories.*

(14) *The Belgian hero of Agatha Christie's detective stories is more famous than any real Belgian.*

(15) *Some (specific) individual, viz. Sartre, is such that it is a continental philosopher and that it is more famous than any analytic philosopher.*

(16) *Some (specific) individual, viz. Poirot, is such that it is a fictional Belgian and that it is more famous than any real Belgian.*

II*b*: Purely substitutional quantification is absurd.

(17) *There are cows.*

(18) *Bessie is a cow.*

II*c*: How?

The extent to which faith in the existence of an appropriate paraphrase outruns the believer's ability to give such a paraphrase is often quite striking

[Nonexistent Objects, p. 36]

5. Reformulating Meinong (STEP B)

Basic idea (Mally):

Stick to Meinong's principles but *relativize* them to properties that don't get you into trouble (like existence). Call such 'harmless' properties *NUCLEAR* ["konstitutorisch"].

Leibniz' NEW Principle

No two distinct objects have exactly the same NUCLEAR properties.

NEW Independence Principle

Objects can have NUCLEAR properties without existing.

NEW Quality pinciple

Every object has precisely the NUCLEAR properties defined in its quality.

OLD Prinicple of Non-Existence

Not all objects exist; some even *could not have* existed.

NEW Principle of Combination
For any set X of NUCLEAR properties there is an object whose NUCLEAR properties are precisely the elements of X.

NEW Principle of Reification
Descriptions of the form *the P* denote (possibly non-existent) objects with the NUCLEAR property P.

NEW Completeness Principle
An existing object has a NUCLEAR property p iff it does not have the opposing NUCLEAR property $\bar{p}$.

Some extra-nuclear properties

Property	*True of x if …*	*Examples*
Existence	x is an ordinary (non-Meinongian) object	London, Russell
Incompleteness	x lacks some nuclear property and its opposite	Holmes, the round square
Consistency	x's nuclear properties do not contradict each other	the generic square, Meinong
Indeterminateness as to baldness	x is neither bald nor non-bald	the present king of France
Possibility	it is possible that there exists something with all of x's nuclear properties	the gold mountain
Fictionality	x does not exist and there exists a work of fiction according to which there is someone with precisely x's nuclear properties	Holmes
Being Worshipped by Julius	Julius worships x	Diana

Working definition for Extra-Nuclearity
Assume that a given property p is nuclear unless this leads to unwelcome consequences.

In order to show that the above properties are all extra-nuclear one may assume the contrary, apply *Combination* to a certain set C of nuclear properties and derive a contradiction to other principles. Ecample: Existence cannot be nuclear, because otherwise there would be an object e whose sole nucler property is existence; but then e would be inderminate as to non-existence (the opposite of existence) and hence incomplete, contradicting *Completeness*. In this case C = {existence}. In the other cases the following sets C do the trick: *incompleteness*: C = Meinong* ∪ {incompleteness}; *consistency*: C = {consistency, inconsistency}; *indeterminateness as to baldnes*:C = {baldness, indeterminateness as to baldness}; *possibility*: C= {possibility, impossibility}; *ficitonality*: C = {p | p is a nuclear property of Holmes} ∪ {fictionality}; *being worshipped by Julius*: C = Meinong* ∪ {being worshipped by Julius}.

5. Modelling Meinong (STEP C)

Montague Lift
There is a one-one correspondence $\triangleq$ matching each individual with the set of its properties (*principal ultrafilter*):

$$x \triangleq x^* \, [:= \{p \mid x \text{ has } p\}]$$

Basic idea:
Construct a (set-theoretic, extensional) model of Meinongian ontology out of the set of (ordinary) individuals by interpreting the theory as follows.

- NUCLEAR (arbitrary) properties are sets of individuals;
- the OPPOSITE of a nuclear property is its complement with respect to the set of individuals
- EXISTING OBJECTS are Montague lifts of individuals;
- OBJECTS are (arbitrary) sets of NUCLEAR properties;
- EXTRA-NUCLEAR properties are (arbitrary) sets of objects.
- an object x HAS a NUCLEAR property p iff $p \in x$;
- an object x HAS an EXTRA-NUCLEAR property P iff $x \in P$;

Thus interpreted, the Meinongian principles become truths:

Leibniz
No two distinct sets of sets of individuals have the same elements.
follows from the set-theoretic Axiom of Extensionality

Independence
A set of sets of individuals can be non-empty without being a principal ultrafilter.
true of many sets

Quality
Every set of sets of individuals has precisely the elements it has.
under the natural assumption that the quality of an object is the set of nuclear properties it has – i.e. the object itself (in the model)

Non-Existence
Not every object is a principal ultrafilter; some even cannot be extended to one.
under the assumption that possibility is consistency (in this extensional model) , i.e. having a quality with a non-empty intersection

Combination

Any set of sets of individuals is identical to a set of sets of individuals.

highly controversial

Reification

SKIPPED

Completeness

A set of individuals is an element of a given principal ultrafilter iff the complement of that set is not an element of that ultrafilter.

this is can be easily seen by looking at the definition of the Montague Lift

Conclusion

The Meinongian principles are consistent (if set theory is).

Observations (on the model)

(I) For any nuclear property p there is a unique corresponding extra-nuclear property p^+ such that any individual x has p iff x has p^+.

$p^+ = \{x \mid p \in x\}$:

$$\begin{array}{ccc} x \text{ has } p & \Leftarrow !!! \Rightarrow & x \text{ has } p^+ \\ \Uparrow & & \Uparrow \\ (p \text{ nuclear}) & & (p^+ \text{ extra-nuclear}) \\ \Downarrow & & \Downarrow \\ p \in x & \Leftarrow (\text{def. of } p^+) \Rightarrow & x \in p^+ \end{array}$$

Uniqueness follows by Extensionality.

(II) For any extra-nuclear property P there is a unique corresponding nuclear property P^- such that any existing individual x has p iff x has P^-.

If x exists, it is of the form a^* (for some individual a). We then have:

$$\begin{array}{ccc} a^* \text{ has } P & \Leftarrow !!! \Rightarrow & a^* \text{ has } P^- \\ \Uparrow & & \Uparrow \\ (P \text{ extra-nuclear}) & & (P^- \text{ nuclear}) \\ \Downarrow & & \Downarrow \\ a^* \in P & \Leftrightarrow a \in P^- \Leftrightarrow & P^- \in a^* \\ & (\text{defs. of } a^* \text{ and } P^-) & \end{array}$$

Uniqueness again follows by Extensionality.

(III) $(p^+)^- = p$, for any nuclear p; but $(P^-)^+ \neq P$, for some extra-nuclear P.

The first part follows immediately from the definitions; the second part holds because, e.g., inconsistency, non-existence, and impossibility (construed as above) all correspond to the same (empty) nuclear property.

(IV) The above distinctions between properties carry over from properties to relations: A nuclear relation is a relation between individuals, an extranuclear relation is a relation between objects, and there are also mixed cases.

(V) On the basis of observation (I), one can do without nuclear properties, replacing them with their extra-nuclear counterparts. (This is reminiscent of Montague's strategy of *generalizing to the worst case*.)

Remarks on the status of the model

In Parsons' reconstruction of Meinong's ontology, the observatons (I) and (II) are general principles that hold in all models.

The model given here is not a *standard* or *intended* model. Its only purpose is to prove consistency. Given that the theory has a model at all, it can be shown (by predicate logic) that it has many non-isomorphic models, some of which are more plausible than the extensional one with its type-layered ontology.

6. Extranuclearity vs. Opacity

Analysis according to Parsons:

verb	nuclear positions	type	lowest type in extensional model
worship	subject	$e(et)$	$((\underline{e}t)t)(et)$
seek	subject	$(s(et)t)(et)$	$((\underline{(et)t)}t)t)(et)$

Property treatment of opacity

T.E. Zimmermann, 'On the Proper Treatment of Opacity in Certain Verbs'. *Natural Language Semantics* 1 (1993), 149–79.

1 Problems with the classical analysis of opacity

Classical decomposition of *seek* into **T**ry and **F**ind:

(CD) $\textit{seek}' = [\ \lambda\mathcal{Q}\ \lambda x\ \mathbf{T}_i(x, [\lambda j\ (\mathcal{Q}_j y)\ \mathbf{F}_j(x,y)\ ]\ )\ ]$

W. V. O. Quine, *Word and Object*, Cambridge, Mass. 1960, Chapter 4 ('Vagaries of Reference), 125–56 + R. Montague, 'The Proper Treatment of Quantification in Ordinary English', J. Hintikka, J. Moravcsik, P. Suppes (eds.), *Approaches to Natural Language*, Dordrecht 1973, 221–42

- *Lexical decomposition not always possible*

(1) Mary worships a Greek goddess.

No problem (see last handout); logical form is:

(2) $(\exists y)\ [\ \mathbf{GG}_i(y)\ \&\ \mathbf{W}_i(\mathbf{m},y)\ ]$

where the variable y may range over real individuals as well as at least some "non-existent objects"

T. Parsons, *Nonexistent Objects*, New Haven 1980

(3) Tom's horse resembles a unicorn.

(4) Tom compares his horse to a unicorn.

<u>Conceivable paraphrases</u>

(3') Tom's horse has a form which seems to be like a unicorn form. (anonymous eviewer)

<u>Problem:</u> *a unicorn* is not a constituent and thus *has a form which seems to be like ______ form* cannot be interpreted by abstraction.

(3") Tom's horse could (almost) be a unicorn. ('close in meaning': Roger Schwarzschild, p.c.)

<u>Problem:</u> Not obvious how to interpret modality. In particular, the following account does not do:

$\textit{resemble}'(x,Q) \equiv (\exists j)\ [i \approx j\ \&\ (\forall\ P)\ [C_x(P) \rightarrow [\ P_j(x)\ \&\ (Q_j y)\ (x = y)\ ]]]$,

where $\approx$ is a suitable similarity relation between worlds and C_x are some contextually relevant properties of x. This would have *Jane resembles Mary* express a contradiction.

(4') Tom says $\left\{ \begin{matrix} \text{that} \\ \text{whether} \end{matrix} \right\}$ his horse looks like a unicorn.

<u>Problem:</u> reintroduces opacity in *look like*

<u>Montague's conclusion</u>

(RM) Referentially opaque transitive verbs denote (not necessarily decomposable) attitudes of individuals towards intensional quantifiers.

R. Montague, 'On the Nature of Certain Philosophical Entities', *Monist* 53 (1969), 159– 94.

Compositionality Problem

It does not always seem possible to describe the meaning of a VP containing an opaque verb as depending on the meaning of its (quantified) object.

It does seem possible, though, to describe the meaning of VPs with indefinite objects as depending on the meaning of the indefinite's domain. Example: *resemble ≈ share some contextually relevant features with all typical (and possibly nonexistent) members of.*

- *Lack of opaque readings*

(5) Arnim compares himself to a pig.
(6) Arnim compares himself to each/every pig.
(6') Arnim compares himself to every pig.
(7) Arnim compares himself to Porky.

(8) Alain is seeking each comic-book.
(8') Alain is seeking every comic-book.
(9) Alain is trying to find each comic-book.
(9') Alain is trying to find every comic-book.

(10) Alain sucht jeden Comic. German
(11) Alain versucht, jeden Comic zu finden. German

		(8)	(9)	(10)	(11)	
(w)	$(\forall y)\ [\mathbf{CB}_i(y) \rightarrow \mathbf{T}_i(\mathbf{a}, \lambda j \mathbf{F}_j(\mathbf{a},y))]$	✔	✔	✔	✔	wide scope
(n)	$\mathbf{T}_i(\mathbf{a}, \lambda j\ (\forall y)\ [\mathbf{CB}_j(y) \rightarrow \mathbf{F}_j(\mathbf{a},y)])$	✔	?	✔	–	narrow scope

'Axiomatic' Solution

Assume opacity without decomposability and add a meaning postulate to the effect that wide scope and narrow scope coincide in case of non-existential objects.

See T. E. Zimmermann, 'Meaning Postulates and the Model-Theoretic Approach to Natural Language Semantics', *Linguistics and Philosophy* 22 (1999), 529–61, for general criticism

Further unattested opaque readings

(12)	Alain is seeking most comic-books.	?	narrow scope
(13)	Alain is seeking at most five comic-books.	?	narrow scope
(14)	Alain sucht die meisten Comics.	–	narrow scope
(15)	Alain sucht höchstens vier Comics.	?	narrow scope

(16) Jane is looking for no cow.
(17) Jane sucht keine Kuh.

		(16)	(17)	
(w)	$\neg(\exists y)\ [\mathbf{C}_j(y)\ \&\ \mathbf{T}_i(\mathbf{j}, \lambda j \mathbf{F}_j(\mathbf{j},y))]$	✔	✔	wide scope
(n)	$\mathbf{T}_i(\mathbf{j}, \lambda j\ \neg(\exists y)\ [\mathbf{C}_j(y)\ \&\ \mathbf{F}_j(\mathbf{j},y)])$	–	–	narrow scope
(w)	$\neg\ \mathbf{T}_i(\mathbf{j}, \lambda j (\exists y)\ [\mathbf{C}_j(y)\ \&\ \mathbf{F}_j(\mathbf{j},y)])$	?	✔	split scope

J. Jacobs, 'Negation', A. v. Stechow & D. Wunderlich (eds.), *Semantik / Semantics*, Berlin 1991, 560–96

Overgeneration Problem

Not all sentences involving opaque verbs are ambiguous in the way predicted by the classical analysis.

- *Analytic overkill*

'Reduction' of *try* to *seek*:

$$\mathbf{T} = \lambda i\, \lambda p\, \lambda x\; seek'(\, x, \lambda j\, \lambda P\, p_j\,)\text{:}$$

Proof:

	$[\lambda i\, \lambda p\, \lambda x\; seek'(\, x, \lambda j\, \lambda P\, p_j\,)]\,(i)(\,p)(x)$	
$\equiv$	$seek'(\, x, \lambda j\, \lambda P\, p_j\,)$	3 β-conversions
$\equiv$	$[\, \lambda \mathcal{Q}\, \lambda x\; \mathbf{T}_i(x,\, [\lambda j\, \mathcal{Q}_j(\lambda k\, \lambda y\, \mathbf{F}_k(x,y)\,)\,]\,)\,]\,(\lambda j\, \lambda P\, p_j\,)\,(x)$	by (CD) + notational convention
$\equiv$	$\mathbf{T}_i(x,\, [\lambda j\, [\lambda j\, \lambda P\, p_j\,]\,(j)\,(\lambda k\, \lambda y\, \mathbf{F}_k(x,y)\,)\,]\,)$	2 β-conversions
$\equiv$	$\mathbf{T}_i(x,\, [\lambda j\, [\lambda P\, p_j\,]\,(\lambda k\, \lambda y\, \mathbf{F}_k(x,y)\,)\,]\,)$	β-conversion
$\equiv$	$\mathbf{T}_i(x,\, [\lambda j\, p(j)\,]\,)$	β-conversion + notational convention
$\equiv$	$\mathbf{T}_i(x,\, p)$	η-conversion.
$\equiv$	$\mathbf{T}(i)(\,p)(x)$	notational convention

2 From Existential Quantifiers to Properties

Basic idea

Common source of all three inadequacies:

- The reduction of *try* exploits the fact that *seek* is defined for arbitrary quantifiers including $\lambda j\, \lambda P\, p_j$.
- The unattested opaque readings arise because (the opaque reading of) *seek* is defined for arbitrary quantifiers including *most comic books*'.
- Lexical decomposition is impossible because it would have to involve arbitrary quantifiers, not just (domains of) existentials.

Ede's Conclusion

The domain of opaque verbs must be restricted from arbitrary quantifiers to existentials.

Definition

An *existential* $\mathcal{Q}$ ist a quantifier of the form $\mathcal{Q} = \lambda i\, \lambda P\, (\exists x)\,[\, A_i(y)\, \&\, P(x)\,]$, where A is some property (called $\mathcal{Q}$'s *domain*).

NB: This definition uses *Ty2* as part of the meta-language.

Remark

Under Russell's theory of descriptions, definites are existentials:

"Ignoring coordination and other complications, it seems that we are left with essentially two kinds of noun phrases acceptable for opaque verbs, viz. indefinites of the form '*a* N ' and definite descriptions of the form '*the* N' [...]" (Zimmermann 1993, 163)

Observation

There is a one-one correspondence BE between existentials and *properties*, i.e. objects of type *(s(et))*: $\mathbf{BE}(\mathcal{Q}) = \lambda i\ \lambda x\ (\mathcal{Q}_i y)\ (x = y)$.

B. Partee, 'Noun Phrase Interpretation and Type Shifting Principles', J. Groenendijk et al. (eds.), *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers*, Dordrecht 1987, 115–43.

Ede's Proposal

The type of an opaque position is that of a property.

Solution of Problems

- *Compositionality*

  Truth conditions can now be given directly in terms of properties.

  Example (elaborating above paraphrase): *resemble*'(x,*P*) is true iff there is a non-empty set of (contextually relevant) features *F* such that x has all features in *F* (at the given index) and such that, for any index *j* and any object y, the following holds: if (at *j*) y is a typical representative of the objects that have *P*, then y has all features in *F* (at *j*).
- *Overgeneration*

  Opaque readings for non-existentials are blocked due to a type mismatch. Existentials are not blocked provided that either (i) they are type-shifted by some systematic application of **BE** restricted to existentials (as in type-driven frameworks), or (ii) they denote properties anyhow (as in DRT). (i) will be pursued on this handout, (ii) is what happens in the text.

  Example (*Nessie resembles a unicorn*):

  (i) $\mathbf{R}_i(\mathbf{n}, \mathbf{BE}(\lambda j\ \lambda P\ (\exists y)\ [\ \mathbf{U}_j(y)\ \&\ P(y)\ ]\ )\ )$ $\quad[\ \equiv \mathbf{R}_i(\mathbf{n},\mathbf{U})\ ]$

  In later examples we will not explicitly mention the **BE**-operator but directly use the property reduction on the right.

  (ii) $\lambda x\ [x = \mathbf{n}\ \&\ \mathbf{R}_i(x, \lambda j\ \lambda y\ \ \mathbf{U}_j(y))\ ]$ $\quad[\ \equiv \lambda x\ [x = \mathbf{n}\ \&\ \mathbf{R}_i(\mathbf{n},\mathbf{U})\ ]\ ]$

  Since, on this variant, *all* existentials are treated as properties, so are proper names like *Nessie*.
- *Overkill*

  Adaptation of Quine's paraphrase:

  (ED) $seek' = [\ \lambda P\ \lambda x\ \mathbf{T}_i(x, \lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(x,y)\ ]\ )\ ]$

  Then the meaning of **T** is not a function of the meaning of *seek*'.

  To be specific, let M and M' be *Ty2*-models satisfying all relevant postulates including (ED) and differing only in their interpretation of **T**: whereas M verifies $\mathbf{T}_i(x,\lambda j\ \neg\ (\exists y)\ \mathbf{F}_j(x,y))$, the same formula is false in M'. It is easily seen that such models exist, under certain natural assumptions about our system of postulates. In particular, due to (ED), M and M' agree on the interpretation of *seek*'; but they differ in their evaluation of **T**, as required.

3 Transparent Readings

(18) Richard is seeking a unicorn.

(*dd*) $\mathbf{S}_i(\mathbf{r},\mathbf{U})$

(*dr*) $(\exists y)\,[\mathbf{U}_i(y)\ \&\ \mathbf{S}_i(\mathbf{r}, y^+)]$ where y^+ is y's *essence* $[\lambda j\ \lambda z\ z = y]$

We thus obtain essentially the same first-orderly de re reading as Montague's version of the classical analysis, except that individuals y get represented by essences y+ rather than by name-like quantifiers y*.

(18*t*) $(\exists y)\,[\mathbf{U}_i(y)\ \&\mathbf{S}_i(\mathbf{r},y^+)]$

$\lambda P\ (\exists y)\,[\mathbf{U}_i(y)\ \&\ P(y)]$ y $\mathbf{S}_i(\mathbf{r},y^+)$

(19) Theo is seeking each unicorn.

(19*t*) $(\forall y)\,[\mathbf{U}_i(y) \rightarrow \mathbf{S}_i(x,y^+)]$

$\lambda P\ (\forall y)\,[\mathbf{U}_i(y) \rightarrow P(y)]$ y $\mathbf{S}_i(\mathbf{t},y^+)$

4 Plurals

(20) Tom needs five toy monsters.

(*dd*) $\mathbf{N}_i(\mathbf{t},\lambda j\ \lambda\gamma\,[\mathbf{TM}_j(\gamma)\ \&\ \mathbf{5}(\gamma)])$

(*dr*) $(\exists\gamma)\,[\mathbf{TM}_i(\gamma)\ \&\ \mathbf{5}(\gamma)\ \&\ \mathbf{N}_i(\mathbf{t},\gamma^+)]$

(21) Tom needs many toy monsters.

a. <u>cardinal *many*</u>:

$[\![\mathbf{M}^{||}]\!]\ (\Gamma) = 1$ iff $|\Gamma|$ 'exceeds a certain (contextually given) standard'

(*dd*) $\mathbf{N}_i(\mathbf{t},\lambda j\ \lambda\gamma\,[\mathbf{TM}_j(\gamma)\ \&\ \mathbf{M}^{||}(\gamma)])$

(*dr*) $(\exists\gamma)\,[\mathbf{TM}_i(\gamma)\ \&\ \mathbf{M}^{||}(\gamma)\ \&\ \mathbf{N}_i(\mathbf{t},\gamma^+)]$

b. <u>proportional *many*</u>:

$[\![\mathbf{M}^{>>}]\!]\ (A)(B) = 1$ iff $|A \cap B| >> |A \setminus B|$

(*dr*) $\mathbf{M}^{>>}(\mathbf{TM}_i,\lambda y\ \mathbf{N}_i(\mathbf{t},y^+))$

according to classical analysis with decomposition *need* ≈ *must have*:

(*dd*) $\mathbf{M}_i(\lambda j\ \mathbf{M}^{>>}(\mathbf{TM}_j,\lambda y\ \mathbf{H}_j(\mathbf{t},y))$

need' = $[\ \lambda\mathcal{Q}\ \lambda x\ \mathbf{M}_i(\lambda j\ (\mathcal{Q}_j y)\ \mathbf{H}_j(x,y)\ )\ ]$

(22) Nessie resembles two monsters.

(*cdd*) $\mathbf{R}_i(\mathbf{n},\lambda j\ \lambda\gamma\ [\mathbf{M}_j(\gamma)\ \&\ \mathbf{2}(\gamma)])$

(*cdr*) $(\exists\gamma)\ [\ \mathbf{M}_i(\gamma)\ \&\ \mathbf{2}(\gamma)\ \&\ \mathbf{R}_i(\mathbf{x},\gamma^+)]$

(*ddr*) $(\exists\gamma)\ [\ \mathbf{M}_i(\gamma)\ \&\ \mathbf{2}(\gamma)\ \&\ (\forall \mathrm{y})\ [\mathrm{y}\in\gamma \rightarrow \mathbf{R}_i(\mathbf{x},\mathrm{y}^+)]]$

On the property approach, there cannot be a distributive de dicto reading because distribution is a (universal) quantifier. On Montague's analysis, one would expect such a fourth reading.

(23) Tom needs at most two blankets.

(*dr*) $(\exists\gamma)\ [\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ (\forall\gamma')\ [\ \mathbf{M}_i(\lambda j\ [\mathbf{H}_j(\mathbf{t},\gamma')\ \rightarrow \gamma' \subseteq \gamma\ ]\ )\ ]\ ]$

(*dd*) $(\forall P)\ [\mathbf{M}_i(\lambda j\ (\exists\gamma)\ [\ P_j(\gamma)\ \&\ \mathbf{H}_j(\mathbf{t},\gamma)\ ] \rightarrow$
$(\forall j)\ (\forall\gamma)\ [\ P_j(\gamma) \rightarrow (\exists\gamma')\ [\gamma\subseteq\gamma'\ \&\ 2(\gamma')\ \&\ \mathbf{B}_j\ (\gamma')\ ]\ ]\ ]$

(*dn*) $(\forall N)\ \ \mathbf{M}_i(\lambda j\ (\exists\gamma)\ [N(\gamma)\ \&\ \mathbf{B}_j\ (\gamma)\ \&\ \mathbf{H}_j\ (\mathbf{t},\gamma)\ ] \rightarrow N \leq \mathbf{2}\ ]$

See extra handout for details.

(23*c*) $\mathbf{M}_i(\lambda j\ (\exists^{\leq 2}\mathrm{y})\ [\mathbf{B}_j(\mathrm{y})\ \&\ \mathbf{H}_j(\mathbf{t},\mathrm{y})])$

Expected on classical approach, cf.:

(24) Tom needs to have at most two blankets.

5 Higher Order Quantification

(25) Geach is looking for something.

(*dd*) $\mathbf{T}_i(\mathbf{g},\lambda j\ (\exists \mathrm{y})\ \mathbf{F}_j(\mathbf{g},\mathrm{y}))$

(*dr*) $(\exists \mathrm{y})\ \mathbf{T}_i(\mathbf{g},\lambda j\ \mathbf{F}_j(\mathbf{g},\mathrm{y}))$

(*h*) $(\exists P)\ \mathbf{T}_i(\mathbf{g},\lambda j\ (\exists \mathrm{y})\ [P(\mathrm{y})\ \&\ \mathbf{F}_j(\mathbf{g},\mathrm{y})])$

$something' = \lambda \wp_{s((s(et))t)}\ (\exists P_{s(et)})\ \wp_i(P)$

(26) Geach is seeking something Quine is not seeking.

(*dd*) $\mathbf{T}_i(\mathbf{g},\lambda j\ (\exists \mathrm{y})\ [\ \neg\ \mathbf{T}_j(\mathbf{q},\lambda k\ \mathbf{F}_k(\mathbf{q},\mathrm{y}))\ \&\ \mathbf{F}_j(\mathbf{g},\mathrm{y})\ ])$

(*dr*) $(\exists \mathrm{y})\ [\ \neg\ \mathbf{T}_i(\mathbf{q},\lambda j\ \mathbf{F}_j(\mathbf{q},\mathrm{y}))\ \&\ \mathbf{T}_i(\mathbf{g},\lambda j\ \mathbf{F}_j(\mathbf{g},\mathrm{y}))\ ]$

(*h*) $(\exists P)\ [\ \ \mathbf{T}_i(\mathbf{g},\lambda j\ (\exists \mathrm{y})\ [P_j(\mathrm{y})\ \&\ \mathbf{F}_j(\mathbf{g},\mathrm{y})\ ])$
$\&\ \neg\ \ \mathbf{T}_i(\mathbf{q},\lambda j\ (\exists \mathrm{y})\ [P_j(\mathrm{y})\ \&\ \mathbf{F}_j(\mathbf{q},\mathrm{y})\ ])\ ]$

(27)

Mats owns something Ede does not own
$(\exists P)\ [\neg\, \mathbf{O}_i(\mathbf{e},P_i)\ \&\ \mathbf{O}_i(\mathbf{m},P_i)]$

something Ede does not own
$[\ \lambda\mathfrak{Q}\ (\exists P)\ [\neg\, \mathbf{O}_i(\mathbf{e},P_i)\ \&\ \mathfrak{Q}(P)]]$

P

Mats own P
$\mathbf{O}_i(\mathbf{m},P_i)$

some
$[\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\exists P)\ [\mathfrak{R}(P)\ \&\ \mathfrak{Q}(P)]]$

thing Ede does not own
$[\lambda P\ \neg\, \mathbf{O}_i(\mathbf{e},P_i)]$

thing
$\lambda P\ (P = P)$

that Ede does not own
$\lambda P\ \neg\, \mathbf{O}_i(\mathbf{e},P_i)$

(28)

Mats owns $\left\{ \begin{array}{c} a \\ the \end{array} \right\}$ *stamp Ede does not own*
???

$\left\{ \begin{array}{c} a \\ the \end{array} \right\}$ *stamp Ede does not own*
???

P

Mats own P
$\mathbf{O}_i(\mathbf{m},P_i)$

$\left\{ \begin{array}{c} a \\ the \end{array} \right\}$

$\left\{ \begin{array}{l} [\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\exists P)\ [\mathfrak{R}(P)\ \&\ \mathfrak{Q}(P)]] \\ [\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\exists^{=1} P)\ [\mathfrak{R}(P),\mathfrak{Q}(P)]] \end{array} \right\}$

stamp Ede does not own
???

stamp
$\mathbf{S}_i$

that Ede does not own
$\lambda P\ \neg\, \mathbf{O}_i(\mathbf{e},P_i)$

(29i) Geach is seeking an arbitrary book.

(ii) $[\ seek'(\mathbf{g},\mathbf{B})\ \&\ (\forall P)\ [\ P < \mathbf{B} \rightarrow \neg\ seek'(\mathrm{x},P)]\ ]$

(iii) $[\ \mathbf{T}_i(\mathbf{g},\lambda j\ (\exists \mathrm{y})\ [\ \mathbf{B}_j(\mathrm{y})\ \&\ \mathbf{F}_j(\mathbf{g},\mathrm{y})\ ])\ \&$
$(\forall P)\ [\ P < \mathbf{B} \rightarrow \neg \mathbf{T}_i(\mathbf{g},\lambda j\ (\exists \mathrm{y})\ [\ P_j(\mathrm{y})\ \&\ \mathbf{F}_j(\mathbf{g},\mathrm{y})\ ]\ )]\ ]$

6 Counterexamples

(30) Few professors appear to be rich.

$\mathbf{A}_i(\lambda j\ \mathbf{F}^{<<}(\mathbf{P}_j,\mathbf{R}_j))$

<u>proportional *few*</u>: $[\![\mathbf{F}^{<<}]\!]\ (A)(B) = 1$ iff $|A \cap B| << |A \setminus B|$

(31) For her term project, Mary needs every book by some Norwegian.

M. Rooth, *Association with Focus*, UMass dissertation 1985, p. 116

(32) Everybody met in the hall. collective *every*

<u>Properties vs. relations:</u>

(32) A student reads a book by some Norwegian.

$\lambda x\ \lambda y\ \lambda z\ [\mathbf{S}_i(x)\ \&\ \mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)\ \&\ \mathbf{R}_i(x,y)\ ]$

need' $= [\ \lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ )\ ]$

type: $((s(\underline{et}))(et))$

(33)

needs a book by some Norwegian

needs$'(\lambda y\ \boxed{\exists z}\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z) \&\ \mathbf{A}_i(z,y)]) \equiv$

$\lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ (\exists z)\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z) \&\ \mathbf{A}_i(z,y)\ \&\ \mathbf{H}_j(x,y)]\ )$

- *needs*
  $[\lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ )\ ]$
- *a book by some Norwegian*
  $\lambda y\ \lambda z\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z) \&\ \mathbf{A}_i(z,y)]$
  - *a book*
    $\mathbf{B}_i$
  - *by some Norwegian*
    $\lambda y\ \lambda z\ [\mathbf{N}_i(z) \&\ \mathbf{A}_i(z,y)]$
    - *by*
      $\mathbf{A}_i$
    - *some Norwegian*
      $\mathbf{N}_i$
      - *some*
        $\lambda P\ P$
      - *Norwegian*
        $\mathbf{N}_i$

need' $= [\ \lambda R\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y_1)\ \ldots\ (\exists y_n)[\ R_j(y_1,\ldots,y_n)\ \&\ \mathbf{H}_j(x,y)\ ]\ )\ ]$

(23*dr*)

- *Tom needs at most two blankets* $(\exists\gamma)\ [\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ (\forall\gamma')\ [\ \mathbf{M}_i(\lambda j\ [\mathbf{H}_j(\mathbf{t},\gamma') \rightarrow \gamma' \subseteq \gamma\ ]\ )\ ]\ ]$
  - *two blankets* $[\lambda P\ (\exists\gamma)\ [\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ P(\gamma)\ ]\ ]$
    - Ø $[\lambda Q\ \lambda P\ (\exists\gamma)\ [\ Q(\gamma)\ \&\ P(\gamma)\ ]\ ]$
    - *two blankets* $[\ \lambda\gamma\ [\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ ]\ ]$
      - *two* $\mathbf{2}$
      - *blankets* $\mathbf{B}_i$
  - γ
  - *Tom needs at most* γ $[\ (\forall\gamma')\ [\ \mathbf{M}_i\lambda j\ \mathbf{H}_j(\mathbf{t},\gamma')) \rightarrow \gamma' \subseteq \gamma\ ]\ ]$
    - *at most* γ $[\lambda P\ (\forall\gamma')\ [P(\gamma') \rightarrow \gamma' \subseteq \gamma\ ]\ ]$
    - γ
    - *Tom needs* γ $\mathbf{M}_i(\lambda j\ \mathbf{H}_j(\mathbf{t},\gamma))$
      - $\mathbf{t}$
      - *needs* γ $[\lambda x\ \mathbf{M}_i(\lambda j\ \mathbf{H}_j(x,\gamma))\ ]$
        - *needs* $[\ \lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ ]$
        - γ^+

(23*dd*)

Tom needs at most two blankets

$(\forall P)\ [\mathbf{M}_i(\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{H}_j(\mathbf{t},y)\ ] \rightarrow P \leq [\ \lambda\gamma\,[\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ P(\gamma)\ ]\ ]\ \mathbf{]}$

at most two blankets

$[\ \lambda\mathfrak{Q}\ (\forall P)\ [\mathfrak{Q}(P) \rightarrow P \leq [\ \lambda\gamma\,[\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ P(\gamma)\ ]\ ]\ \mathbf{]\ ]}$

at most

$[\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\forall P)\ [\mathfrak{Q}(P) \rightarrow P \leq \mathbf{BE(}\mathfrak{R}\mathbf{)]\ ]}$

two blankets

$[\lambda P\ (\exists\gamma)\ [\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ P(\gamma)\ ]\ ]$

Ø

$[\lambda Q\ \lambda P\ (\exists\gamma)\ [\ Q(\gamma)\ \&\ P(\gamma)\ ]\ ]$

two blankets

$[\ \lambda\gamma\,[\ \mathbf{2}(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ ]\ ]$

two

$\mathbf{2}$

blankets

$\mathbf{B}_i$

P

Tom needs P

$\mathbf{M}_i(\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{H}_j(\mathbf{t},y)\ ]$

$\mathbf{t}$

needs P

$[\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ ]$

needs

$[\ \lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ ]$

P

(23*dn*)

Tom needs at most two blankets
$(\forall N)\ [\ \mathbf{M}_i(\lambda j\ (\exists\gamma)\ [\ N(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ \mathbf{H}_j(\mathbf{t},\mathrm{y})\ ]\ ] \rightarrow N \leq \mathbf{2}]$

at most two
$[\lambda P\ (\forall N)\ [P(N) \rightarrow N \leq \mathbf{2}]\ ]$

at most two
$[\lambda M\ \lambda P\ (\forall N)\ [P(N) \rightarrow N \leq M]\ ]$

two
$\mathbf{2}$

N

Tom needs N blankets
$[\ \mathbf{M}_i(\lambda j\ (\exists\gamma)\ [\ N(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ \mathbf{H}_j(\mathbf{t},\mathrm{y})\ ]\ ]$

Tom
$\mathbf{t}$

needs N blankets
$[\ \lambda\mathrm{x}\ \mathbf{M}_i(\lambda j\ (\exists\gamma)\ [\ N(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ \mathbf{H}_j(\mathrm{x},\mathrm{y})\ ]\ ]$

needs
$[\ \lambda P\ \lambda\mathrm{x}\ \mathbf{M}_i(\lambda j\ (\exists\mathrm{y})\ [P_j(\mathrm{y})\ \&\ \mathbf{H}_j(\mathrm{x},\mathrm{y})\ ]\ ]$

N blankets
$[\lambda P\ (\exists\gamma)\ [\ N(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ \&\ P(\gamma)\ ]\ ]$

Ø
$[\lambda Q\ \lambda P\ (\exists\gamma)\ [\ Q(\gamma)\ \&\ P(\gamma)\ ]\ ]$

N blankets
$[\ \lambda\gamma\ [\ N(\gamma)\ \&\ \mathbf{B}_i(\gamma)\ ]\ ]$

N

N blankets
$\mathbf{B}_i$

(25*h*)

- *Geach is looking for something*
  $(\exists P)\ \mathbf{T}_i(\mathbf{g},\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{g},y)])$
  - *some*
    $[\ \lambda\mathfrak{Q}\ (\exists P)\ \mathfrak{Q}(P)]$
    - *some*
      $[\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\exists P)\ [\mathfrak{R}(P)\ \&\ \mathfrak{Q}(P)]]$
    - *thing*
      $\lambda P\ (P = P)$
  - P
  - *Geach is looking for P*
    $\mathbf{T}_i(\mathbf{g},\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{g},y)])$
    - *Geach*
      $\mathbf{g}$
    - *is looking for P*
      $[\lambda x\ \ \mathbf{T}_i(x,\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(x,y)])$
      - *is looking for*
        $[\lambda P\ \lambda x\ \ \mathbf{T}_i(x,\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(x,y)])$
      - P

(26*h*)

- *Geach is seeking something Quine is not seeking*
  $(\exists P)\ [\neg\ \mathbf{T}_i(\mathbf{q},\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{q},y)\ ])$
  $\&\ \mathbf{T}_i(\mathbf{g},\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{g},y)\ ])]$
  - *something Quine is not seeking*
    $[\ \lambda\mathfrak{Q}\ (\exists P)\ [\neg\ \mathbf{T}_i(\mathbf{q},\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{q},y)\ ])\ \&\ \mathfrak{Q}(P)\ ]\ ]$
    - *some*
      $[\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\exists P)\ [\mathfrak{R}(P)\ \&\ \mathfrak{Q}(P)]]$
    - *thing Quine is not seeking*
      $\lambda P\ \neg\ \mathbf{T}_i(\mathbf{q},\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{q},y)\ ])$
      - *thing*
        $\lambda P\ (P = P)$
      - *that Quine is not seeking*
        $\lambda P\ \neg\ \mathbf{T}_i(\mathbf{q},\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{q},y)\ ])$
  - P
  - *Geach is seeking P*
    $[\mathbf{T}_i(x,\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(\mathbf{g},y)\ ])]$

N(∀ (∃))

needs every book by some Norwegian

$needs'(\lambda\gamma\, (\forall y)\, [y \in \gamma \leftrightarrow (\exists z)\, [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)]\ ]\ ) \equiv$

$\lambda x\ \mathbf{M}_i(\lambda j\ (\exists\gamma)[(\forall y)\ [y \in \gamma \leftrightarrow (\exists z)\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)]\ \&\ \mathbf{H}_j(x,\gamma)]\ )$

needs

$[\lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ )\ ]$

every book by some Norwegian

$\lambda\gamma\ (\forall y)\ [y \in \gamma \leftrightarrow (\exists z)\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)]\ ]$

every

$\lambda P\ \lambda\gamma\ (\forall y)\ [y \in \gamma \leftrightarrow P(y)]$

book by some Norwegian

$\mathbf{C}_\exists(\lambda y\ \lambda z\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)]) \equiv$

$\lambda y\ (\exists z)\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)]$

book by some Norwegian

$\lambda y\ \lambda z\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)]$

book

$\mathbf{B}_i$

by some Norwegian

$\lambda y\ \lambda z\ [\mathbf{N}_i(z)\&\ \mathbf{A}_i(z,y)]$

by

$\mathbf{A}_i$

some Norwegian

$\mathbf{N}_i$

some

$\lambda P\ P$

Norwegian

$\mathbf{N}_i$

N(∃(∀))

needs every book by some Norwegian

$needs'(\lambda i\ \lambda\gamma\ \lambda z\ [\mathbf{N}_i(z)\ \&\ (\forall y)\ [y\in\gamma \leftrightarrow [\mathbf{B}_i(y)\ \&\ \mathbf{A}_i(z,y)]\ ]\ ])\ \equiv$

$\lambda x\ \mathbf{M}_i(\lambda j\ (\exists\gamma)(\exists z)[\mathbf{N}_i(z)\ \&\ (\forall y)\ [y\in\gamma \leftrightarrow [\mathbf{B}_i(y)\ \&\ \mathbf{A}_i(z,y)]\ ]\ \&\ \mathbf{H}_j(x,\gamma)]\ )$

needs

$[\lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ )\ ]$

every book by some Norwegian

$\lambda\gamma\ \lambda z\ (\forall y)\ [y\in\gamma \leftrightarrow [\mathbf{N}_i(z)\ \&\ \mathbf{B}_i(y)\ \&\ \mathbf{A}_i(z,y)]\ ]\ \equiv$

$\lambda\gamma\ \lambda z\ [\mathbf{N}_i(z)\ \&\ (\forall y)\ [y\in\gamma \leftrightarrow [\mathbf{B}_i(y)\ \&\ \mathbf{A}_i(z,y)]\ ]\ ]$

every

$\boxed{\lambda R\ \lambda\gamma\ \lambda z\ (\forall y)\ [y\in\gamma \leftrightarrow R(z,y)]}$

book by some Norwegian

$\lambda y\ \lambda z\ [\mathbf{B}_i(y)\ \&\ \mathbf{N}_i(z)\ \&\ \mathbf{A}_i(z,y)]$

book

$\mathbf{B}_i$

by some Norwegian

$\lambda y\ \lambda z\ [\mathbf{N}_i(z)\&\ \mathbf{A}_i(z,y)]$

by

$\mathbf{A}_i$

some Norwegian

$\mathbf{N}_i$

some

$\lambda P\ P$

Norwegian

$\mathbf{N}_i$

Moltmann on Opacity

F. Moltmann, 'Intensional Verbs and Quantifiers'. *Natural Language Semantics* 5 (1993), 1–52.

1 Criteria of opacity

Quantifier Exportation

Opaque verbs V do not satisfy the following equivalence:

$$x\ Vs\ Q \Leftrightarrow For\ Q\ y\!: x\ Vs\ y$$

where the subject x is a proper name.

Example:

John is looking for a horse ≠>

For a horse y: John is looking for y. [≈ There is a horse that John is looking for.]

NB: Moltmann only considers the '⟹' direction; the test is not genuinely linguistic in that it employs mathematical jargon (variable talk).

Substitution

Opaque verbs V do not satisfy the following equivalence:

$$x\ Vs\ Q \Leftrightarrow x\ Vs\ Q'$$

where Q and Q' are co-extensional.

Standard Example:

John is looking for an animal with a heart <≠>

John is looking for an animal with a kidney

Moltmann's variant

(MV) *x Vs D N and the N that x Vs is the M* ⇒ *x Vs D M*

NB: A Montagovian interpretation of *own* as higher-order and extensional would falsify (MV)!

Discourse Anaphora

More a generalization than a test – ambiguity is the test

Anaphoric pronouns relating to objects of opaque verbs disambiguate.

'Multiple reference often necessitates transparency' (Montague)

Example

John is looking for an expert on unicorns. She lives in Hobart Lane. specific

Impersonality

On the unspecific reading, the object of an opaque verb behaves as if it referred to an inanimate object.

Examples

John is looking for something, viz. an expert on unicorns. unspecific

John is looking for the same thing as Mary, viz. an expert on unicorns. unspecific

John is looking for the same person as Mary, viz. an expert on unicorns. specific

Corollary (Moltmann's fifth criterion)

Personal vs. impersonal proforms in the object positions of opaque verbs may disambiguate.

Examples

Who is John looking for? An expert on unicorns. specific

What is John looking for? An expert on unicorns. unspecific

2 Classes of opaque verbs

Verbs of absense

John is looking for an expert on unicorns.

John needs an expert on unicorns.

This car lacks two wheels. <≠> It is not the case that this car has two wheels

I owe you a horse.

Verbs of comparison

John compares his stepmother to an alien.

John's stepmother resembles an alien.

This book differs from a newspaper (in that it is heavier).

Epistemic verbs

Men have seen unicorns. Montague (1969)

Grover counted 6 cookies (though there were only 5).

Friederike found someone who knew her father's birthday.

Resultative verbs

John found a friend.

The philosophy department hired a metaphysics professor.

Verbs of creation

John painted $\left\{\begin{array}{l}\text{a unicorn}\\ \text{a picture}\end{array}\right\}$.

John imagined a unicorn.

Verbs of ownership

Mats inherited a stamp.

3 Problems with previous approaches

Propositions

John needs at most two assistants. –> Zimmermann (1993)

John needs to have at most two assistants.

John needs no assistant.

John needs to have no assistant.

Properties

?John and Bill are a doctor and a lawyer.

?I consider John and Bill two nice people.

John needs at most two secretaries. intensional reading available

(*dd*) $(\forall P)\ [\mathbf{M}_i(\lambda j\ (\exists\gamma)\ [\ P_j(\gamma)\ \&\ \mathbf{H}_j(\mathbf{j},\gamma)\ ])\rightarrow$
$(\forall j)\ (\forall\gamma)\ [\ P_j(\gamma)\rightarrow(\exists\gamma')\ [\gamma\subseteq\gamma'\ \&\ 2(\gamma')\ \&\ \mathbf{S}_j\ (\gamma')\ ]\ ]\ ]$
'John needs at most a group containing at most two secretaries'
at most' = $[\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\forall P)\ [\mathfrak{Q}(P)\rightarrow P\leq\mathbf{BE}(\mathfrak{R})]\ ]$ Zimmermann (1993)

(*dn*) $(\forall N)\ [\ \mathbf{M}_i(\lambda j\ (\exists\gamma)\ [N(\gamma)\ \&\ \mathbf{S}_j\ (\gamma)\ \&\ \mathbf{H}_j\ (\mathbf{j},\gamma)\ ]\rightarrow N\leq\mathbf{2}\ )\ ]$ [+ ∃-presupp.]
'The number of secretaries needed by John is at most 2' Zimmermann (p.c.)

John is looking for exactly two secretaries. intensional reading available

(*dd*) $(\forall P)\ [\mathbf{T}_i(\lambda j\ (\exists\gamma)\ [\ P_j(\gamma)\ \&\ \mathbf{F}_j(\mathbf{j},\gamma)\ ])\leftrightarrow P=[\lambda j\ \lambda\gamma\ [2(\gamma)\ \&\ \mathbf{S}_j\ (\gamma')\ ]\ ]\ ]$
'John tries to find nothing but a group containing (exactly) two secretaries'
exactly' = $[\lambda\mathfrak{R}\ \lambda\mathfrak{Q}\ (\forall P)\ [\mathfrak{Q}(P)\leftrightarrow P=\mathbf{BE}(\mathfrak{R})]\ ]$ by analogy

(*dn*) $(\forall N)\ [\ \mathbf{T}_i(\lambda j\ (\exists\gamma)\ [N(\gamma)\ \&\ \mathbf{B}_j\ (\gamma)\ \&\ \mathbf{F}_j\ (\mathbf{j},\gamma)\ ]\rightarrow N=\mathbf{2}\ )\ ]$ [+ ∃-presupp.]
'The number of secretaries sought by John is exactly 2'

John	braucht	keinen	Assistenten
John	needs	no	assistent

'John does not need an(y) assistent'

John	braucht	keinen	Assistenten	außer	Bill
John	needs	no	assistent	except	Bill

‘John does not need an(y) assistent except Bill’

John	muss	kein	Haus	außer	diesem	kaufen
John	must	no	house	except	this one	buy

‘John does not have to buy a house apart from this one ’

John wants every painting by Matisse. intensional reading available

They resemble at most ten kings. no intensional reading $\Rightarrow$ property analysis

Quantifiers

Decompositions of need:

(a) $[\lambda\mathcal{Q}\,\lambda x\,\mathbf{M}_i(\lambda j\,(\mathcal{Q}_j y)\,\mathbf{H}_j(x,y)\,)\,]$ modality independ of subject

(b) $[\lambda\mathcal{Q}\,\lambda x\,(\forall j)\,[\mathbf{S}_j(x) \rightarrow (\mathcal{Q}_j y)\,\mathbf{H}_j(x,y)\,)\,]\,]$ modality depends on subject

John needs at most two assistents.

‘does not exclude that John’s needs are satisfied even if he happens to have ten assistents’

$(\forall j)\,[\mathbf{S}_j(\mathbf{j}) \rightarrow \neg\,(\exists x)\,(\exists y)\,(\exists z)\,[\mathbf{3}(\{x,y,z\})\ \&\ \mathbf{A}_j(\{x,y,z\})\ \&\ (\forall u)\,[u \in \{x,y,z\} \rightarrow \mathbf{H}_j(\mathbf{j},u)\,]\,]\,]$

(c) $[\lambda\mathcal{Q}\,\lambda x\,(\forall j)\,[\mathbf{MIN}(j,[\lambda k\,\mathbf{S}_k(x)]) \rightarrow (\mathcal{Q}_j y)\,\mathbf{H}_j(x,y)\,)\,]\,]$ minimality added

John needs exactly two assistents.

$(\forall j)\,[\mathbf{MIN}(j,[\lambda k\,\mathbf{S}_k(x)]) \rightarrow (\exists x)\,(\exists y)\,[\mathbf{2}(\{x,y\})\ \&\ (\forall u)\,[u \in \{x,y\} \leftrightarrow [\mathbf{A}_j(u)\ \&\ \mathbf{H}_j(\mathbf{j},u)\,]]]$

$?\Rightarrow?$ $(\forall j)\,[\mathbf{MIN}(j,[\lambda k\,\mathbf{S}_k(x)]) \rightarrow (\forall x)\ [\mathbf{A}_j(x) \rightarrow \mathbf{H}_j(\mathbf{j},u)\,]\,]$

John needs every assistent.

4 Domain Presupposition

Basic idea:

Lexical meanings should imply

$V(x,\mathcal{Q}) \leftrightarrow (\mathcal{Q}_i y)\ V(x,y^*)$

whenever needed, e.g. if V translates *need* and $\mathcal{Q}$ is universal.

Would work if, e.g., V and $\mathcal{Q}$ are both universal:

$$\underbrace{(\forall x)\,[P(x) \rightarrow}_{\text{object}}\ \underbrace{(\forall y)\,[Q(y) \rightarrow (\forall y')\,[Q(y') \rightarrow \ldots}_{\text{verb}}\ \varphi]] \equiv$$

$$\underbrace{(\forall y)\,[Q(y) \rightarrow (\forall y')\,[Q(y') \rightarrow \ldots}_{\text{verb}}\ \underbrace{(\forall x)\,[P(x) \rightarrow}_{\text{object}}\ \varphi]]$$

Thus: all quantifiers in lexical analyis of verb would have to be universal.

Cf. the above *need*' = $[\lambda\mathcal{Q}\ \lambda x\ (\ \forall j)\ [\mathbf{MIN}(j,[\lambda k\ \mathbf{S}_k(x)]) \rightarrow (\mathcal{Q}_j y)\ \mathbf{H}_j(x,y)\ )\ ]\ ]$

Complication: intensionality. One of the bound variables is 'i'. But
$(\forall x)\ [P_i(x) \rightarrow (\forall i)\ [Q_i(y) \rightarrow \varphi]]$ (with free $\underline{i}$) is not necessarily equivalent to
$(\forall \boxed{i})\ [Q_i(y) \rightarrow (\forall x)\ [P_{\underline{i}}(x) \rightarrow \varphi]]$ (with $\underline{i}$ bound by '$(\forall \boxed{i})$ ')

Only works if P is constant (rigid), i.e. if '$(\forall \boxed{i})\ (\forall \boxed{i})\ [P_{\underline{i}} = P_{\underline{j}}]$ ' is true.

__Domain Presupposition Thesis__

Strong quantifiers presuppose their domain:

If D is a strong determiner, then for a context c and any situaton s, $[D\ N']^s$ is defined relative to c only if $[N']^s = [N']^{D(c)}$.

Attitudes de rebus

1 Wide scope readings

(1) Alain is looking for a guinea pig.

(n) $\mathbf{T}_i(\mathbf{a}, \lambda j\ (\exists y)\ [\mathbf{GP}_j(y)\ \&\ \mathbf{F}_j(\mathbf{a},y)])$

narrow scope = unspecific

'Alain is looking for some guinea pig or other', i.e.:
'Alain is trying to bring it about that there is some guinea pig that Alain finds'

(w) $(\exists y)\ [\mathbf{GP}_i(y)\ \&\ \mathbf{T}_i(\mathbf{a}, \lambda j \mathbf{F}_j(\mathbf{a},y))]$

wide scope = specific

'There is some guinea pig that Alain is looking for', i.e.:
'There is some guinea pig such that Alain is trying to bring it about that Alain finds it'

(2) Alain is looking for the guinea pig.

(n) $\mathbf{T}_i(\mathbf{a}, \lambda j\ (\iota y)\ [\mathbf{GP}_j(y);\ \mathbf{F}_j(\mathbf{a},y)])$

narrow scope = *de dicto*

'Alain is looking for whatever would be the unique guinea pig ', i.e.:
'Alain is trying to bring it about that: (a) there is a unique guinea pig; and (b) there is some guinea pig that Alain finds'

(w) $(\iota y)\ [\mathbf{GP}_i(y);\ \mathbf{T}_i(\mathbf{a}, \lambda j \mathbf{F}_j(\mathbf{a},y))]$

wide scope = *de re*

'There is a unique guinea pig; and there is some guinea pig that Alain is looking for', i.e.:
'There is a unique guinea pig; and there is some guinea pig such that Alain is trying to bring it about that Alain finds it'

(3) Alain is looking for Leo.

$\mathbf{T}_i(\mathbf{a}, \lambda j\ \mathbf{F}_j(\mathbf{a},\mathbf{l}))$

only one reading

'Alain is looking for Leo ', i.e.:
'Alain is trying to bring it about that Alain finds Leo'

2 Double vision

W. V. O. Quine, 'Quantifiers and propositional attitudes'. *Journal of Philosophy* 53 (1956), 157–87
S. Kripke, 'A Puzzle about Belief', A. Margalit (ed.), *Meaning and Use*. Dordrecht 1979, 239–83

Ralph has two neighbors, Will and Van. Will once invited him, on which occasion he showed him a guinea pig, which seemed to cause a strong allergic reaction in Ralph, who decided to avoid any further contact with that particular animal, though not with guinea pigs in general. So from that time on, Ralph has tried hard to not get in contact with – let alone: *find* – that particular animal. Hence (4) appears be true, where the constant '**o**' refers to Ortcutt, the animal that Ralph takes to be Will's obnoxious guinea pig:

(4) $\mathbf{T}_i(\mathbf{r}, \lambda j\ \neg\ \mathbf{F}_j(\mathbf{r},\mathbf{o}))$

As a matter of fact, Ortcutt is not Will's guinea pig but Van's; and Ralph is not allergic to it, but to the wall paint in Will's house. In fact, Van often invites Ralph to his house, mainly to show off with his award-winning guinea pig, i.e. Ortcutt, and Ralph never showed an allergic reaction on those occasions. So he erroneously believes there to be two guinea pigs in the neighborhood. Now. one day Ortcutt disappears and Ralph joins Van in his search for the animal. Now Ralph is looking for a particular guinea pig (Ortcutt) and thus, given certain contextual restrictions, (5) – (7) should all be true on their wide scope readings:

(5) Ralph is looking for a guinea pig.
$(\exists y)\ [\mathbf{GP}_i(y)\ \&\ \mathbf{T}_i(\mathbf{r}, \lambda j \mathbf{F}_j(\mathbf{r},y)])$

(6) Ralph is looking for the guinea pig.
$(\iota y)\ [\mathbf{GP}_i(y);\ \mathbf{T}_i(\mathbf{r}, \lambda j \mathbf{F}_j(\mathbf{r},y))]$

(7) Ralph is looking for Ortcutt.
$\mathbf{T}_i(\mathbf{r}, \lambda j\ \mathbf{F}_j(\mathbf{r},\mathbf{o}))$

(4) remains valid – Ralph still hasn't found out about the true causes of his allergy, nor about the identity of the guinea pig he met at Will's place. But according to (4) and (7), Ralph appears to be irrational in his desires: if only he made the connection between the goal of his search and his avoidance of Will's guinea pig – and why shouldn't he? – he would have to see a conflict, which is not true.

3 Attitude reports and internalism

<u>Frege's idea</u>

G. Frege, 'Über Sinn und Bedeutung', *Zeitschrift für Philosophie und philosophische Kritik* 100 (1892), 25–50

A propositional attitude verb expresses a relation between persons and propositions. An attitude report is true if the person denoted by the subject stands in the relation expressed by the verb to the informative value of the complement clause, i.e. the proposition it expresses.

<u>Possible worlds formulation</u>

J. Hintikka, 'Semantics for Propositional Attitudes', in: J. W. Davis et al. (eds.), *Philosophical Logic*. Dordrecht 1969, 21–45

The extension of a (non-presuppositional) propositional attitude verb is a relation between persons and possible worlds [indices, situations,…]. An attitude report is true if the complement clause is true of every world [index, situation,…] to which the person denoted by the subject stands in the relation denoted by the object.

In symbols: $[\![x\ V\ S]\!]^i = 1$ iff $(\forall j)\ [\ (\ [\![x]\!]^i, j) \in [\![V]\!]^i \rightarrow [\![S]\!]^j = 1]$, i.e. (identifying sets with their characteristic functions) iff $[\![V]\!]^i([\![x]\!]^i) \subseteq [\![S]\!]$.

Special case

$[\![x \text{ believes } S]\!]^i = 1$ iff $[\![believe]\!]^i([\![x]\!]^i) \subseteq [\![S]\!]$. The *belief set* $[\![believe]\!]^i$(Alain) is the set of all indices that are compatible with what Alain knows about i:

'The belief set model [...] is supposed to be an internal (or individualistic) characterisation of a person's beliefs. That is, whether a possible world w belongs to a given person's belief set is solely determined by that person's inner psychological state [...] The usually understood criterion of membership can be roughly characterised like this: Imagine the actual epistemic state of a person as fixed and then place him in a world w which he may investigate in each and every detail. If he then finds no clues that w is not the actual world – if, in other words, he can in no way distinguish w from the real world as he knows it – then, and only then, will w be an element of his belief set. As a result, a proposition p is believed by a person if p is a superset of the person's belief set; for it is then that he takes the actual world to be in p.'

U. Haas-Spohn, *Versteckte Indexikalität und subjektive Bedeutung*, Berlin 1995, ch. 1 [tr. by E. Z.]

Internalism

Whether or not the relation expressed by a (non-presuppositional) attitude verb holds between a person and a world depends only the person's cognitive state.

4 Singular propositions

D. Kaplan, 'How to Russell a Frege-Church'. *Journal of Philosophy* 72 (1975), 716–29
D. Lewis, 'What puzzling Pierre does not believe'. *Australasian Journal of Philosophy* 59 (1981), 283–89

(8) Alain is looking for a green pen.

(n) $\underline{\underline{\mathbf{T}}}_i(\mathbf{a}, \lambda j\, (\exists y)\, [\mathbf{GP}_j(y)\ \&\ \mathbf{F}_j(\mathbf{a},y)])$

(w) $(\exists y)\, [\mathbf{GP}_i(y)\ \&\ \underline{\underline{\mathbf{T}}}_i(\mathbf{a}, \lambda j \mathbf{F}_j(\mathbf{a},y))]$

Same propositional attitude **T** characterized (roughly) by:

$\mathbf{T}_i$(x,p) iff at i x performs actions aimed at making p true.

⇒ (8w) is true iff there is some object f such that (i) f is a green pen and (ii) Alain's search is aimed at indices at which Alain finds f.

Here, aims are (understood to be) subjective: whether or not a given index is compatible with the subject's aim depends on the subject's cognitive state.

Alain may have means of recognizing f (color, texture, etc.) – in which case his aims depend on these identification procedures; or he may remember using f recently and now aims at finding the pen he used – in which case his aims depend on this piece of memory.

However

Cognitive states practically never suffice to determine the precise identity of an object.

Though the properties Alain uses for identifying *f* (by perception, memory, etc.) may pick out one particular object in each world compatible with Alain's cognitive state, this object need not always be *f*: If Alain recognizes *f* by perceptual properties, this test is not infallible – so his aim may be reached without him finding *f*; if Alain relies on his memory, then the object he remembers having used need not be *f* – because Alain used different pens in lots of worlds compatible with what he remembers.

Alternatively (Twin-earth *gedankenexperiment*) [H. Putnam, 'The meaning of "meaning"', In *Mind, Language, and Reality. Philosophical Papers. Vol. 2.* Cambridge 1975. 215–71]
Imagine someone exactly like Alain, including all his perceptions, beliefs, desires etc., but living in a different (though subjectively indistinguishable) environment. That person would have the same aims. However, he could not be satisfied if he found *f*.

Conclusion:

Given internalism, people do not have subjective attitudes to *singular* propositions, i.e. sets of possible worlds in which a particular object has a particular property. So *de re* (specific) attitudes cannot be wide scope attitude reports.

For externalism see

T. Burge, 'Individualism and the Mental', *Midwest Studies in Philosophy* 4 (1979), 73–121

5 Relational attitudes

Relational belief

Quine (1956)

(9) Alain believes that there are white guinea pigs.

$\mathbf{B}_i(\mathbf{a}, \lambda j\, (\exists y)\, [\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)])$

propositional

(10) Alain believes *of* something that it is a white guinea pig.
'Alain believes being-a-white-guinea-pig of something'.

$(\exists y)\ \underline{\underline{\mathbf{B}}}_i(\mathbf{a}, y, \lambda j\, \lambda y\, [\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)])$

relational

NB: Equivocation! The two relations **B** and $\underline{\underline{\mathbf{B}}}$ cannot be the same – they have different -arites.

(11) Alain believes that the white guinea pig is hungry.

$\mathbf{B}_i(\mathbf{a}, \lambda j\, (\iota y)\, [[\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)];\ \mathbf{H}_j(y)])$

de dicto = propositional

(12) Alain believes that the white guinea pig is hungry.
Alain believes the white guinea pig to be hungry.
'Of the white guinea pig, Alain believes being-hungry.'

$(\iota y)\, [[\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)];\quad \underline{\underline{\mathbf{B}}}_i(\mathbf{a}, y, \mathbf{H})]$

de re = relational

(13) Alain believes that a white guinea pig is hungry.

$\mathbf{B}_i(\mathbf{a}, \lambda j\ (\exists y)\ [\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)\ \&\ \mathbf{H}_j(y)])$

unspecific = propositional

(14) Alain believes that a white guinea pig is hungry.
Alain believes a white guinea pig to be hungry.
'Of a white guinea pig, Alain believes being-hungry.'

$(\exists y)\ [\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)\ \&\ \underline{\underline{\mathbf{B}}}_i(\mathbf{a}, y, \mathbf{H})]$

specific = relational

By analogy

(15) Alain is looking for a white guinea pig.

$\mathbf{T}_i(\mathbf{a}, \lambda j\ (\exists y)\ [\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)\ \&\ \mathbf{F}_j(\mathbf{a}, y)])$

propositional

(16) 'Alain is trying being-a-white-guinea-pig-found-by-Alain of something.'

$(\exists y)\ \underline{\underline{\mathbf{T}}}_i(\mathbf{a}, y, \lambda j\ \lambda y\ [\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)\ \&\ \mathbf{F}_j(\mathbf{a}, y)])$

relational

(17) Alain is looking for the white guinea pig.
Alain is trying to find the white guinea pig.
'Of the white guinea pig, Alain is trying being-found-by-Alain.'

$(\iota y)\ [[\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)];\ \ \underline{\underline{\mathbf{T}}}_i(\mathbf{a}, y, \lambda j\ \lambda z\ \mathbf{F}_j(\mathbf{a}, z))]$

de re = relational

(18) Alain is looking for a white guinea pig.
Alain is trying to find a white guinea pig.
'Of a white guinea pig, Alain is trying being-found-by-Alain.'

$(\exists y)\ [\mathbf{GP}_j(y)\ \&\ \mathbf{W}_j(y)\ \&\ \underline{\underline{\mathbf{T}}}_i(\mathbf{a}, y, \lambda j\ \lambda z\ \mathbf{F}_j(\mathbf{a}, z))]$

specific = relational

Old problems

- *Double vision*

(4*r*) $\underline{\underline{\mathbf{T}}}_i(\mathbf{r}, \mathbf{o}, \lambda j\ \lambda z\ \neg\ \mathbf{F}_j(\mathbf{r}, z))$

(7*r*) $\underline{\underline{\mathbf{T}}}_i(\mathbf{r}, \mathbf{o}, \lambda j\ \lambda z\ \mathbf{F}_j(\mathbf{r}, z))$

No reason why (4*r*) and (7*r*) should not be true at the same time, even for perfectly rational **r**.

- *Singular propositions*

… have disappeared from the *de re* report. Instead, the report is external though the propositional attitude need not be. In fact, it is open how the latter comes in at all. We thus have a

NEW PROBLEM

How are the propositional attitude (**T**) and the relational attitude ($\underline{\underline{\mathbf{T}}}$) related?

Conceivablen solutions

D. Kaplan, 'Quantifying in'. In: D. Davidson & J. Hintikka (eds.), *Words and Objections: Essays on the Work of W. V. Quine*. Dordrecht 1969, 178–214

- *First (stupid) guess*

  $\underline{\underline{\mathbf{T}}}_i(\mathrm{x,y,P}) \Leftrightarrow \mathbf{T}_i(\mathrm{x}, \lambda j\ \mathrm{P}_j(\mathrm{y}))$

  No, because that would take us back to singular propositions

- *Exportation*

  $(\iota \mathrm{z})\ [\mathrm{Q}_i(\mathrm{z});\ \ \underline{\underline{\mathbf{T}}}_i(\mathrm{x,z,P})] \Leftrightarrow \mathbf{T}_i(\mathrm{x}, \lambda j\ (\iota \mathrm{z})\ [\mathrm{Q}_j(\mathrm{z});\ \mathrm{P}_j(\mathrm{z})])$

  "$\Rightarrow$" leads back to singular propositions (if Q = y^+); "$\Leftarrow$" overgenerates *de re* readings if uniqueness can be deduced (shortest spy argument).

- *Vivid names*

  $\underline{\underline{\mathbf{T}}}_i(\mathrm{x,y,P}) \Leftrightarrow (\exists N)\ [\mathbf{VN}_i(N,\mathrm{y,x})\ \&\ \mathbf{T}_i(\mathrm{x}, \lambda j\ \mathrm{P}_j(N_j))]$

  N is an individual concept (usually partial), i.e. of type <s,e>; the relation denoted by **VN** holds between a concept, an object and a subject if *(a)* the concept represents a sufficiently detailed ('vivid') description for the subject, and *(b)* the concept applies to ('names') the object. *(a)* is an internal criterion; *(b)* is external (causal). [Other interpretations have been proposed for **VN**.]

Compositionality problem

The second and third arguments, y (*res*) and P (attributed property P), cannot be recovered from the singular proposition $\lambda j\ \mathrm{P}_j(\mathrm{y})$, which would be necessary for a compositional interpretation of the structure ((*a guinea pig*) y (*Alain* (*seeks* y))) as *de re*.

DESIRED RESULT for (marked) structure:

$\lambda \mathrm{x}\ \underline{\underline{\mathbf{T}}}_i(\mathrm{x,y}, \lambda j\ \lambda \mathrm{z}\ \mathbf{F}_j(\mathrm{x,z}))$

INPUT: y + …

… $\lambda \mathbb{Q}\ \lambda \mathrm{x}\ \mathbf{T}_i(\mathrm{x}, \lambda j\ (\mathbb{Q}_j \mathrm{z})\ \mathbf{F}_j(\mathrm{x,z}))$

quantifier treatment

… $\lambda \mathrm{P}\ \lambda \mathrm{x}\ \mathbf{T}_i(\mathrm{x}, \lambda j\ (\exists \mathrm{z})\ [\ \mathrm{P}_j(\mathrm{z})\ \&\ \mathbf{F}_j(\mathrm{x,z})])$

property treatment

Compositionality by type coercion

Replace *Montague Lift* …

quantifier treatment

et

$(s((et)t))(et)$ $\boxed{(s((et)t))\ e}$

… by *De Re Lowering*

$$\begin{array}{ccc} & et & \\ \boxed{\begin{array}{c} e(et) \\ (s((et)t))(et) \end{array}} & & e \end{array}$$

$\boldsymbol{\mathfrak{R}} \rightsquigarrow \lambda y\ \lambda x\ (\exists N)\ [\mathbf{VN}_i(N,y,x)\ \&\ \boldsymbol{\mathfrak{R}}(x,\ \lambda j\ \lambda P\ \ P(N_j))]$

[or *Essential Lifting* …

property treatment

$$\begin{array}{ccc} & et & \\ (s(et))(et) & & \boxed{\begin{array}{c} s(et) \\ e \end{array}} \end{array}$$

… by *De Re Lowering*

$$\begin{array}{ccc} & et & \\ \boxed{\begin{array}{c} e(et) \\ (s(et))(et) \end{array}} & & e \end{array}$$

$\mathfrak{R} \rightsquigarrow \lambda y\ \lambda x\ (\exists N)\ [\mathbf{VN}_i(N,y,x)\ \&\ \mathfrak{R}(x,\ \lambda j\ \lambda z\ (z = N_j))]$

]

<u>*Note*</u>: This solution does not carry over to 'overt' propositional attitudes *de re*, where one would have to emply structured propositions.

–> M. J. Cresswell, A. v. Stechow, 'De Re Belief Generalized', *Linguistics and Philosophy* 5 (1982), 503 - 535

6 Attitudes *de se*

(19) His pants are on fire.

(19') he = the man I am watching

(20) My pants are on fire.

(20') I = the German semanticist who is married to Caroline etc.

(20") I = the EGO

(21) Roger's pants are on fire.

(21') Roger = the semanticists who is married to Karina etc.

Attitude contents are (like) …

… *characters*

D. Kaplan,: ‘Demonstratives’, in J. Almog et al. (eds.), *Themes from Kaplan*. Oxford 1989, 481–563

(K)

Character $\xrightarrow{\textit{context } c}$ Intension $\xrightarrow{\textit{index } i}$ Extension

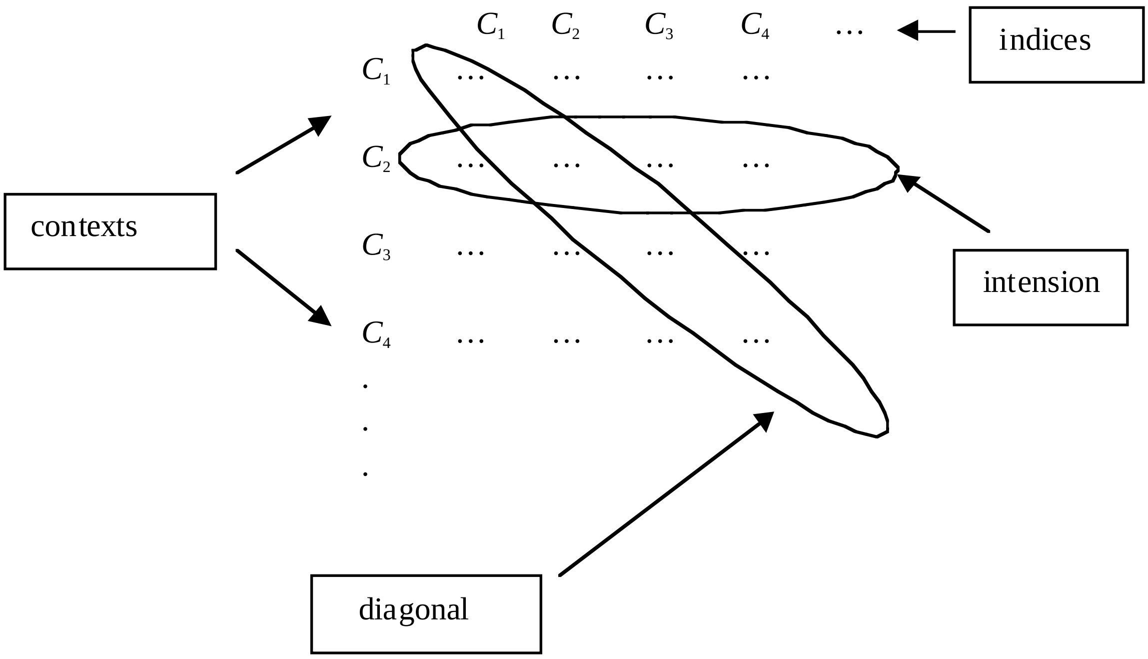
$\chi_{19} \neq \chi_{20}$ $\chi_{19}(c) = \chi_{20}(c)$ $\chi_{19}(c)(i) = \chi_{20}(c(i))$

(22) I am hungry.

$\chi_{22} = \lambda c\ \lambda i\ \mathbf{H}_i(\mathbf{m}_c)$

… *(diagonal) ‘propositions’*

R. Stalnaker,’Assertion’, in: P. Cole (ed.), *Syntax and Semantics 9: Pragmatics*. New York, 315–32



(22) I am hungry.

$\delta_{22} = \lambda c\ \mathbf{H}_c(\mathbf{m}_c)$

… *sets of subjects*

D. Lewis, ‘Attitudes de dicto and de se’, *Philosophical Review* 8 (1979), 513–43

(22) I am hungry.

$\sigma_{22} = \lambda x\ \mathbf{H}_{\mathbf{wt}(x)}(x)$

De re belief reports

(23) Alain is looking for a yeti.

$(\exists y)\ (\exists N)\ [\mathbf{Y}_i(y)\ \&\ \mathbf{VN}_i(N,y,\mathbf{a})\ \&\ \mathbf{T}_i(\mathbf{a},\ \lambda x\ \mathbf{F}_{\mathbf{wt}(x)}(x,N_{\mathbf{wt}(x)}(x)))\ ]$

De se as de re

(24) Alain is looking for himself.

$(\exists N)\ [\ \mathbf{VN}_i(N,\mathbf{a},\mathbf{a})\ \&\ \mathbf{T}_i(\mathbf{a},\ \lambda x\ \mathbf{F}_{\mathbf{wt}(x)}(x,N(x))\ ]$

– true if $[\ \underline{\mathbf{VN}_i((\lambda x\ x),\mathbf{a},\mathbf{a})}\ \&\ \mathbf{T}_i(\mathbf{a},\ \lambda x\ \mathbf{F}_{\mathbf{wt}(x)}(x,x))\ ]$

"Everyone is presented to himself in a special and primitive way, in which he is presented to no-one else"

G. Frege, 'Der Gedanke', *Beiträge zur Philosophie des deutschen Idealismus* 2 (1918), 58–77

Forbes, G. (2000) "Objectual Attitudes," *Linguistics and Philosophy*, **23** (2):141-184

Part I. Terminology

A. notional/relational

John seeks a unicorn is ambiguous:

Relational paraphrase: There is a particular unicorn that John seeks.
Notional paraphrase: John seeks relief from unicornlessness.

B. Substitution permitting/resisting

An argument position of a predicate is **substitution permitting**, if coreferential names can be used there interchangeably without affecting truth.

If an argument position is not substitution permitting, it is **substitution resisting**.

Part II. Raw Data

Claim: the notional/relational distinction is independent of the substitution resisting/permitting distinction.

A. Relational only predicates: the 'none in particular' test

(1) John was looking for a kid in his class. (✓ but no kid in particular)
(2) John met a kid in his class (#but no kid in particular)
(3) John admires a kid in his class. (#but no kid in particular)
(4) John is afraid of a kid in his class. (#but no kid in particular)
(5) John likes a toy in the store. (#but no toy in particular)
(6) John worships a rock star. (#but no star in particular).
(7) John considers a kid in his class intelligent. (#but no kid in particular)

Like the extensional verb *met,* the predicates *admire, is afraid of, likes, worships, consider*__ AP, are all relational. Unlike *met*, they have substitution resisting readings:

The following inference is blocked on one reading, called **substitution resisting**, and goes through on another reading, called **substitution permitting**:

(8) John is afraid of Superman
Superman = Clark Kent
→ John is afraid of Clark Kent.

[NOTE: for the purposes of this discussion, you are to assume the Superman story is true]

The following makes sense on a **substitution-resisting** reading:

(9) Lois considers Clark Kent less interesting than Superman. (p9,fn3)

Conclusion: relational readings are compatible with substitution resisting and substitution permitting.

B. Predicates with notional and relational readings.

i. Relational reading with substitution (names)

(10) John is looking for Superman
Superman = Clark Kent
→ John is looking for Clark Kent.

ii. Notional readings with substitution.

“notional readings” are only defined for arguments that aren’t names. So we need to widen the definition of ‘substitution’ to include coreferential <u>predicates</u>.

Examples (11)-(13) all have notional readings.

(11) Ann painted a victim of Jekyll.
a victim of Jekyll = a victim of Hyde
→ Ann painted a victim of Hyde.

(12) The police are looking for a victim of Jekyll.
a victim of Jekyll = a victim of Hyde
→ The police are looking for a victim of Hyde.

(13) John is looking for a cop
a cop = a policeman
→ John is looking for a policeman.

Judgement: (11) and (12) show resistance, (13) seems not to. Forbes, I think, would say they all do.

iii. Relational reading with non-names

[Setting Up the Relational Reading:]
John is looking for Akin.
Akin is an African phonologist at Rutgers
so: John is looking for an African phonologist at Rutgers.
sticking with that reading, do we get the following inference:

(14) John is looking for an African phonologist at Rutgers.
African phonologist at Rutgers = African department chair at Rutgers
→ John is looking for an African department chair at Rutgers.

Suggestion from discussion with Ede: based on missing substitution resistance in (13) and (14), perhaps resistance only really occurs with names. Forbes believes it happens with non-names as well (see for example his discussion of chucks on bottom of page 43)

Part III. Substitution resistance and the semantics of proper names.

<u>Kripkean Claim</u>: Names are often associated with descriptions but the descriptions do not give the meanings of the names.

Suppose Robert Oppenheimer is a famous physicist who invented the atom bomb. (this is roughly based on an example found in Kripke's *Naming and Necessity*). Suppose this is all you know Robert Oppenheimer.

Even so, *Oppenheimer* doesn't mean the same as *the inventor of the atom bomb.* You may one day discover:

(15) Oppenheimer did not in fact invent the atom bomb.

which is not the same as discovering:

(16) The person who invented the atom bomb did not in fact invent the atom bomb.

And you might imagine:

(17) If the atom bomb had not been invented, Oppenheimer would not have become famous.

the inventor of the atom bomb denotes a different individual in different possible worlds. In worlds where no atom bomb was invented, it may not denote at all. But *Oppenheimer* denotes the same thing in (17) as it does in simpler examples like:

(18) Oppenheimer was a physicist.

The name denotes Oppenheimer, the man.
Conclusion: Names denote the same individual in all possible worlds, they are ***rigid designators.***

Another way to see this is that in (17) you could replace *Oppenheimer* with a definite description, but a very special one:

(19) If the atom bomb had not been invented, <u>the actual person who I thought invented it</u> would not have become famous.

The definite description here is also rigid. It does NOT pick out different people in different possible worlds depending on my thoughts in those worlds, or whatever.

Resistance with names therefore doesn't follow on property analysis of opaque objects:

While names are or may be associated with concepts that is not their intension. Since Clark Kent and Superman corefer they have the same intension. It follows then that we couldn't explain substitution resistance in (8) by appeal to differences in the intensions of the names.

Part IV. An analysis of substitution resistance in relational-only predicates.

Idea: (psychological) relations between individuals maybe relative to a **way of thinking**.

(20) John is afraid of Superman, as Superman/qua Superman/as such.

Letting α stand for an individual concept, we can indicate this 'way of thinking' by writing:

(21) John is α-afraid of Superman.

Resistance comes about because we get different values for α in the two cases. John is afraid of Superman relative to the Superman concept (man with the extrahuman powers) but he is not afraid of **him** relative to the Clark Kent concept.

What determines the value of α in a given utterance of (21)? In Forbes' story, the speaker indicates or can indicate the intended value of α via a name used in the discourse. This involves a 'labelling' function, β, that relates names to individual concepts. So we have:

(22) John is α-afraid of Superman & α=β("Superman")
=/=>
John is α-afraid of Clark Kent & α=β("Clark Kent")

β is one way to set α. But not necessarily the only way:

"someone who has no names for Superman could still make a substitution-resistant ascription by pointing at two pictures, one of Superman, the other of Clark, and saying *Lois is in awe of* ***him*** *but not of* ***him***" (footnote 40)

Note: For predicates with more opaque positions, we would need for more way-of-thinking arguments:

(23) Clark Kent doesn't α,χ-resemble Superman & α=β("Clark Kent") & χ = β("Superman")

We said that the inference in (8) is blocked on the substitution resisting reading, but there is also a substitution permitting reading in which it goes through. How do we get that?

Existentially quantify α:

(24) ∃α[John is α-afraid of Superman]
=>
∃α[John is α-afraid of Clark Kent]

Summary: predicates that show substitution resisting behavior are interpreted relative to a way of thinking. This way of thinking can be indicated by an expression used in the context.

Upshot: while co-referent names do not have different intensions, they may be associated with different concepts and that can lead to substitution resistance.

<u>Discussion during the seminar:</u>

How to handle the following examples:
Markus Hiller:
(25) John is afraid of Clark Kent but he doesn't know it.

Ron Artstein:
(26) John doesn't know that he is afraid of Clark Kent.

These are intuitively true, but it doesn't look like there is any setting for α or scope setting for (❧α) that will get this to be true.

Ede: This is a de-re reading of *Clark Kent*:

(27) CK = "the Clark Kent" & John doesn't know [THE[CK(x) ; ❧α John α-afraid of x]]

Part V. Substitution resistance in notional/relational predicates.

We begin with our ‘favorite theory’ for opacity, Zimmermann 1993.

(28) The police are looking for a victim of Mr. Hyde.

“a victim of Mr. Hyde” denotes a property which remains in situ on the notional reading.

The police do not know that Dr. Jekyll is Mr. Hyde. Hence we are reluctant to conclude that:

(29) The police are looking for a victim of Dr. Jekyll.

but the property of being a victim of Dr. Jekyll is just the property of being a victim of Mr. Hyde, so the inference is not blocked by the property theory.

Solution: extend the analysis from above.

This inference does not go through:

(30) The police are α-looking for a victim of Mr. Hyde & $\alpha = \beta$(“victim of Mr. Hyde”)
victim of Jekyll=victim of Hyde
→ The police are α-looking for a victim of Dr. Jekyll & $\alpha = \beta$(“victim of Dr. Jekyll”)

Again, there is a sense in which the police are looking for a victim of Jekyll. This inference does go through:

(31) $\exists\alpha$[The police are α-looking for a victim of Mr. Hyde]

→ $\exists\alpha$[The police are α-looking for a victim of Dr. Jekyll]

so does this one:

(32) The police are α-looking for a victim of Mr. Hyde & $\alpha = \beta$(“victim of Mr. Hyde”)
→ $\exists\alpha$[The police are α-looking for a victim of Dr. Jekyll]

The story has been extended by allowing β to apply to non-names. So now we have notional readings that display the substitution resisting/permitting ambiguity.

It is possible, within this theory, that a verb could display the notional/relational ambiguity but not be relative to a way of thinking. This would mean that they would not block substitution. Forbes claims that *lack* is such a verb.

Part VI. Kaplan’s de-re

Given last time’s presentation of de-re attitudes, we could analyze

(33) John is seeking Superman

as:

(34) $(\exists N)\ [\mathbf{Vn}_{W_a}(N,j,s)\ \&\ seek_{W_a}\ (j, \lambda w\ \lambda z\ (z = N_w))]$

N is an individual concept (usually partial), i.e. of type <s,e>; the relation denoted by **VN** holds between a concept, an object and a subject if *(a)* the concept represents a sufficiently detailed (‘vivid’) description for the subject, and *(b)* the concept applies to (‘names’) the object. *(a)* is an internal criterion; *(b)* is external (causal). [Other interpretations have been proposed for **VN**.]

This comes close to the Forbes story when α is existentially quantified. This would not explain why there is substitution resistence here. For that we need a free α. (that is why Forbes calls his theory a HIT: Hidden Indexical Theory).

Part VII. How critical are the names?

Above we suggested that contrary to Forbes, substitution resistance perhaps comes from names and not from just use of different words. A relevant example would be:

(35) John is looking for a cop.
$\rightarrow$John is looking for a policeman.

Which on the above analysis should have a resistant reading:

(36) John is α-looking for a cop & $\alpha = \beta$("a cop")
$\rightarrow$ John is α-looking for a policeman & $\alpha = \beta$("a policeman")

[we probably should assume that John doesn't know that cops are just policemen. So perhaps a better example would be:

(37) John is searching the data for a stop, a fricative or an affricate.
$\rightarrow$ John is searching the data for an obstruent.]

This analysis therefore seems to predict that we should get resistance no matter what type of phrase the object of the attitude predicate is.

If in fact, this analysis only does work where names are concerned, it might be worthwhile reconsidering why we need it in that case.

One could think of this analysis, as an attempt to have it both ways. We have perfectly good property theory that explains substitution resistance (eg. between *seek a unicorn* and *seek a centaur*) so to extend it to names, we need properties, different ones, as part of the semantic contribution of coreferential names, on the other hand we know that coreferential names have the same meaning and that meaning is not a property.

Ede suggestion: what if both names are **not** rigid designators. What if in fact, one of them is not a name at all. *Clark Kent* really does mean something like "Superman in disguise". Relevant Kripke-type data would be:

(38) If Superman had never come to Earth, Clark Kent would not have been a reporter for a great metropolitan newspaper.

Ede: could we discover that:

(39) Clark Kent actually never came to Earth.

Karina: Would the non-rigid-designator view of Clark Kent be able to account for the substitution permitting reading of *John fears Superman therefore John fears Clark Kent*?

Part VIII. Semantic Innocence

"If we could recover our pre-Fregean semantic innocence…it would seem to us plainly incredible that … words [in the content sentences of propositional attitude ascriptions] mean anything different, or refer to anything else, than is their wont when they come in other environments' (Davidson 1969:172)" (page 3)

"a word in an attitude ascription should contribute exactly what it does in other environments (U uses *Superman* just to refer to Superman)" (page 3)

"Montague's account appears to require that the notional reading of *Perseus seeks a gorgon* is true if and only if Perseus is *seeks*-related to an intensional quantifier. Despite the elegance of the formalism, this looks like a category-mistake." (page 6)

"… specific violation of semantic innocence against which Davidson was protesting: we would be implying that in objectual attitude ascriptions… the names *Clark Kent* and *Superman* do not denote people. The proposal also has intelligibility problems like those of Montague's account: it is people not concepts that are feared." (page 9)

"the semantics is innocent, in that it does not impute any 'unusual' semantic properties to the QNP's that specify depictional kinds [see below RSS] or to their constituents. However, it is innocent because it is extensional" (page 37).

There seem to me to be several independent points here:

a) intelligibility: do the meanings we assign as the objects of attitudes have the intuitively correct properties, are they the right kind of things?

b) innocence: Do attitude contexts require us to attribute strange meanings to expressions that we wouldn't otherwise need?

c) extensionality: Are extensions more intuitive than intensions? sets vs. properties? If so, then (b) comes down to asking if we really need anything other than extensions to handle attitude contexts.

Consider the following version of (c):

c') Is it possible to give a semantics for opaque contexts where noun phrases only get extensional interpretations?

If the correct theory is the one given in the last section, then the answer to c' is no. That theory might be claimed to be semantically neither innocent nor intelligble.

Forbes believes the answer to c' is yes. His story is spelled out in terms of logical forms for sentences of natural language. I will provide these forms, explain them and show how they answer the questions.

So,

(40) Ann painted a victim of Jekyll.

has as one of its logical forms:

(41) (an x: picture(x))) Ann α-painted x & $kind_d$(x, (a y: victim-of(y, Jekyll)))
$\alpha = \beta$("(a y: victim-of(y, Jekyll))")

Notes:
i. I've simplified from what Forbes has on page 38, leaving out his mechanism for setting α.
ii. $kind_d(\xi,\zeta)$ is a relation read as ξ *is of depictional kind* ζ which holds between various types of depictions and the kind to which they belong as determined by the marks made on the physical surface of a depiction by its producer (page 34)
iii. (41)is a notional reading of (40), no particular **victim** is involved.
iv. (41) is presumably intelligble, since Ann is painting pictures, not properties.
v. since the meaning of the object NP is just a set of sets, this is extensional and hence its innocent.

Does this work?
If there are no victims of Jekyll, why doesn't (40) entail that:

(42) Ann painted a unicorn.

(42) should have a reading of the form:

(43) $\exists\alpha$(an x: picture(x))) Ann α-painted x & $kind_d$(x, (a y: unicorn(y)))

Since *a unicorn* and *a victim of Jekyll* are extensionally equivalent, (43) follows.

Are *a unicorn* and *a victim of Jekyll* extensionally equivalent?

Perhaps not, if we include non-existent objects, like those depicted in Ann's pictures….

To get this story, we needed to introduce pictures and depictional kinds. What should we do for verb like *seek*?

Here's a modified version of Forbes' (47.5),p40:

(44) Perseus seeks a groundhog.

(45) (some e: seeking(e)) [agent(e,Perseus) & α-$kind_g$(e, (a y: groundhog(y)))
$\alpha = \beta$("(a y: groundhog(y))")

"a seeking of which Perseus is the agent has a certain kind of goal under a specific way of thinking of that kind of goal" (page 40).

Again, *a groundhog* innocently denotes a set of sets. And the intelligiblity comes from introducing goals.

The rest is random notes that were not part of the handout.

I still don't see how extensionality will work. If John owes me a car, does it follow, on any reading, that he owes me a car made before 2001, given that the extension of *car* is the same as *car made before 2001*? What if our bet said he has 10 years to pay the debt?

If it is true at 4:00 that John is looking for a book, in the next few minutes the number of books changes, some are created, some destroyed, nothing about John changes. From what does it follow that John is still looking for a book at 4:01?

Part IX. Issues.

What happens if we have quantified attitude bearers.

Suppose A,B,C are brothers. However, A was given up for adoption when he was born, something neither he nor B nor C are aware of.

C has gone missing and A and B set out to find him. It is true in some sense that:

(46) Only one of the boys is α-looking for his$_j$ brother.

This true reading corresponds to substitution resistance in:

(47) A is α-looking for B's brother & α=β("B's brother")
$\rightarrow$ A is α-looking for A's brother. & α=β("A's brother")

This looks like it has something to do with how α is actually set in (46), since it is hard to get a true reading for:

(48) Only one of the boys is α-looking for C.

1. Should ways of thinking be individual concepts? What if the bearer of the attitude has no individual concept for the name in question? For example, he knows Mark Twain is a famous American author, but not much more. So, he has heard of Mark Twain, but he has not heard of Samuel Clemens. Should α be allowed to be something more general?

2. It often seems that for substitution resistance to obtain, the attitude bearer has to believe that the substituted names have disjoint reference. Is that the case? Why?

Can we have:

(49) Chelsea Clinton admires her father but she doesn't admire the President.

Doesn't Chelsea have different concepts associated with "her father" and with "the President"?

Part IV. Issues:

1. quantifying in: this was the reason why quotational stories were rejected in the first place.

an apparent problem:

three successively harder cases:
Case one: bound pronoun as object of intensional verb:

(1) every toy is such that Tom is looking for it.

What is β(*it*)? We don't need to answer this question. There is no substitution resistance here. So in this context, *it* and *that toy* are extensionally equivalent and it follows from

every toy is such that Tom is looking for that toy.

this would be a case where α is existentially quantified.

note: this shows that Forbes' account is compatible with wide scope quantifiers as objects of intensional verbs. but it doesn't force wide-scope (see below).

Case Two: expression containing bound pronoun as object of intensional verb:

Case Three: expression containing 'essential' bound pronoun as object of intensional verb:

A student died in the hospital yesterday. The police are now looking for his mother.
The dead student's mother is the Attorney General
*⇒ The police are now looking for the Attorney General.

A student died in the hospital yesterday. The police have arrested his mother.
The dead student's mother is the Attorney General
⇒ The police have arrested the Attorney General.

do we want to say that there is a concept of "his mother"? Probably not. Here's why.

Suppose A,B,C are brothers. However, A was given up for adoption when he was born, something neither he nor B nor C are aware of. (this happens in the real world, not only in philosopher's worlds).

C has gone missing and A and B set out to find him.

B is looking for his_B brother. (T)
A is looking for his_A brother. (F – on de dicto)
A is looking for his_B brother. (T – on de dicto)

The concepts we want here are the concept of "my brother" or "A's brother" versus the concept of "B's brother". How do we get them?

What about:

3. Only one of the boys is looking for his_j brother.

This sentence is true on the bound reading of the pronoun (de-dicto).

if "his_j brother" gives the concept of "B's mother" it's false, cause both boys are looking for him under that concept.
if it gives the concept of "A's brother" then neither of them is.
what we need here, intuitively, is the concept of "my brother".

Do we need to bind into the arguments of β?

Easier case:
every student knows a professor who is looking for a book about him.
If a philosopher was a member of the Vienna circle, then John is looking for a book about him.

suppose all books about members for the V. circle are in fact novels, but John doesn't know it.

then:

If a philosopher was a member of the Vienna circle, then John is looking for a novel about him.

doesn't follow. but that means that we are assigning concepts to "a novel about him" where him is bound. but that seems wrong, their should be different concepts.
No: the concept could be a assigned to "novel" versus "book".

this doesn't work in the brother case, because the pronoun referent is 'essential'.

ohn is looking for a unicorn under α

de-dicto: $\alpha = \beta$(*a unicorn*)
de-re: $\alpha = \beta$(N), where N is a vivid name for John. (note: In order for there to be a vivid name for a unicorn, there would have to be unicorns out there).

Akin's brother is looking for the chairman under α
$\alpha = \beta$(*Akin*), de-re
➔ Akin's brother is looking for Akin under α

as kripke pointed out, we may not have a individual concept associated with a name (his example: we might know of Richard Feynman that he is a famous physicist and that is all), but I am not sure that matters for Forbes' view.

does α have to be assigned a value based on an expression of the language? in the context of discourse? Forbes's footnote, my examples

de-re from last time. according to Kaplan, de-re attitudes involve 3-place relations, can we synthesize Kaplan and Forbes, i.e. let ✂ be a vivid names as arguments of β?

Based on

4. ①(Galileo fears the Inquisition & *the Inquisition* does not exist). (Forbes example (26))
5. Galileo feared the Inquisition before it was called that.

Forbes: β is given by the context. The truth conditions make use of the way of thinking given by β to the words used by the ascriber. …?

Is it the case that the bearer of the attitude has to not know about the equivalence, or better has to believe there is no equivalence? what does that follow from?

I like him as a father, but I don't like him as a President….

Indefinites and Properties

V. van Geenhoven, L. McNally: 'Beliefs about Opaque and Other Property Arguments'. Ms.

1 Data

Indefinites

(1) Marta is looking for a toy. ambiguous

Bare plurals G. Carlson, *Reference to Kinds in English*. PhD dissertation, UMass 1977

(2) Max is looking for books on Danish cooking. narrow scope

(3) Bill noticed actors in every scene of the film. narrow scope

Nonspecific NPs F. Liu, *Scope Dependency in English and Chinese*. PhD dissertation, UCLA 1990

(4) Every student read at least three papers. narrow scope

(5) Bill didn't date few girls. narrow scope

Incorporation (West Greenlandic) M. Bittner, *Case, Scope, and Binding*. Dordrecht 1994

(6) Juuna Kaali-mit (marlu-nik) allagar-si-nngi-l-q narrow scope
Juuna ABS Kaali-ABL (two-INST.PL) letter-get-NEG-IND[-tr]-3SG
'It is not the case that Juuna got (two) letters from Kaali.'

2 Analysis

category	type	example	translation
opaque verb[1]	*(s(et))(et)*	**seek**	$\lambda P\ \lambda x\ \mathbf{T}_i(x,\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(x,y)])$
transparent verb[2]	*(s(et))(et)*	**eat**	$\lambda P\ \lambda x(\exists y)\ [P_i(y)\ \&\ \mathbf{E}_i(x,y)]$
opaque verb[3]	*e(et)*	**seek**	$\lambda y\ \lambda x\ \mathbf{T}_i(x,\lambda j\ \mathbf{F}_j(x,y))$
transparent verb[3]	*e(et)*	**eat**	$\mathbf{E}_i$
singular indefinite[4]	*s(et)*	**a unicorn**	$\mathbf{U} \cap \mathbf{D}$
singular indefinite[5]	–	**a unicorn**	"[x: $\mathbf{U}_i(x)$ &…]"
bare plural[4]	*s(et)*	**unicorns**	$\mathbf{U}$
bare plural[6]	*e*	**unicorns**	$\mathbf{u}$

NB: Only Quantifiers and indefinites of the second kind may take scope!

Notes

1) = Property analysis + lexical decomposition —> Zimmermann (1993): 168

2) = Generalizing to the worst case

3) The two readings can be related by a productive lexical (type shifting) process:

If α *(of type (s(et))(et)) translates a transitive verb, then so does:*

$\lambda y\ \lambda x\ [\ \alpha\ (x, y^{+})]$

4) $\mathbf{U} \in Con_{s(et)}$

5) This is the DRT/dynamic treatment of indefinites as 'introducing discourse referents'; scope is variable.

6) $\mathbf{u}$ [$\in Con_e$] denotes a kind.

Examples

(1*o*) **is-looking-for**'(**a-toy**') (**Marta**')

$= [\lambda P\ \lambda x\ \mathbf{T}_i(x, \lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(x,y)])]\ (\mathbf{Y})\ (\mathbf{m})$

$\equiv \mathbf{T}_i(\mathbf{m}, \lambda j\ (\exists y)\ [\mathbf{Y}_j(y)\ \&\ \mathbf{F}_j(\mathbf{m},y)])]$

(1*t*) $[y\text{: } \mathbf{Y}_i(y)\ \&\ \textbf{is-looking-for}''(\textbf{Marta}', y)\ ]$

$= [y\text{: } \mathbf{Y}_i(y)\ \&\ [\lambda y\ \lambda x\ \mathbf{T}_i(x, \lambda j\ \mathbf{F}_j(x,y))]\ (\mathbf{m}, y)\ ]$

$\equiv [y\text{: } \mathbf{Y}_i(y)\ \&\ \mathbf{T}_i(\mathbf{m}, \lambda j\ \mathbf{F}_j(\mathbf{m},y))]\ ]$

(2*o*) **is-looking-for**'(**books**') (**Max**')

$= [\lambda P\ \lambda x\ \mathbf{T}_i(x, \lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(x,y)])]\ (\mathbf{B})\ (\mathbf{m})$

$\equiv \mathbf{T}_i(\mathbf{m}, \lambda j\ (\exists y)\ [\mathbf{B}_j(y)\ \&\ \mathbf{F}_j(\mathbf{m},y)])]$

(2*t*) **is-looking-for**''(**books**'') (**Max**')

$= [\lambda y\ \lambda x\ \mathbf{T}_i(x, \lambda j\ \mathbf{F}_j(x,y))]\ (\mathbf{b})\ (\mathbf{m})$

$\equiv \mathbf{T}_i(x, \lambda j\ \mathbf{F}_j(\mathbf{m},\mathbf{b}))$ sortally incorrect?

(4) [M. Krifka,'At least some determiners aren't determiners'. In: K. Turner (ed.), *The Semantics/ragmatics Interface from Different Points of View*. Oxford 1999, 257–91]

$\textbf{three}_{\mathrm{F}}\textbf{-papers}'$

$\equiv \lambda i\ \lambda x\ [\mathbf{3}(x)\ \&\ \mathbf{P}_i(x)]$

$\textbf{three}_{\mathrm{F}}\textbf{-papers}^{a}$ ranked alternatives

$\equiv \lambda\langle P,Q\rangle\ (\exists n,m)\ [n \leq m\ \&\ P = [\lambda i\ \lambda x\ [n(x)\ \&\ \mathbf{P}_i(x)]]\ \&$

$Q = [\lambda i\ \lambda x\ [m(x)\ \&\ \mathbf{P}_i(x)]]\ ]$

at-least'

$\equiv \lambda\langle \boldsymbol{P},\boldsymbol{A}\rangle\ \lambda i\ \lambda x\ (\exists Q)\ [Q_i(x)\ \&\ \boldsymbol{A}(\langle \boldsymbol{P},Q\rangle)])$

at-least-three-papers'

= **at-least**'(<**three$_F$-papers**',**three$_F$-papers^a**>))

$\equiv$ $\lambda\langle \boldsymbol{P},\boldsymbol{A}\rangle\ \lambda i\ \lambda x\ (\exists Q)\ [Q_i(x)\ \&\ \boldsymbol{A}(\langle \boldsymbol{P},Q\rangle)])$

$\langle\lambda x\ [\mathbf{3}(x)\ \&\ \mathbf{P}_i(x)],$

$\lambda\langle P,Q\rangle\ (\exists n,m)\ [n\leq m\ \&\ P = [\lambda i\ \lambda x\ [n(x)\ \&\ \mathbf{P}_i(x)]]\ \&$

$Q = [\lambda i\ \lambda x\ [n(x)\ \&\ \mathbf{P}_i(x)]]\ ]\ \rangle)\rangle$

$\equiv$ $\lambda i\ \lambda x\ (\exists Q)\ [Q_i(x)\ \&\ (\exists n,m)\ [\ n\leq m\ \&\ \underline{\lambda x\ [\mathbf{3}(x)\ \&\ \mathbf{P}_i(x)] =}$

$\underline{[\lambda x\ [n(x)\ \&\ \mathbf{P}_i(x)]]}\ \&\ Q = [\lambda i\lambda x\ [m(x)\ \&\ \mathbf{P}_i(x)]]\ ]\ \rangle)])$ $\underline{\equiv n = 3\mathbf{!}}$

$\equiv$ $\lambda i\ \lambda x\ (\exists Q)\ [Q_i(x)\ \&\ (\exists m)\ [\mathbf{3}\leq m\ \&\ Q = [\lambda i\lambda x\ [m(x)\ \&\ \mathbf{P}_i(x)]]\ ]\ \rangle)])$

$\equiv$ $\lambda i\ \lambda x\ (\exists m)\ [\mathbf{3}\leq m\ \&\ m(x)\ \&\ \mathbf{P}_i(x)]]\ ]$

read'

= $\lambda P\ \lambda x(\exists y)\ [P_i(y)\ \&\ \mathbf{R}_i(x,y)]$

read-at-least three-papers'

= **read**'(**at-least three-papers**')

$\equiv$ $\lambda P\ \lambda x(\exists y)\ [P_i(y)\ \&\ \mathbf{R}_i(x,y)]\ (\lambda i\ \lambda y\ (\exists m)\ [\mathbf{3}\leq m\ \&\ m(y)\ \&\ \mathbf{P}_i(y)]]\ ])$

$\equiv$ $\lambda x(\exists y)\ (\exists m)\ [\mathbf{3}\leq m\ \&\ m(y)\ \&\ \mathbf{P}_i(y)\ \&\ \mathbf{R}_i(x,y)]$

every-student'

$\equiv$ $\lambda Q\ (\forall x)\ [\mathbf{S}_i(x)\rightarrow Q(x)]$

every-student-read-at-least three-papers'

= **every-student**'(**read-at-least three-papers**')

$\equiv$ $\lambda Q\ (\forall x)\ [\mathbf{S}_i(x)\rightarrow Q(x)]$

$(\lambda x(\exists y)\ (\exists m)\ [\mathbf{3}\leq m\ \&\ m(y)\ \&\ \mathbf{P}_i(y)\ \&\ \mathbf{R}_i(x,y)])$

$\equiv$ $(\forall x)\ [\mathbf{S}_i(x)\rightarrow(\exists y)\ (\exists m)\ [\mathbf{3}\leq m\ \&\ m(y)\ \&\ \mathbf{P}_i(y)\ \&\ \mathbf{R}_i(x,y)$

(5) **not**'(**date**'(**few-girls**'))(**Bill**')

$\equiv$ $[\lambda X\ \lambda x\ \neg X(x)]$

$(\lambda P\ \lambda x(\exists y)\ [P_i(y)\ \&\ \mathbf{D}_i(x,y)]\ (\lambda i\lambda y\ [\mathbf{FEW}(y)\ \&\ \mathbf{G}_i(y)])\ (\mathbf{b}))$

$\equiv$ $\neg\ (\exists y)\ [\mathbf{FEW}(y)\ \&\ \mathbf{G}_i(y)\ \&\ \mathbf{D}_i(\mathbf{b},y)]$

<u>Problem</u>

(7) **Marta is looking for at least five toys.** p. 45

i. "Marta is looking for toys, namely at least five.

ii. #"There are at least five toys such that Marta is looking for them." ???

(8) **John needs few assistents.** p. 45

i. "John needs assistents, in fact he needs few of them."

ii. #"There are few assistents such that John needs them." ???

3 Opaque verbs

3.1 Failure of substitutivity (S) and existential generalization (EG) Quine (1960)

(S) $\left.\begin{array}{l}\mathbf{T}_i(x,\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_i(x,y)]) \\ P_i = Q_i\end{array}\right\} \neq> \mathbf{T}_i(x,\lambda j\ (\exists y)\ [Q_j(y)\ \&\ \mathbf{F}_i(x,y)])$

(EG) $\mathbf{T}_i(x,\lambda j\ (\exists y)\ [P_j(y)\ \&\ \mathbf{F}_j(x,y)]) \neq> (\exists y)\ P_i(y)$
– due to *intensionality* of **T**.

Hence (?) opacity requires lexical decomposition.

(9) **John resembles a unicorn.**
(10) **John resembles a mythological animal with one horn.**
(11) **John is looking for a unicorn.**
(12) **John is looking for a mythological animal with one horn.**

resemble' = $[\ \lambda P\ \lambda x\ (\exists Q)\ [Q_i(x)\ \&\ Q \supseteq P]$

´$Q \supseteq P$' = 'P is among the prototypical properties of the individuals that are Q'

(13) **Bill and John resemble two doctors.** Moltmann (1997)
odd redundancy

3.2 Negation

(14) **John needs to have no assistent.**
need'(**not**'(**have**'(**an-assistent**'))) (**John**')

$\equiv\ [\ \lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ P_j(x))\ ]$ VP negation (intensional)

$(\ \underline{[\lambda P\ \ \lambda j\ \lambda x\ \neg\ P_j(x)]}\ (\lambda P\ \lambda j\ \lambda x(\exists y)\ [P_j(y)\ \&\ \mathbf{H}_j(x,y)]\ (\mathbf{A})\ )\ )\ (\mathbf{j})$

$\equiv\ [\ \lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ P_j(x))\ ]\ (\lambda j\ \lambda x\ \neg\ (\exists y)\ [\mathbf{A}_j(y)\ \&\ \mathbf{H}_j(x,y)]\ )\ (\mathbf{j})$

$\equiv\ \lambda x\ \mathbf{M}_i(\lambda j\ \neg\ (\exists y)\ [\mathbf{A}_j(y)\ \&\ \mathbf{H}_j(x,y)]\ )\ (\mathbf{j})$

$\equiv\ \mathbf{M}_i(\lambda j\ \neg\ (\exists y)\ [\mathbf{A}_j(y)\ \&\ \mathbf{H}_j(\mathbf{j},y)]\ )$

(15) **John needs no assistent.**
not'(**need**'(**an-assistent**'))(**John**')

$\equiv\ \underline{[\lambda X\ \lambda x\ \neg\ X(x)]}\ (\ [\lambda P\ \lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ P_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ )\ ]\ (\mathbf{A}))\ (\mathbf{j})$

VP negation (extensional)

$\equiv\ [\lambda X\ \lambda x\ \neg\ X(x)]\ (\lambda x\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ \mathbf{A}_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ ))\ (\mathbf{j})$

$\equiv\ [\lambda x\ \neg\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ \mathbf{A}_j(y)\ \&\ \mathbf{H}_j(x,y)\ ]\ )\ ]\ (\mathbf{j})$

$\equiv\ \neg\ \mathbf{M}_i(\lambda j\ (\exists y)\ [\ \mathbf{A}_j(y)\ \&\ \mathbf{H}_j(\mathbf{j},y)\ ]\ )$

Problem

… to block:

[$\underline{y}$: $\underline{\mathbf{A}_i(y)}$ & **not**'(**need**"($\underline{y}$))(**j**)] wide scope indefinite

≡ [y: $\mathbf{A}_i(y)$ & $[\lambda X\, \lambda x\, \neg X(x)]$ $([\lambda y\, \lambda x \mathbf{M}_i(\lambda j\, \mathbf{H}_j(x,y))]\,(y)\,)\,(\mathbf{j})$]

≡ [y: $\mathbf{A}_i(y)$ & $\neg\, \mathbf{M}_i(\lambda j\, \mathbf{H}_j(\mathbf{x},y))$]

4 Kind readings of bare plurals

(16) **A dog is here and a dog is not here.**

i. $[\,[\lambda P\,(\exists y)\,P_i(y)\,\&\,\mathbf{H}_i(y)]\,(\mathbf{D})\,\&\,[\lambda \boldsymbol{P}\ \ \lambda P\,\neg \boldsymbol{P}(P)]\,(\lambda P\,(\exists y)\,[P_i(y)\,\&\,\mathbf{H}_i(y)])\,(\mathbf{D})\,]$

by generalization

≡ $(\exists y)\,[\mathbf{D}_i(y)\,\&\,\mathbf{H}_i(x)]\,\&\,\neg\,(\exists y)\,[\mathbf{D}_i(y)\,\&\,\mathbf{H}_i(x)]$ contradiction

ii. [x,$\underline{y}$: $\mathbf{D}_i(x)$ & $\underline{\mathbf{D}_i(y)}$ & $\mathbf{H}_i(x)$ & **¬** $\mathbf{H}_i(y)$] wide scope indefinite

(17) **Dogs are here and dogs are not here.**

i. $[\,[\lambda P\,(\exists y)\,P_i(y)]\,(\mathbf{D})\,\&\,[\lambda \boldsymbol{P}\ \ \lambda P\,\neg \boldsymbol{P}(P)]\,(\lambda P\,(\exists y)\,[P_i(y)\,\&\,\mathbf{H}_i(x)])\,(\mathbf{D})\,]$

property reading

≡ $(\exists y)\,[\mathbf{D}_i(y)\,\&\,\mathbf{H}_i(x)]\,\&\,\neg\,(\exists y)\,[\mathbf{D}_i(y)\,\&\,\mathbf{H}_i(x)]$ contradiction

ii. $[\lambda x \mathbf{H}_i(x)]\,(\mathbf{d})\,\&\ \ [\lambda X \lambda x\,\neg X(x)]\,(\lambda x \mathbf{H}_i(x))\,(\mathbf{d})$ kind reading

≡ $[\mathbf{H}_i(\mathbf{d})\,\&\,\neg\,\mathbf{H}_i(\mathbf{d})]$ contradiction

(18) **Dogs are nice.**

NOT: (GEN i,x) ($\mathbf{D}_i(x)$; $\mathbf{N}_i(x)$) 'Bare plurals don't introduce variables'

[≡ GEN(**D**,**N**) !]

BUT: $\mathbf{N}_i(\mathbf{b})$ Carlson (1977)

(19) **Otto wollte <u>Tollkirschen</u> in den Obstsalat tun, weil er <u>sie</u> mit richtigen Kirschen verwechselte.**
Otto wanted to put <u>belladonna berries</u> into the fruit salad, because he mistook <u>them</u> for [real] cherries.

$(\exists y)\,[\,\mathbf{T}_i(y)\,\&\,\mathbf{W}_i(\mathbf{o},\lambda j\ \ \mathbf{P}_j(\mathbf{o},y))\,\&\,\mathbf{V}_i(\mathbf{o},y,\mathbf{C}))]$

A. Kratzer, 'Die Analyse des bloßen Plurals bei Gregory Carlson', *Linguistische Berichte* **70**(1980),47–50

<u>Res est qualitas</u> + <u>E-type</u> analysis

$[[\underline{\lambda P}\ \ \mathbf{W}_i(\mathbf{o},\lambda j\ \ (\exists y)\,[\,P_i(y)\,\&\,\mathbf{P}_j(\mathbf{o},y)]])]\,(\underline{\mathbf{T}})\,\&$

$\mathbf{V}_i(\mathbf{o},\underline{\underline{(\iota P)\mathbf{W}_i(\mathbf{o},\lambda j\ \ (\exists y)\,[\,P_i(y)\,\&\,\mathbf{P}_j(\mathbf{o},y)])}},\,\mathbf{C})]$

why the kind variant? (cf. p. 42, (94))

or, rather:

$[\,(\exists N)\,[\mathbf{VN}_i(N,\mathbf{T},\mathbf{o})\,\&\,\mathbf{W}_i(\mathbf{o},\lambda j\ \ (\exists y)\,[\,N_i(y)\,\&\,\mathbf{P}_j(\mathbf{o},y))]\,\&\,\ldots$ cf. Zimmermann (ms.)

The Clausal Analysis of Opacity

R. Larson, M. den Dikken, P. Ludlow: 'Intensional Transitive Verbs and Abstract Clausal Complementation'. Ms.

1 Clausal Analysis: Basic Idea

(The rest is syntax)

(1) **Mary wants a cracker.**
Mary wants [FOR PRO TO HAVE a cracker]
Mary wants-FOR-HAVE PRO a cracker — restructuring
Mary [$_{AgroP}$ a cracker wants-FOR-HAVE PRO t] — scope ambiguity (by reconstruction)

(2) **Mary wants to have a cracker.**
Mary wants [FOR PRO to have a cracker] — no restructuring

(3) **Mary hopes for a cracker.**
Mary hopes [for PRO TO HAVE a cracker]

(4) **Mary seeks a cracker.**
Mary seeks [FOR PRO TO FIND a cracker]

(5) **Mary seeks to find a cracker.**
Mary seeks [FOR PRO find a cracker] — no restructuring

(6) **Max imagined a new car.**
Max imagined [a new car P] — small clause with 'hidden' stage level predicate *P*

<u>Lexical Assumptions</u>

$[\![\mathbf{have}]\!] = [\![\mathit{HAVE}]\!]$, $[\![\mathbf{find}]\!] = [\![\mathit{FIND}]\!]$, $[\![\mathbf{seek}]\!] \approx [\![\mathbf{try}]\!]$ (and, of course, $[\![\mathbf{for}]\!] = [\![\mathit{FOR}]\!] = [\![\lambda x\, x]\!]$)

2 Evidence for a clausal analysis

- *Selectional restrictions and 'disjointness effects'*
  J.R. Ross, 'To Have Have and to Not Have Have', in: M. Jazayery *et al.* (eds.), *Linguistic and Literary Studies in Honor of Archibald Hill.* Lisse 1976, 263–70.

(7) **I** $\left\{\begin{matrix}\textbf{want}\\ \textbf{have}\end{matrix}\right\}$ $\left\{\begin{matrix}\textbf{a cold}\\ \textbf{a sister}\\ \textbf{freedom}\\ \textbf{a driveway}\end{matrix}\right\}$**.**

(7') #**I** $\left\{\begin{matrix}\textbf{want}\\ \textbf{have}\end{matrix}\right\}$ **sentencehood.**

(8) **You** $\left\{\begin{matrix}\textbf{want}\\ \textbf{have}\end{matrix}\right\}$ **my sympathy.**

(8') #**You** $\left\{\begin{matrix}\textbf{want}\\ \textbf{have}\end{matrix}\right\}$ **your sympathy.**

<u>Comment:</u> These effects should follow from a decomposition of **want** in terms of **want** and **have** plus a *semantic* account of selectional restrictions and 'disjointness'.

• *Adverbial Modification*

(9) **Max will need to have a bicycle tomorrow.** ambiguous (?)

(10) **Max will need a bicycle tomorrow.** ambiguous (?)

(11) **A week ago Bill wanted your car yesterday.**
J. McCawley, ‘On Identifying the Remains of Deceased Clauses‘, *Language Researc* 3.2 (1974), 73-85.

(12) **A week ago Bill needed your car yesterday.**
(13) **Walter was looking for a camera before the meeting.** unambiguous
(14) **Walter was looking to find a camera before the meeting.** ambiguous
B. Partee, ‘Opacity and Scope‘, in M. Munitz, P. Unger (eds.), *Semantics and Philosophy*. New York 1974.

• *Ellipsis*

(15) **Do you want another sausage?**
I can’t ~~have another sausage~~, I’m on a diet.

(16) **Jonathan wants to have more toys than Benjamin.**

⇔ **Jonathan wants to have more toys than Benjamin ~~has~~.**

(17) **Do you need your glasses?**
Actually, I don’t ~~need my glasses~~. ≠ **I don't ~~have my glasses~~**
(18) **Jonathan needs more toys than Benjamin.**
⇔ **Jonathan needs more toys than Benjamin ~~needs~~.**
(19) **Bush needs more votes than Gore.** (Roger Schwarzschild, p.c.)

(20) **Are you looking for your glasses?**
I can’t ~~look for my glasses~~, my eyes are too bad. ≠ **I can’t ~~find my glasses~~**
(21) **Jonathan was looking for more toys than Benjamin.**
⇔ **Jonathan was looking for more toys than Benjamin ~~is looking for~~.**
≠ **Jonathan was trying to find more toys than Benjamin ~~found~~**

• *Propositional Anaphora*

(22) **Joe wants some horses but his mother won’t allow it.**

⇔ **Joe wants** [*FOR PRO HAVE* **some horses**]$_p$ **but his mother won’t allow it**$_p$**.**

(23) **Joe needs some horses but his mother won’t allow it.**
?⇔ **Joe needs** [*FOR PRO HAVE* **some horses**]$_p$ **but his mother won’t allow it**$_p$**.**
(24) **Joe is looking for some horses but his mother won’t allow it.**
?⇔ **Joe is looking** [*FOR PRO FIND* **some horses**]$_p$ **but his mother won’t allow it**$_p$**.**

3 Counterevidence explained away

• *Complex determiners*

(25) **Max needed no bananas.**

Analysis inspired by E. Klima, 'Negation in English'. In J. Fodor, J. Katz (eds.), *The Structure of Language*. Englewood Cliffs, NJ, 1964

no bananas = NEG + **bananas**,
where *NEG* takes scope over the smallest sentence containing it :

Max needed [FOR PRO TO HAVE NEG bananas]
Mary needed-FOR-HAVE PRO NEG bananas restructuring
Mary [$_{AgroP}$ NEG bananas wants-FOR-HAVE PRO t] raising to SpecAgro
NEG Mary [$_{AgroP}$ bananas wants-FOR-HAVE PRO t$_{NEG\ bananas}$] scope ambiguity

Roger's example:

(26) **In order to win you need [to have] no cards.** ambiguous???

Further predictions:

(27) **Max didn't need any bananas.** upstairs negation only
(28) **Max needed to have no bananas.** downstairs negation only
(29) **Max needed not to have any bananas.** downstairs negation only
(30) **Max didn't need to have any bananas.** upstairs negation only

(31) **Max needs at most five bananas.**

Analysis

at most five bananas = **at most** + **five bananas** …where **at most** must take narrow scope
Then proceed as above.

(32) **Max needs to have at most five bananas.** scope ambiguity by QR?

• De re *preference*

(33) **Alain is trying to find each comic book.**	ambiguous	ambiguous
(34) **Alain is seeking each comic book.**	unambiguous	ambiguous
… according to:	Zimmermann (1993)	La,dD & Lu

 '[…] the correct idealization of the data is that full clausal complementation structures show both *de dicto* and *de re* readings, but with intensional transitives a matrix […] construal is more accessible […]. On our analysis this difference finds a natural analog in the distinction between (79a) and (79b):

(79) a. Some juror believes every defendant is guilty.
b. Some juror believes every defendant to be guilty. ' (La,dD & Lu, p. 25)

(35) **Alain is seeking a comic book.** *de re* preferred?

- *Comparison and pseudo-intensionality*

(36) **Tom's horse resembles a unicorn.** Zimmermann (1993)

(37) **Arnim compares himself to a pig.** -"-

(38) **Hercule Poirot was as smart as Sherlock Holmes.**

⇔ H.P.'s height exceeded S.H.'s height.

(39) **Seymour resembles Max.**

⇔ S.'s (relevant) properties are M.'s (relevant) properties.

(40) **Seymour resembles twin-Max.**

⇔ S.'s (relevant) properties are M.'s (relevant) properties.

For any adjective A:

(41) $\textbf{Seymour is} \left\{ \begin{array}{c} \textbf{as } \mathrm{A} \textbf{ as} \\ \textbf{more } \mathrm{A} \textbf{ than} \\ \textbf{less } \mathrm{A} \textbf{ than} \end{array} \right\} \textbf{Max.}$

⇔ $\textbf{Seymour is} \left\{ \begin{array}{c} \textbf{as } \mathrm{A} \textbf{ as} \\ \textbf{more } \mathrm{A} \textbf{ than} \\ \textbf{less } \mathrm{A} \textbf{ than} \end{array} \right\} \textbf{twin-Max.}$ … though not for A = **famous**!

 '[…] comparative constructions allow truth with nondenoting terms because they involve standing in relation to something coarser-grained than referents. What appears to [be] true with comparatives is that terms contribute sets of properties.'

(La, dD, & Lu, p. 33)

Implementation

1st try:

x ⟦**as tall as**⟧ y

$\{P \mid P$ is a heigt and x has $P\} = \{P \mid P$ is a heigt and x has $P\}$ }

To be sure: ⟦**Max**⟧ = Max

– but then: ⟦**Hercule Poirot**⟧ = ???

So maybe (*2nd try*):

⟦**Max**⟧ = $\{P \mid$ Max has $P\}$

⟦**Hercule Poirot**⟧ = $\{P \mid$ according to the story, H.P. has $P\}$

A ⟦**as tall as**⟧ B ⇔

$\{P \mid P$ is a height and $P \in A\} = \{P \mid P$ is a height and $P \in B\}$

A ⟦**resembles**⟧ B ⇔

$\{P \mid P$ is relevant and $P \in A\} = \{P \mid P$ is relevant and $P \in B\}$

– but then:

⟦**Tom's horse resembles a unicorn**⟧ is true

⇔ ⟦(**a unicorn**: x)**Tom's horse resembles** x⟧ is true

⇔ for some unicorn u: $\{P \mid P$ is relevant and Tom' s horse has $P\} = \{P \mid P$ is relevant and u has $P\}$

i.e.: the specific reading.

To get the unspecific reading, we could try (2 ½):

⟦**a unicorn**⟧ = $\{P \mid$ some unicorn has $P\}$ … = $\{P \mid$ some married Catholic priest has $P\}$

So seem to need intensionality after all.

Free Choice Disjunction

1 The Problem

(1) You may take an apple or take a pear.

(1') e$(a \vee p)$

(2) You may take an apple.

(2') e a

(3) You may take a pear.

(3') e p

<u>Deontic Logic D</u> (in the language of propositional logic plus 'u'; e A = ¬ u ¬ A)

Axioms

$\vdash_D$ A (PL)

where A is an instance of a propositional tautology (e.g. 'u B $\leftrightarrow$ ¬ ¬ u B')

$\vdash_D$ (e (A $\vee$ B) $\rightarrow$ e A) (FC)

where A and B are arbitrary formulae

Deduction Rules

$\vdash_D$ (A $\rightarrow$ B) & $\vdash_D$ A $\Rightarrow$ $\vdash_D$ B (MP)

$\vdash_D$ (A $\leftrightarrow$ B) $\Rightarrow$ $\vdash_D$ (u A $\leftrightarrow$ u B) (Sub)

Let G be something good and let E be something evil; then:

1. $\vdash_D$ (¬ u ¬ (¬ G $\vee$ ¬ E) $\rightarrow$ ¬ u ¬ ¬ G) FC
2. $\vdash_D$ ((¬ u ¬ (¬ G $\vee$ ¬ E) $\rightarrow$ ¬ u ¬ ¬ G) $\rightarrow$ (u ¬ ¬ G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E))) PL: contraposition
3. $\vdash_D$ (u ¬ ¬ G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E)) MP(**2**,**1**)
4. $\vdash_D$ (¬ ¬ G $\leftrightarrow$ G) PL: double negation
5. $\vdash_D$ (u ¬ ¬ G $\leftrightarrow$ u G) Sub(**4**)
6. $\vdash_D$ ((u ¬ ¬ G $\leftrightarrow$ u G) $\rightarrow$ ((u ¬ ¬ G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E)) $\rightarrow$ (u G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E)))) PL
7. $\vdash_D$ ((u ¬ ¬ G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E)) $\rightarrow$ (u G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E))) MP(**6**,**5**)
8. $\vdash_D$ (u G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E)) MP(**7**,**3**)
9. $\vdash_D$ (¬ (¬ G $\vee$ ¬ E) $\leftrightarrow$ (G $\wedge$ E)) PL: de Morgan
10. $\vdash_D$ (u ¬ (¬ G $\vee$ ¬ E) $\leftrightarrow$ u (G $\wedge$ E)) Sub(**9**)
11. $\vdash_D$ ((u ¬ (¬ G $\vee$ ¬ E) $\leftrightarrow$ u (G $\wedge$ E)) $\rightarrow$ ((u G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E)) $\rightarrow$ (u G $\rightarrow$ u (G $\wedge$ E)))) PL
12. $\vdash_D$ ((u G $\rightarrow$ u ¬ (¬ G $\vee$ ¬ E)) $\rightarrow$ (u G $\rightarrow$ u (G $\wedge$ E))) MP(**11**,**10**)
13. $\vdash_D$ (u G $\rightarrow$ u (G $\wedge$ E)) MP(**12**,**8**)

<u>Conclusion:</u> (FC) cannot be a principle of deontic logic!

2 The Pragmatics of Permissions

Lewis (1975), Stalnaker (ms.)

$Poss_c = \{w \in W \mid w \textit{ is accessible from context world } w_c\}$
$Per_c = \{w \in W \mid \textit{addressee behaves in compliance with authority's demands in } c\}$
$c{+}\varphi$ = the context resulting after the athority 's utterance of φ in c

$$Per_{c+\mathbf{e}\,\varphi} = (Per_c \cup [\![\varphi]\!]) \cap Poss_c$$

<u>Example</u>

$[\![\mathrm{n^{th}}]\!] = \{w \in W \mid \textit{in } w\textit{, the addressee is on the } n^{th} \textit{ floor}\}$

$Poss_c = [\![\mathbf{1^{std}}]\!] \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!] \cup [\![\mathbf{4^{th}}]\!]$ $\boxed{[\![\mathbf{1^{st}}]\!]}\boxed{[\![\mathbf{2^{nd}}]\!]}\boxed{[\![\mathbf{3^{rd}}]\!]}\boxed{[\![\mathbf{4^{th}}]\!]}$

$Per_c = [\![\neg\mathbf{2^{nd}}]\!] \cap [\![\neg\mathbf{3^{rd}}]\!] \cap [\![\neg\mathbf{4^{th}}]\!]$ $\boxed{[\![\mathbf{1^{st}}]\!]}\boxed{}\boxed{}\boxed{}$

$Per_{c+\mathbf{e}\,\mathbf{2^{nd}}}$

$= \quad (Per_c \cup [\![\mathbf{2^{nd}}]\!]) \cap Poss_c$ $\boxed{[\![\mathbf{1^{st}}]\!]}\boxed{}\boxed{}\boxed{} \cup \boxed{}\boxed{[\![\mathbf{2^{nd}}]\!]}\boxed{}\boxed{}$

$= \quad (([\![\neg\mathbf{2^{nd}}]\!] \cap [\![\neg\mathbf{3^{rd}}]\!] \cap [\![\neg\mathbf{4^{th}}]\!]) \cup [\![\mathbf{2^{nd}}]\!]) \cap ([\![\mathbf{1^{std}}]\!] \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!] \cup [\![\mathbf{4^{th}}]\!])$

$= \quad [\![\neg\mathbf{3^{rd}}]\!] \cap [\![\neg\mathbf{4^{th}}]\!] \cap ([\![\mathbf{1^{std}}]\!] \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!] \cup [\![\mathbf{4^{th}}]\!])$

$= \quad [\![\neg\mathbf{3^{rd}}]\!] \cap [\![\neg\mathbf{4^{th}}]\!]$ $\boxed{[\![\mathbf{1^{st}}]\!]}\boxed{[\![\mathbf{2^{nd}}]\!]}\boxed{}\boxed{}$

$Per_{c+\mathbf{e}\,(\mathbf{2^{nd}} \vee \mathbf{3^{rd}})} =$

$= \quad (Per_c \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!]) \cap Poss_c$ $\boxed{[\![\mathbf{1^{st}}]\!]}\boxed{}\boxed{}\boxed{} \cup \boxed{}\boxed{[\![\mathbf{2^{nd}}]\!]}\boxed{}\boxed{} \cup \boxed{}\boxed{}\boxed{[\![\mathbf{3^{rd}}]\!]}\boxed{}$

$= \quad (([\![\neg\mathbf{2^{nd}}]\!] \cap [\![\neg\mathbf{3^{rd}}]\!] \cap [\![\neg\mathbf{4^{th}}]\!]) \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!]) \cap ([\![\mathbf{1^{std}}]\!] \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!] \cup [\![\mathbf{4^{th}}]\!])$

$= \quad ([\![\neg\mathbf{2^{nd}}]\!] \cap [\![\neg\mathbf{3^{rd}}]\!] \cap [\![\neg\mathbf{4^{th}}]\!]) \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!]$

$= \quad [\![\neg\mathbf{4^{th}}]\!] \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!]$

$= \quad [\![\mathbf{1st}]\!] \cup [\![\mathbf{2^{nd}}]\!] \cup [\![\mathbf{3^{rd}}]\!]$ $\boxed{[\![\mathbf{1^{st}}]\!]}\boxed{[\![\mathbf{2^{nd}}]\!]}\boxed{[\![\mathbf{3^{rd}}]\!]}\boxed{}$

<u>Counterexample</u>

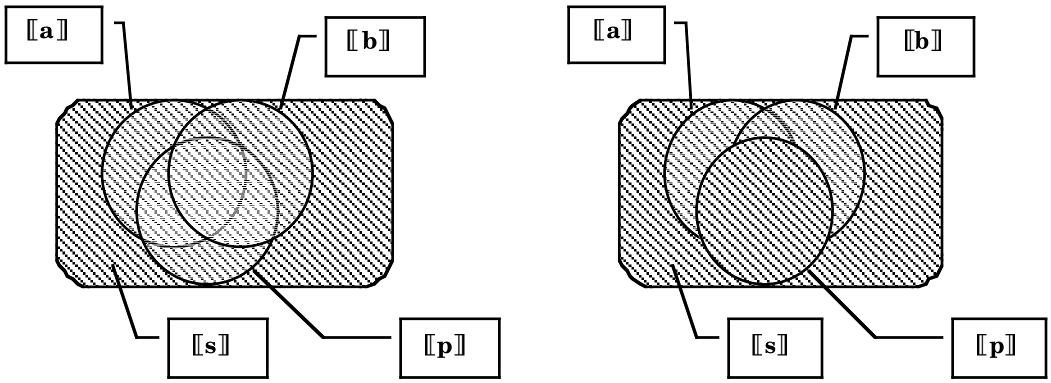
$[\![\mathbf{a}]\!] = \{w \in W \mid \textit{addressee takes an apple in } w\}$
$[\![\mathbf{b}]\!] = \{w \in W \mid \textit{addressee takes a banana in } w\}$
$[\![\mathbf{p}]\!] = \{w \in W \mid \textit{addressee takes a pear in } w\}$
$[\![\mathbf{s}]\!] = \{w \in W \mid \textit{addressee is starving in } w\}$
$Poss_c = [\![\mathbf{a}]\!] \cup [\![\mathbf{b}]\!] \cup [\![\mathbf{p}]\!] \cup [\![\mathbf{s}]\!]$
$Per_c = [\![\neg\mathbf{a}]\!] \cap [\![\neg\mathbf{b}]\!] \cap [\![\neg\mathbf{p}]\!]$
$Per_{c+\mathbf{e}\,\mathbf{p}}$

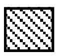
$= \quad (Per_c \cup [\![\mathbf{p}]\!]) \cap Poss_c$

$= \quad (([\![\neg\mathbf{a}]\!] \cap [\![\neg\mathbf{b}]\!] \cap [\![\neg\mathbf{p}]\!]) \cup [\![\mathbf{p}]\!]) \cap ([\![\mathbf{a}]\!] \cup [\![\mathbf{b}]\!] \cup [\![\mathbf{p}]\!] \cup [\![\mathbf{s}]\!])$

$= \quad ([\![\neg\mathbf{a}]\!] \cap [\![\neg\mathbf{b}]\!]) \boxed{\cup [\![\mathbf{p}]\!]} \cap ([\![\mathbf{a}]\!] \cup [\![\mathbf{b}]\!] \cup [\![\mathbf{p}]\!] \cup [\![\mathbf{s}]\!])$ $[= [\![\mathbf{p}]\!] \cup [\![\mathbf{s}]\!]\ ]$

Before [= *c*]…

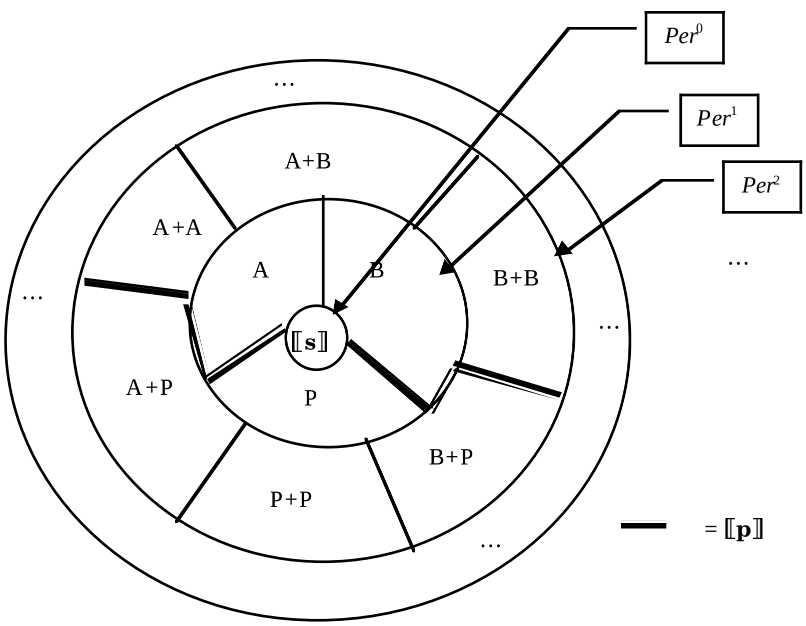


 = *Per*

… after [= c + **e p**]

⚠ *In particular, the addressee is invited to have (a) an apple and (b) a banana – provided that (s)he takes (p) a pear!*

Solution: Spheres



Degrees of irreproachability

$Per_c = (Per_c^n)_{n \in \omega}$ (slightly simplifying)

$Per^0_{c + e\,\varphi} = (Per^0_c \cup (⟦\varphi⟧ \cap Per^1_c)) \cap Poss_c$? (first guess)

No:
φ = *You take exactly two pears* $\Rightarrow [\![\varphi]\!] \cap Per_c^1 = \varnothing$!

Hence:
$Per^0_{c\,+\,\mathrm{e}\,\varphi} = (Per_c^0 \cup ([\![\varphi]\!] \cap Per_c^{[c,\varphi]})) \cap Poss_c$, where $[c,\varphi] = min\{n \,|\, Per_c^n \cap [\![\varphi]\!] \neq \varnothing\}$

[Aside: How about *You may take an apple and a banana*?]

Asymmetry problem:
φ = *You take an apple*
ψ = *You take two bananas*
$Per^0_{c\,+\,\mathrm{e}(\varphi\vee\psi)}$
= $(Per_c^0 \cup ([\![\varphi\vee\psi]\!] \cap Per_c^{[c,\varphi\vee\psi]})) \cap Poss_c$
= $(Per_c^0 \cup ([\![\varphi\vee\psi]\!] \cap Per_c^{1})) \cap Poss_c$ $\quad Per_c^{[c,\varphi\vee\psi]} = Per_c^{[c,\varphi]} = 1$!
= $(Per_c^0 \cup ([\![\varphi]\!] \cap Per_c^{1})) \cap Poss_c$ $\quad [\![\varphi\vee\psi]\!] \cap Per_c^1 = [\![\varphi]\!] \cap Per_c^1$!
… which is disjoint from $[\![\psi]\!]$!

3 Solutions

3.1 Rescoping

You may take an apple or ~~you~~ ~~may take~~ a banana. *wide disjunction*

$Per^0_{c\,+\,\mathrm{e}\varphi\,\mathbf{or}\,\mathrm{e}\psi}$
= $Per^0_{c\,+\,\mathrm{e}\psi} \cup Per^0_{c\,+\,\mathrm{e}\psi}$ *speech act disjunction*
= $((Per_c^0 \cup ([\![\varphi]\!] \cap Per_c^{[c,\varphi]})) \cap Poss_c) \cup ((Per_c^0 \cup ([\![\psi]\!] \cap Per_c^{[c,\psi]})) \cap Poss_c)$

PRO *Rescoping*
- In general $[c,\varphi] \neq [c,\psi]$, which solves the asymmetry problem.
- Though **or** does not combine the propositions expressed by the disjuncts, it is still propositional disjunction, i.e. it denotes (or a type-shifted variant of) the union operation over sets of worlds.

CONTRA *Rescoping*
- Syntactically implausible (?)
- Explicit wide scope disjunctions do not produce the choice effect so easily.

  … but they do
- Semantics cannot be separated from pragmatics; in particular, pragmatics becomes recursive: in assertoric uses of free choice sentences (permission reports).

  $[\![\mathrm{e}\ \varphi]\!]^c = \{w \in W \,|\, (\exists c')\ [w_{c'} = w\ \&\ Per^0_{c'+\mathrm{e}\varphi} \subseteq Per^0_c]\}$.

  This would also be fed into the interpretation of embedded permission reports:
  Usually, you may only take an apple. So, if you may take an apple or take a pear, you should bloody well be pleased.

3.2 Brute Force

cf. Karttunen (1977)

$$[\![\textbf{MAY}\ (\varphi\ \textbf{OR}\ \psi)]\!]^c = \{w \in W \mid (\exists c')\ [w_{c'} = w\ \&\ ([\![\varphi]\!] \cap Per^0_c) \neq \emptyset \neq ([\![\psi]\!] \cap Per^0_c)]\}$$

PRO *Brute Force*

- No mixing of pragmatics and semantics.
- Choice effect preserved under embedding.

CONTRA *Brute Force*

- Non-compositional: bracketing is ok, but irrelevant; neither **MAY** nor **OR** have their ordinary meanings.
- One would still predict a non-choice reading obtained by compositionally combining **may** and **or**.
- Does not carry over to epistemic choice (= **or** ≈ **and**) effects, as in:
  We may go to France or stay put next summer.

3.3 Grice

$$[\![\mathsf{e}\ \varphi]\!]^c = \{w \in W \mid (\exists c')\ [w_{c'} = w\ \&\ [\![\varphi]\!]^c \cap Per^0_c \neq \emptyset]\}$$

Deriving choice effect as a conversational implicature:

Performative use

… as special case of assertoric use ('Saying so makes it so'):

> Assume that *A* has authority over *B* and that this fact is common knowledge shared between *A* and *B*. Then *B* may be expected to react to *A*'s utterance: 'You make take an apple' with the reflection: 'It is up to *A* whether I may take an apple or not. Therefore he knows what he says is true or false. It may be assumed moreover that he is not saying what he knows to be false, as this would go against established principles of conversational propriety. So I may conclude that I have the permission to take an apple. (Kamp 1978, 275)

… in the case of an utterance of (1), *A* may reason as follows:

> 'There must be a reason why *A* used [(1)] rather than e.g. [(2)] or [(3)]. His use of [(1)] cannot but signify that while he allows me to satisfy [**take an apple or take a pear**] he has left it undecided which of these disjuncts I shall satisfy; for if he had decided this matter he could have used – and conversational propriety would in that case have demanded that he use– the simpler [(2)] or [(3)]. That he has left the question regarding which disjunct I shall satisfy undecided could have one of two reasons; it is either that he isn't yet in a position to make this decision (e.g. because he doesn't yet possess all the relevant information); or else it is because he doesn't really care.' (Kamp 1978, 278)

PRO *Grice*

- No mixing of pragmatics and semantics.
- No ambiguity.

CONTRA *Grice*

- Free choice effect in embedded permission sentences can only be obtained by assuming a frozen implicature.

References

Kamp, Hans: 'Free Choice Permission'. *Proceedings of the Aristotelean Society, N.S.* **74** (1973), 57–74.

- : 'Semantics versus Pragmatics'. In: F. Guenthner, S. J. Schmidt (eds.): *Formal Semantics and Pragmatics for Natural Languages*. Dordrecht 1978, pp. 255–287.

Karttunen, Lauri: 'Syntax and Semantics of Questions'. *Linguistics and Philosophy* **1** (1977), 3–44.

Lewis, David: 'A problem about permission'. In: E. Saarinen *et al.* (eds.), *Essays in Honour of Jaakko Hintikka*. Dordrecht 1975.

Stalnaker, Robert (ms.): 'Comments on Lewis's problem about permission'.