Kritikon Litterarum

Herausgeber: Robin Cooper, Kirby Farrell, Martin Franzbach, Gerhard Giesemann, Edward Jayne, Bernhard Ostendorf

3. Jahrgang 1974 Heft 1 Thesen Verlag Darmstadt

PHILOLOGIE ROMANE

Linguistique

XVI^e siècle

XVII^e siècle

LINGUISTICS

On Incorporating *any* into a Montague Grammar that
has been Extended to Existential Presuppositions [1]

By Roland R. Hausser
University of Texas, Dept. of Linguistics

The topic of this paper is the quantifier *any*. *Any* per se does not involve existential presuppositions. But it will turn out that a formal description of *any* is possible only if the presuppositional properties of other quantifiers are recognized and formally represented.

I will proceed in two steps: first I will propose a certain way of implementing existential presuppositions into Montague's 'Proper Treatment of Quantification in Ordinary English' - hence PTQ. And then I will present a formal treatment of *any* within the framework of an extended PTQ.

In PTQ sentences of English are translated into intensional logic and then interpreted with respect to possible worlds. Sentence

(1) John has found a unicorn.

for example, translates into

(1') $\bigvee x\,[\text{unicorn}'(x) \wedge H\ \text{find}'(^{\wedge}j, x)]$.

In order to interpret sentence (1) we have to explicitly define a possible world - say world *i*. Once we have done that, the truth definitions stated in the semantics of PTQ will tell us if sentence (1) is true with respect to world *i* or false with respect to world *i*.
Number (2) is an example of such a truth definition [2].

(2) If $\phi \in ME_t$ and u is a variable of type a then $[\bigvee u\phi]^{\mathfrak{A}, i, j, g}$ is 1 if and only if there exists $x \in D_{a, A, I, J}$ such that $\phi^{\alpha, i, j, g'}$ is 1, where g' is the $\mathfrak{A}$ - assignment like except for the possible difference that $g'(u)$ is x.

This truth condition means with respect to sentence (1): if there exists an individual in world *i* that is both a unicorn and something John has found, then sentence (1) is true in that world and false otherwise.

Now consider sentence

(3) John has found *the* unicorn.

Sentence (3) *presupposes* that there exists such a unicorn (while sentence (1) only entailed the existence of a unicorn). Sentence (3) translates in PTQ as

(3') $\bigvee x\,[\bigwedge y\,[\text{unicorn}'(y) \leftrightarrow y=x] \wedge H\ \text{find}'(^{\wedge}j, x)]$.

Translation (3') is subject to truth definition (2) in the same way as translation (1'). In other words, sentence (3) will be *false* with respect to a world where no unicorns exists. Thus the translation of *the unicorn* as well as the truth condition stated under (2) are defined in such a way in PTQ, that this particular existential presupposition in (3) is not reflected in the truthvalue-assignment.

What do we have to do to extend the semantics of PTQ in such a way that a failing existential presupposition leads to a truthvalueless sentence? We have to add a new truth condition for sentences containing definite noun phrases - like sentence (3). Since we want this new truthcondition to apply only to a sentence like (3) but not to a sentence like (1), the translations of sentence (3) and sentence (1) should differ in some principled way in order for the two different truth conditions to apply to the translations of the right sentences.

Our proposal to implement existential presuppositions into PTQ then is as follows:

Let us assume that the+noun and every+noun always induce existential presuppositions while a+noun and any+noun do not induce existential presuppositions. Now we change the translation rules of PTQ in such a way that the+noun and every+noun is translated by means of restricted quantification, but a+noun and any+noun is translated by the usual nonrestricted quantification.

The new translation rules are stated below

(4a) the ζ' translates as $\hat{P} \bigvee x \in \{y: \zeta'(y) \wedge \bigwedge z[\zeta'(z) \leftrightarrow z=y]\} [P\{x\}]$
which is abbreviated as $\hat{P} \bigvee x \in \{y: \zeta'(y)\}^1 [P\{x\}]$

(4b) every ζ' translates as $\hat{P} \bigwedge x \in \{y: \zeta'(y)\} [P\{x\}]$

(4c) a ζ' translates as $\hat{P} \bigvee x [\zeta'(x) \wedge P\{x\}]$

(4d) any ζ' translates as $\hat{P} \bigwedge x [\zeta'(x) \rightarrow P\{x\}]$

According to these new translations sentence (1) will still translate into (1') above, but sentence (3) will translate into

(3*) $\bigvee x \in \{y: unicorn'(y)\}^1 [find'(^\wedge j, x)]$

For this new type of translation we have to define a new truth condition. Consider

(5) If $\varphi, \psi \in ME_t$ and u, v are variables of type a, then $\bigvee u \in \{v: \psi\}$ $[\varphi]^{\alpha, i, j, g}$ has the truth definition (2) iff there is some $v \in D_{a, A, I, J}$ which satisfies $\psi^{\alpha, i, j, g}$ and truthvalueless otherwise. And similarly for $\bigwedge u \in \{v: \psi\} [\varphi]$.

According to this new truth condition the translation (3') will be truthvalueless with respect to a world where the set of unicorns is empty.

By translating the and every by means of restricted quantification we not only implement the right existential presuppositions, but we make room for a formal treatment of any.

The treatment of any has been a notorious problem - mainly because it takes different meanings in different environments and because its occurrence is quite restricted. But by translating any and the indefinite article in a different type of quantification (i.e. nonrestricted quantification) than all the other quantifiers we gain the advantage that we can make exclusive use of logical equivalences that would otherwise hold between all kinds of quantifier translations.

We want to show first that any+noun has all the intuitive properties of a nonspecific indefinite noun phrase. Thus

John didn't find any unicorn.

or

John is looking for any unicorn.

can be true even if there is no "unicorn John doesn't find" and no "unicorn John is looking for", respectively.

Furthermore, any never occurs in linguistic environments that exclude a nonspecific reading of a corresponding indefinite noun phrase. For example

(6) John has read a book on chinese cooking.

permits only a specific interpretation of the indefinite noun phrase. If we replace "a book on chinese cooking" in (6) by "any book on chinese cooking" the result is the ungrammatical

(6') * John has read any book on chinese cooking.

On the other hand, the sentences

(7) John has not read a book on chinese cooking.

(8) If John has read a book, Mary is surprised.

(9) John looks for a book on chinese cooking.
(1o) John tries to read a book on chinese cooking.

all permit a nonspecific interpretation. Replacing the indefinite article in (7 - 1o) by any results in the grammatical sentences

(7') John has not read any book on chinese cooking.
(8') If John has read any book, Mary is surprised.
(9') John looks for any book on chinese cooking.
(1o') John tries to read any book on chinese cooking.

Note, however, that even though
(11) Mary believes that John has read a book on chinese cooking.
permits a nonspecific reading of the indefinite noun phrase, most speakers reject
(11') * Mary believes that John has read any book on chinese cooking.

Another peculiarity of any are the different shades of meaning it takes in different environments. For example the any after negation and in the antecedent of a conditional is synonymous with the nonspecific reading of the indefinite article. Thus the nonspecific reading of (7) and (8) is synonymous with (7') and (8'), respectively.

Any in the scope of an intensional verb (i. e. look for) or in an infinitival complement, on the other hand, differs in meaning quite clearly from the nonspecific reading of the indefinite article. Compare in this respect the nonspecific readings of (9) and (1o) with (9') and (1o'), respectively.

Since any after negation and any in the antecedent of a conditional have the same meaning and since a conditional like $A \rightarrow B$ is logically equivalent to $\neg A \vee B$, let us call both, the any after negation and the any in the antecedent of a conditional, in general the negation-any.

The any after intensional verbs and in infinitival complements as well as the any arising with modals translate into an expression that will be within the scope of the intensional operator '^'. Let us therefore refer to this any in general as the intensional-any.

Since negation-any is synonymous with the nonspecific reading of the indefinite article we could give it the same translation as the indefinite article. Thus
(12) John didn't find a unicorn.
and
(13) John didn't find any unicorn.
would both translate as
(14) $\neg \bigvee u\,[\text{unicorn}_{*}{}'(u) \wedge \text{find}_{*}{}'(j, u)]$.
In order to incorporate negation-any, could we then simply add the translation rule (15)?
(15) any ζ translates as $\hat{P} \bigvee x\,[\zeta'(x) \wedge P\{x\}]$
Not unless we are able to state the restrictions on the occurrence of negation-any. Any should be translated according to (15) only if the sentence is negated or if the sentence constitutes the antecedent of a conditional. In case of negation we require furthermore, that it is wide scope negation like in (14). Narrow scope negation would render the specific reading of the indefinite article and in that case we couldn't optionally substitute any without changing the meaning.

How should we translate intensional-any? Compare the nonspecific reading of
(16) John is looking for a unicorn.
with

(17) John is looking for <u>any</u> unicorn.
It seems that <u>any</u> in (17) adds a touch of universality. The semantic difference between (16) and (17) can be captured if we translate (16) in the usual way as
(16a) look for' $(^\wedge j, \hat{P}\bigvee u[\text{unicorn}_*'(u) \wedge P\{^\wedge u\}])$.
but (17) as
(17') look for' $(^\wedge j, \hat{P}\bigwedge u[\text{unicorn}_*'(u) \rightarrow P\{^\wedge u\}])$.

According to Montague's original translations (17') represents the sentence

John is looking for <u>every</u> unicorn.

But we abandoned this translation for <u>every</u>, since <u>every</u> presupposes existence, while the original translation by means of the unrestricted universal quantifier, namely $\hat{P}\bigwedge x\,[\zeta'(x) \rightarrow P\{x\}]$, doesn't even entail existence. It is the universality together with the lack of existential entailment that makes $\hat{P}\bigwedge x\,[\zeta'(x) \rightarrow P\{x\}]$ the suitable translation of <u>any</u> and not of <u>every</u>.

We could thus add another translation rule for <u>intensional-any</u>, namely
(18) <u>any</u> ζ translates as $\hat{P}\bigwedge x\,[\zeta'(x) \rightarrow P\{x\}]$.
However, as in case of (15), the problem is not so much to state the <u>translation</u> for intensional-any but to state the <u>restrictions on its occurrence.</u> Thus <u>any</u> should be translated according to (18) only if the sentence is some kind of modal construction, or if <u>any</u>+noun occurs as the object of an intensional transitive verb or in an infinitival complement.

It turns out, however, that the restrictions on the occurrence of <u>any</u> simply cannot be formalized without extending the formal apparatus of PTQ. This becomes obvious when we consider that for example

John finds any unicorn

must be ruled out if it is a complete sentence, but must be permitted as the antecedent of a conditional, as in

If John finds any unicorn, Bill is surprised.

We conclude that the restrictions on <u>any</u> should be stated in form of an output constraint.

Now granted that <u>any</u> should be described by means of an output constraint, should the constraint apply to syntactic structures or to semantic structures within the derivation?

The answer to this question will vary from language to language. For example in Finnish the lexical item corresponding to negation-any differs overtly from the lexical item corresponding to intensional-any. This overt distinction would facilitate the formulation of an output constraint on <u>syntactic</u> structures. The overt distinction between <u>negation</u>- und <u>intensional-any</u> allows the statement of two distinct translation rules as well as formulating the occurrence restrictions for the two different <u>any</u>'s seperately with respect to the different surface forms.

In English, however, the two <u>any</u>'s are overtly identical. If we were to provide a description of <u>any</u> on the syntactic level we would be able state the general restrictions. But it would be very difficult to formulate a <u>procedure that interprets</u> analysis trees in order to decide whether <u>any</u> should be translated according to (15) or according to (18).

In order to avoid this almost unsurmountable problem let us state the restrictions on <u>any</u> as a filter condition on <u>translation formulas</u>. As a consequence of this move we must provide one general translation for both <u>any</u>'s. We will generate <u>any</u> freely on the syntactic level and then filter out all derivations the translations of which do not comply with the output condition. The difference in meaning between <u>negation-any</u> and <u>intensional-any</u> will be represented indirectly but explicitly over the interaction between the translation of any+noun and the rest of the respective translation formula.

The unified translation rule for both any's is

(18) any ζ translates as $\hat{P}\bigwedge x\,[\,\zeta'(x) \rightarrow \overline{P}\{x\}]$.

The output constraint can be stated as follows:

(19) Any derivation the translation of which contains a nonrestricted universal quantifier is filtered out unless
- a) the subformula in the scope of the universal quantifier contains narrow scope negation, or
- b) the subformula in the scope of the universal quantifier is of the form $[f(x) \rightarrow (g(x) \rightarrow h(x))]$, or
- c) the universal quantifier is directly preceded by '$\hat{P}$' or '$\hat{\mathcal{Y}}$'.

For example the sentence

(2o) John didn't find any unicorn.

will have the two translations

(2oa) $\neg\bigwedge u\,[\text{unicorn}_*'(u) \rightarrow \text{find}_*'(j,u)]$

(2ob) $\bigwedge u\,[\text{unicorn}_*'(u) \rightarrow \neg\text{find}_*'(j,u)]$

According to constraint (19a), however, only translation (2ob) is accepted. Note that (2ob) is logically equivalent to (14) which translated the nonspecific reading of the corresponding sentence with an indefinite noun phrase:

(14) $\neg\bigvee u\,[\text{unicorn}_*'(u) \wedge \text{find}_*'(j,u)]$

We thus indirectly but explicitly captured the synonymy of negation-any and the nonspecific reading of the indefinite article.

The next example demonstrates the working of constraint (19b). The sentence

(21) If John finds any unicorn, Bill is surprised.

has the two translations

(21a) $\bigwedge u\,[\text{unicorn}_*'(u) \rightarrow \text{find}_*'(j,u)] \rightarrow \text{surprise}_*'(b)$

(21b) $\bigwedge u\,[\text{unicorn}_*'(u) \rightarrow (\text{find}_*'(j,u) \rightarrow \text{surprise}_*'(b))]$.

According to output constraint (19b) the translation (21a) must be filtered out since the formula is not of the form $\bigwedge x\,[f(x) \rightarrow (g(x) \rightarrow h(x))]$ but instead of the form $\bigwedge x\,[(f(x) \rightarrow g(x)) \rightarrow h(x)]$. (21a) represents also intuitively a rather bizarre meaning: it says that only if John finds any and all unicorns (i.e. doesn't overlook a single unicorn), Bill will be surprised.

Note that the acceptable translation formula (21b) is again logically equivalent to the translation of the nonspecific reading of the corresponding sentence

(22) If John finds a unicorn, Bill is surprised.

which translates (on the nonspecific reading) as

(22a) $\bigvee u\,[\text{unicorn}_*'(u) \wedge \text{find}_*'(j,u)] \rightarrow \text{surprise}_*'(b)$.

This crucial logical equivalence can be shown as follows:

(21b) $\bigwedge u\,[\text{unicorn}_*'(u) \rightarrow (\text{find}_*'(j,u) \rightarrow \text{surprise}_*'(b))]$

$= \bigwedge u\,[\neg\,\text{unicorn}_*'(u) \vee (\neg\text{find}_*'(j,u) \vee \text{surprise}_*'(b))]$

$= \bigwedge u\,[(\neg\text{unicorn}_*'(u) \vee \neg\,\text{find}_*'(j,u)) \vee \text{surprise}_*'(b)]$

$= \bigwedge u\,[\neg\,\text{unicorn}_*'(u) \vee \neg\,\text{find}_*'(j,u)] \vee \text{surprise}_*'(b)$

$= \neg\bigvee u\,[\text{unicorn}_*'(u) \wedge \text{find}_*'(j,u)] \vee \text{surprise}_*'(b)$

(22a) $\bigvee u\,[\text{unicorn}_*'(u) \wedge \text{find}_*'(j,u)] \rightarrow \text{surprise}_*'(b)$.

After showing that our formal treatment renders the desired equivalence between any after negation as well as any in the antecedent of conditionals on the one hand, and the nonspecific reading of the indefinite article on the other, we turn to intensional-any. A sentence contains an instance of intensional-any whenever one of its translations is accepted by output condition (19c).

The sentence

(23) John looks for any unicorn.

translates as

(23a) $\bigwedge u\,[\text{unicorn}_*'(u) \rightarrow \text{look for}'\ ({}^\wedge j, {}^\wedge u)]$.

and

(23b) look for$'({}^\wedge j, \hat{P}\bigwedge u\,[\text{unicorn}_*'(u) \rightarrow P\{{}^\wedge u\}]$

According to output condition (19c) only the translation (23b) is acceptable. We note furthermore that this acceptable translation (23b) is not logically equivalent to the translations of the nonspecific reading of

(24) John looks for a unicorn.

which translates as

(24a) look for$'({}^\wedge j, \hat{P}\bigvee x\,[\text{unicorn}_*'(u) \wedge P\{{}^\wedge u\}]$.

The semantic difference between intensional-any and negation-any is thus captured by the fact that in our formal treatment negation-any in its acceptable occurrences is logically equivalent to the nonspecific indefinite article, while intensional-any is not.

The formal account of any presented here reflects the linguistic fact that negation-any and intensional-any have one single surface form in English. At the same time the formal translations represent explicitly the difference in meaning between negation-any and intensional-any. The crucial formal mechanism of our description is the logical equivalence of $\neg\bigvee x$ and $\bigwedge x\neg$. The descriptive utilization of this equivalence was made possible by the independently motivated change of the translation for every.

Because of the equivalence between $\neg\bigvee$ and $\bigwedge\neg$ it is impossible to describe the quantifier any in terms of scope alone. We have seen that translating negation-any by means of $\bigvee$ and intensional-any by means of $\bigwedge$ permits the general hypothesis that any always takes narrow scope. This in turn permits the generalization that any always requires "nonspecific environments". But we have also seen that such a use of two translations for any leads to almost unsurmountable problems for a formal description of English.

Our alternative move to instead translate any uniformily by means of the unrestricted universal quantifier (i. e. $\bigwedge$) led to slight complications with regard to a general scope specification: now negation-any has to take wide scope, but intensional-any has to take narrow scope (as stipulated in output condition (19)). But while loosing a unified scope specification we gained a unified translation for any.

Since the "unified scope approach" is logically equivalent to the "unified translation approach" the choice between the two alternatives hinges on purely technical aspects. We have shown that the "unified translation approach" is the technically more suitable approach for a formal description of English.

Notes:

(1) Paper read at the forty-eighth meeting of the Linguistic Society of America, San Diego, California, December 28-3o, 1973.

(2) where: ME_t is the set of meaningful expressions of type t i. e. sentences of the logic

α is an interpretation in terms of entities, worlds and times

i is a world

j is a time

g is an assignment of variables relative to α.

$D_{a,A,I,J}$ is the set of possible denotations of the logical type a, corresponding to the set of entities A, the set of worlds I and the set of times J.

Bibliography

Hausser, R. (1973) Presuppositions and Quantifiers. (Papers from the Ninth Regional Meeting of the Chicago Linguistic Society.)

Herzberger, H. (197o) Truth and Modality in Semantically Closed Languages. (In: R. L. Martin (ed.) The Paradox of the Liar, Yale University Press, New Haven.)

Montague, R. (1973) The Proper Treatment of Quantification in Ordinary English (In: K. J. J. Hintikka, J. M. E. Moravcsik, and P. Suppes (eds.) Approaches to Natural Language, Reidel)

Quine, W. van O. (196o) Word and Object (M.I.T. Press)