Semantic Values and Model-Theoretic ‘Semantics’

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3. No reference: closure under arbitrary isomorphisms

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5. Conclusion

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A model-theoretic account of a (given) natural language does not say what their expressions mean

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4. *Semantics: theory of reference*

Let e, t, s be the respective numbers 0, 1, 2. (The precise choice of these objects is unimportant; the only requirements are that they

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to objects of type τ) is in T. In connection with any sets E and I and any $\tau \in T$, we characterize $D_{\tau,E,I}$, or the set of *possible denotations of type* τ based on the set E of entities (or possible individuals) and the set I of possible worlds, as follows: $D_{e,E,I} = E$; $D_{t,E,I} = \{\Lambda, \{\Lambda\}\}$ (where Λ is as usual the empty set, and Λ, $\{\Lambda\}$ are identified with falsehood and truth respectively); if $\sigma, \tau \in T$, then $D_{\langle\sigma,\tau\rangle,E,I} = D_{\tau,E,I}{}^{D_{\sigma,E,I}}$ (where in general A^B is the set of functions with domain B and range included in A); if $\tau \in T$, then $D_{\langle s,\tau\rangle,E,I} = D_{\tau,E,I}{}^I$. If J is also a set, then $M_{\tau,E,I,J}$, or the set of possible *mean-*

[…]

$R\rangle$. A *type assignment* for L is a function σ from Δ into T such that $\sigma(\delta_0) = t$. A *Fregean interpretation* for L is an interpretation $\langle B, G_\gamma, f\rangle_{\gamma \in \Gamma}$ for L such that, for some nonempty sets E, I, J, and some type assignment σ for L, (1) $B \subseteq \bigcup_{\tau \in T} M_{\tau,E,I,J}$, (2) whenever $\delta \in \Delta$ and $\zeta \in X_\delta$, $f(\zeta) \in M_{\sigma(\delta),E,I,J}$, and (3) whenever $\langle F_\gamma, \langle\delta_\xi\rangle_{\xi<\beta}, \varepsilon\rangle \in S$ and $b_\xi \in M_{\sigma(\delta_\xi),E,I,J}$ for all $\xi < \beta$, then $G_\gamma(\langle b_\xi\rangle_{\xi<\beta}) \in M_{\sigma(\varepsilon),E,I,J}$. Here $I \times J$ is uniquely determined and is called the set of *points of reference* of the Fregean interpretation. By a *Fregean* […]

Montague, Richard: 'Universal Grammar'. *Theoria* **36** (1970), 373–398; pp. 378–380

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In particular …

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Compositional semantic theories specify the meanings of an expression by assigning a **semantic value** to it.

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Model-theoretic accounts don't assign (decent) semantic values.

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OBJECTION:
Not clear whether all expressions have (independent) communicative functions.

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SYNTHESIS

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EDUCATED answer: SYNTHESIS

Some values represent communicative functions, some don't, depending on their <u>interpretability</u>.

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- The GQ extension of *every* is likely to be uninterpretable.

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Uninterpretability may lead to serious restrictions in applying semantic theory.

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is closed under *arbitrary* (model-) isomorphisms.

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In particular, despite the section heading global extensions do not determine reference because the class of all (admissible) models – **Model Space** for short – is closed under *arbitrary* (model-) isomorphisms.

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Montague (1970: 380)

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Should this come out valid?
Maybe not: John and Bill could be the same person.

And indeed, it is safe to assume:

$[\![John]\!]^{M,i} = [\![Bill]\!]^{M,i}$

for at least some admissible models

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Only John likes Mary
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However, if names *N* are disambiguated by their bearers *b*
[as at least some semanticists have suggested],
then the inference should be valid on the reading:

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A straightforward disambiguation policy could take care of this:

- The referent of $N_x = x$.

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A straightforward disambiguation policy could take care of this:

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However, this strategy is inconsistent with model-theoretic interpretation, where the referent of a name cannot be determined from its global extension (and shifts with its local extensions).

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4. No content: Model Space vs. Logical Spaces

Closure under arbitrary isomorphisms also leads to problems with cross-linguistic comparison (as hinted at in K&K's intro):

Adapting a classical argument (by Heringer?) against structuralist phonology, it follows that no two languages can be distinguished if one results from the other by permuting (lexical) expressions of the same category (e.g., *cat* and *mouse*): the Model Spaces are the same!

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…like *entailment*:

$\langle$'thou art hungry', $\langle i, \langle$Smith, Jones$\rangle\rangle\rangle$.) The precise characterizations are the following. If $\langle \varphi, p\rangle$ and $\langle \psi, q\rangle$ are tokens in L, then $\langle \varphi, p\rangle$ *K-entails* $\langle \psi, q\rangle$ in L if and only if $\varphi, \psi \in DS_L$ and, for every Fregean interpretation $\mathcal{B}$ for L, if $\langle \mathcal{B}, p\rangle$ is in K and φ is a true sentence of L with respect to $\langle \mathcal{B}, p\rangle$, then $\langle \mathcal{B}, q\rangle$ is in K and ψ is a true sentence of L with respect to $\langle \mathcal{B}, q\rangle$. If $\varphi, \psi \in DS_L$, then the sentence *type* φ *K-entails* the sentence *type* ψ in L if and only if $\langle \varphi, p\rangle$ K-entails $\langle \psi, p\rangle$ for every ordered pair p. (It is clear

Montague (1970: 381f.)

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A sentence S_1 *locally entails* a sentence S_2 *according to* a model $M \in K$ iff S_2 is true [= has extension 1] at every point of reference (of M) at which S_1 is true:

- $(\forall i \in W_M)\ [\![S_1]\!]^{M,i} = 1 \Rightarrow [\![S_2]\!]^{M,i} = 1$

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A sentence S_1 *globally entails* a sentence S_2 iff S_1 locally entails S_2 according to every model $M \in K$:

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4. No content: Model Space vs. Logical Spaces

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An expression E_1 is *locally non-synonymous with* an expression E_2 *according to* a model $M \in K$ iff, at some point of reference (of M), the extension of E_1 does not coincide with the extension of E_2:

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In general, a local sense relation *R* is defined in terms of the set of all points of reference of a given model – its Logical Space – and the corresponding global relation *R** holds iff *R* holds according to every model.

Given the structuralist spirit of model-theoretic semantics, one would expect the global relations to be the ones that predict ‘observed’ sense relations

However, they don’t …

4. No content: Model Space vs. Logical Spaces

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The smallness of Model Space

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The smallness of Model Space

If Model Space is large enough, it will block many desirable global sense relations. As a case in point, unless the relevant counter-examples are not declared inadmissible (e.g., by means of *meaning postulates*), the entailment between

Everyone is married

and

Nobody is a bachelor

does not come out.

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Q: How small?

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Q: How small?
A [without argument]: Ideally so as to contain only one single ‘intended’ model and its isomorphic copies

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So Model Space has to be small enough for the global sense relations to come out right.

Q: How small?
A [without argument]: Ideally so as to contain only one single ‘intended’ model and its isomorphic copies

… in which case local and global relations coincide.

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The vastness of Logical Space(s)

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Despite the (intended) smallness of Model Space, Logical Space ought to be **vast** so as to allow for a maximum of variation among the possible combinations of extensions …

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Despite the (intended) smallness of Model Space, Logical Space ought to be **vast** so as to allow for a maximum of variation among the possible combinations of extensions …

… which is needed to get the global sense relations right: models with small Logical Spaces could be counter-examples to, say, the non-synonymy of *John loves Mary* and *Bill loves Mary*.

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No – the theory of Logical Space is a metaphysical background theory. Logical Space should be assumed to be given in all its vastness, ready to be made use of whenever needed

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Maybe, but then that theory is not model theory …

THANK YOU FOR YOUR ATTENTION