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More on Any : Reply to Ladusaw

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Any is the centre of a disagreement over the status of formal semantics in the articulation of formal properties of grammars. Ladusaw has argued that restrictions on the grammaticality of sentences containing negative polarity items, one of which is any, have to make reference to model-theoretic constructs (Ladusaw 1982), in particular to the denotation function of a polarity reverser.<sup>1</sup> His claim and associated definitions are;

A negative polarity item is acceptable only if it is in the scope of a polarity reversing expression.

An expression is a polarity reverser iff its denotation function  $d'$  is downward entailing, i.e. such that:

$$\forall X \forall Y ( X \leq Y \rightarrow d'(Y) \leq d'(X) )$$

where ' $\leq$ ' is realised either as the subset relation if its two arguments are sets or as entailment if its two arguments are propositions.

Hornstein has argued to the contrary (Hornstein 1984) that the properties of any are a particular case of the general phenomenon that articulation of properties of grammar, even properties of logical form, make no essential reference and may even be opaque with respect to semantic, i.e. model-theoretic properties. More precisely, any he argues has properties which demonstrate its status at LF as a name despite its interpretation as a quantificational element.

The facts about any are as follows. NP's with any as a determiner never give rise straightforwardly to existential inferences. Any is construed universally in those environments which preserve the inferential properties of their parts, the conditional implicit in this understanding precluding an existential inference which might otherwise be associated with the NP. These environments are the so-called upward-entailing environments. They include simple affirmatives:

- (1) John likes any linguist.

the consequent of conditionals (on the grounds that just as Sue smoked and drank entails Sue smoked, so too If Sue is a philosopher, she smokes and drinks entails If Sue is a philosopher, she smokes):

- (2) If Sue is a philosopher, she despises any linguist.

the complement of noun phrases with some, many, or the numerals as determiner (on the grounds that Some/four/many students who smoke and drink were given funding respectively entail Some/four/many students who smoke were given funding):

- (3) Some/four students who understood anything she said were given funding.

and the complement of predicates such as believe, hope, be pleased... (He believed she smoked and drank entails He believed she smoked):

- (4) He believed he understood anything she said.

In the negative polarity environments, which for various reasons do not straightforwardly preserve the inferential properties of their parts, any can be construed 'existentially',<sup>2</sup> as long as the associated quantification is construed within the scope of the relevant operator. The list of downward-entailing environments is a motley one. Some of them are downward-entailing, as Ladusaw observes, but contrary to his claim, not all of them are. They are (i) negatives

- (5) Sam doesn't like any policemen.

(ii) yes-no questions

- (6) Does Sam like any policemen?  
 (7) Is anyone at home?

(iii) wh-questions

- (8) Which student believed anything I said?

(iv) antecedents of conditionals

- (9) If anyone can understand the book, Joan can.

(v) restrictive relative clauses of NP's with every, any, most, few as determiner

- (10) Every student who has seen any films by Fellini is a movie addict.  
 (11) Few students who went to any lectures by Judith dislike linguistics.  
 (12) Most students who went to any lectures by Jo dislike linguistics.

(vi) in the scope of only

(13) Only John believed anything I said.

(vii) complements of regret, doubt, be surprised/annoyed/ashamed...

(14) I was surprised that he liked anyone.

Of these only negatives and NP's with every, any and no as determiner are clearly downward-entailing: John didn't see Bill dance entails John didn't see Bill and Harry dance; and Everyone/No-one who was singing stood up respectively entail Everyone/no-one who was singing loudly stood up. As long as we ignore the conditional paradoxes, antecedents of conditionals are also downward-entailing: If Bill dances, John will be angry appears to entail If Bill dances and Harry dances, John will be angry, though If the kids eat rice pudding, they will sleep well does not imply let alone entail If the kids eat rice pudding and drink black coffee they will sleep well.<sup>3</sup> But for the remainder, the purported entailment between Bill regretted Sue had bought a car and Bill regretted Sue had bought a Porsche is extremely dubious as pointed out by Linebarger (1981); there is no entailment relation in either direction between Most applicants who were graduate students got a job and Most applicants who were students got a job; Only John drank entails Only John drank and smoke only if we assume that John did indeed both drink and smoke (a move Ladusaw makes in assessing entailment relations but which Linebarger correctly criticises); and questions do not enter into entailment relations at all. The only semantic property that these negative polarity environments have in common is that they are not upward-entailing. They are otherwise quite divergent.

The final datum about any and its construal is that any in negative polarity environments is ambiguous, any in a non-negative-polarity environment is not. That is, any case where an 'existential' interpretation of any is available can always be over-ridden by a focussing device such as contrastive stress, giving rise to ambiguity; So (5)-(14) are ambiguous. For example, (8) can either be a question as to which student believed everything I said or as to which student believed even one thing I said.

The first problem to sort out is whether this ambiguity has to be stipulated lexically as an ambiguity of any as Ladusaw assumes, or whether as Hornstein does that the variation can be explained in terms of some other device. There is a range of arguments in both Ladusaw 1979 and Linebarger 1981, but what I shall show here is that within Hornstein's framework, the attempt to characterise the ambiguity without invoking some form of ambiguity in any itself leads to ad-hoc loss of generalisation elsewhere.

There are two plausible types of solution one might construct to explain the ambiguity of (5)-(14) within Hornstein's framework. Hornstein analyses any as an arbitrary name universally construed and not dependent on anything else.<sup>4</sup> In line with this assumption, we could assign (5) a logical form (5a)

(5a)  $- \text{like}(s, a)$   $a$  an arbitrary name  
 $r(a) = \{x | \text{policeman}(x)\}$   $r(a)$  the range of  $a$

and manipulate its interpretation vis a vis the scope of the falsity operator to get the desired ambiguity effect, obtaining interpretations equivalent to (5a') and (5a''):

(5a')  $\forall i -\text{like}(s, i)$   
 $i \in \{x | \text{policeman}(x)\}$

(5a'')  $-\forall i \text{like}(s, i)$   
 $i \in \{x | \text{policeman}(x)\}$

But any such move is extremely implausible, as it makes the interaction of focus and any inexplicable. Suppose (5) and (9) are uttered with the any expression focussed:

- (5) Sam doesn't like ANY policemen;  
 (9) If ANYONE can understand the book, Joan can.

If we wish to reconstruct the 'universal' construal, the universal quantification associated with the focussed arbitrary name has to be construed as within the scope of the main operator to give an interpretation which we might characterise by (5a'') and (9'):

(9')  $(\forall i (i \text{ can read the book}) \rightarrow (j \text{ can read the book}))$   
 $i \in \{x | \text{person}(x)\}$

However if as in (15) the two operators are combined<sup>5</sup>

(15) If you didn't solve ANY problems, you won't pass.

the 'universally' construed reading associated with focus requires the quantifier to have wide scope over both operators:

(15')  $\forall i ( (-\text{you solve } i) \rightarrow ( -\text{you pass}) )$   
 $i \in \{x | \text{problem}(x)\}$

Thus if any is treated invariably as an independent arbitrary name, the interaction with focus has to be stipulated as sometimes involving wide and sometimes narrow scope with respect to other operators. But the phenomenon is the same in each case: in those environments where an 'existential' construal is available, a 'universal' construal is only available if the any expression is focussed.<sup>6</sup>

The other way of predicting the ambiguity of (5)-(14) is by varying the restrictions on the range of the arbitrary name, and this is a reasonably principled way of capturing the ambiguity of yes-no questions such as (6) which are otherwise problematic.<sup>7</sup> One

might assign (6) the form (6a), and vary the restriction on the range of the arbitrary name as specified, either by just the  $\bar{N}$  content or by some computation over the entire S content:

- (6a) ? like (s, a)
- $$r(a) = \{x \mid \text{policeman}(x)\} \quad (i)$$
- $$r(a) = \{x \mid \text{policeman}(x) \ \& \ \text{like}(s, x)\} \quad (ii)$$

On the first of these restrictions we get the 'universal' reading 'Does Sam like the total set of policemen?', on the second, we get the 'existential' reading 'Is there some subset of policemen such that Sam likes all of them?' (as long as we can construe the specification of the range as falling within the scope of the Q operator). But this move is also problematic on the assumption that the name is invariably independent, for there is no straightforward algorithm for determining what elements are used for restricting the range of the name. Take (16):

- (16) Any student who finds any book that has any damaged pages should return it to the library.

Only the first any expression is 'universally' construed, its value ranging over all members of the set in question. On the pattern of (6) we might therefore expect its range to be given by its (complex)  $\bar{N}$  content; The two any's nested within the  $\bar{N}$  itself are however construed 'existentially', allowing as their value a subset of the set in question (a subset of books with damaged pages and a subset of damaged pages respectively). So again on the pattern of (6), we might expect these expressions to have their range determined by some computation over their whole clause. But if we insist that any indicates the use of an arbitrary name which is invariably independent and equivalent to a wide-scope universal quantifier, then what we need to get the right reading is:

- (16')            a            finds b that has c            → a should return
- $$r(a) = \{x \mid \text{student}(x)\} \quad r(b) = \{x \mid \text{book}(x)\} \quad r(c) = \{x \mid \text{damaged } b \text{ to the library page}(x)\}$$
- =
- $$\forall x \quad \forall y \quad \forall z \quad (x \text{ finds } y \text{ that has } z \rightarrow x \text{ should return } y \text{ to the library})$$
- $$x \in \{x \mid \text{student}(x)\} \quad y \in \{y \mid \text{book}(y)\} \quad z \in \{z \mid \text{damaged page}(z)\}$$

But in (16') the restriction on the range of both the first two arbitrary names is not their associated  $\bar{N}$  content or the total S content, but merely the head N content. (16) is symptomatic of the entire range of construals of any within the scope of another quantifier such as no, every, most: one can retain a unitary account of any but only by postulating restrictions on its range for which the linguistic configuration provides no principled basis. Moreover this account cannot be extended to wh- questions containing any such as (17) and (18):

- (17) Which student has done any work?  
 (18) Who has seen any Fellini films?

So any such auxiliary invocations, while possible, lead to loss of generalisation and are quite ad hoc.

From now on, I shall assume that any does lead to ambiguity at the articulated level of propositional content that I shall call logical form.<sup>8</sup> It does not however follow that any is lexically ambiguous, if we take seriously the view that the linguistic meaning of an expression considerably under-determines its propositional content. What we want for any is some element neutral as to quantificational force, whose form triggers a mapping onto divergent forms at logical form. The analysis I shall adopt is an enriched version of Hornstein's. The problems that arose with Hornstein's account of any were due not to the analysis of any as an arbitrary name but to the assumption that arbitrary names are unvarying in their construal. There are two parameters along which arbitrary names can vary. They can be unrestricted or restricted, independent or dependent. On the assumption that variables in natural language are generally restricted, I shall assume arbitrary names are too. Now the independent/dependent contrast. When an arbitrary name is independent, it ranges freely over the members of the set which constitute its domain; but when it is dependent, it has its range fixed by a relation on some other entity on which it depends. The analysis of any I propose is that its specification in the lexicon is a variable over arbitrary names, A-names as I shall call them, a meta-variable which has one of two values - a dependent A-name or an independent A-name. Its lexical content is thus a translation-variable associated with a mapping from s-structure configurations onto wellformed expressions of the selected logic.

The logic I make use of is that of Fine (1983, forthcoming). In addition to the standard array of quantifiers, variables, etc., Fine's logic has what he calls A-names, which vary along the parameters unrestricted, restricted, independent, dependent. On Fine's account, an independent A-name takes as value an arbitrary object which is in its turn mapped onto the set of individuals satisfying the restricting predicate. A dependent A-name denotes a dependent arbitrary object which in its turn is mapped onto individuals via a dependency relation on some other entity. Both A-names are subject to the same rule of evaluation requiring universal satisfaction by all individuals in the range of the A-name:<sup>9</sup>

I  $F(a)$  is true iff  $F(j)$  holds for all individuals  $j$  in the range of  $a$ ,

F a predicate  
a an A-name

If the A-name has a restricted range, as in:

$F(a)$  F, B predicates  
 $r(a) = \{x \mid B(x)\}$  a an A-name  
r(a) the range assigned to a

I can be restated as I':<sup>10</sup>

I'  $F(a)$  is true iff  $F(j)$  holds for all individuals  
 $r(a) = \{x \mid B(x)\}$  satisfying the predicate B

If we wish to restate this by reducing it to the standard calculus in which all quantificational force is syntactically expressed, we have:

$$F(a) \equiv \forall x B(x) \rightarrow F(x)$$

$$r(a) = \{x \mid B(x)\}$$

where  $F$  is the complex predicate on  $a$  constructed from the sentence in which the A-name occurs.<sup>11</sup> In the case of dependent A-names, their satisfaction depends on a relation  $R$  on some other entity: As before, we have:

II  $F(d)$  is true iff  $F(j)$  holds for all individuals  $j$  in the range of  $d$ .

$F$  a predicate  
 $\underline{d}$  a dependent A-name

but since the range of  $\underline{d}$  is determined by some other entity we have:

II'  $F(d)$  is true iff there is a relation  $R$  such that  $F(j)$  holds for all individuals  $j$  in the range of  $R$ .

( $R$  is assumed to be non-empty.) The cases I shall be primarily concerned with are those where the range of the A-name is both restricted and dependent, i.e. of the form:

$$F(d)$$

$$r(d) \subseteq \{x \mid B(x)\}$$

For this case we modify II' to II'':

II''  $F(d)$  is true iff there is a relation  $R$  such that  
 $r(d) \subseteq \{x \mid B(x)\}$   $F(j)$  and  $B(j)$  holds of all individuals  $j$   
 in the range of  $R$ .

or for a two-place predicate  $H$  and individual constant  $\underline{s}$ :<sup>12</sup>

II'''  $H(\underline{s}, d)$  is true iff there is a relation  $R$  such that  
 $r(d) \subseteq \{x \mid B(x)\}$   $H(\underline{s}, j)$  and  $B(j)$  holds for all individuals  
 $j$  in the range of  $R$ .

If as before we choose to restate this in normal predicate calculus form we obtain:<sup>13</sup>

$$H(\underline{s}, d) \equiv \exists R \forall \langle i, j \rangle \langle i, j \rangle \in R \ H(\underline{s}, j) \ \& \ B(j)$$

$$r(d) \subseteq \{x \mid B(x)\}$$



With two pragmatic restrictions on how A-names are construed in natural language inference, these definitions of restricted but independent A-names and restricted and dependent A-names are all that we require to predict the occurrence of any and its associated interpretations.<sup>14</sup> The two restrictions apply to any construed as a dependent A-name. An any expression can only be construed as a dependent A-name if (1) the domain of the relation intrinsic to the A-name can be constructed from the s-structure configuration and (2) such a construal will not give rise to a conclusion which associates an implication of existence with the any expression. For the moment, these stand as stipulations.

The interpretation of any as dependent or independent is altogether predictable from the s-structure configuration. If there is some expression c-commanding any (preceding it if in the same clause) which can be construed at logical form as providing an entity on which the any expression can be dependent without giving rise to direct existential inferences, then any can and most naturally is interpreted as a dependent A-name. Consider first (19)-(25):

- (19) If Sue read any linguistics books, she'll pass the exam.
- (20) Did Mark eat any buns?
- (21) Was anyone sick?
- (22) If any liquor store is open, Sue'll stop.
- (23) Mark didn't eat any buns.
- (24) \*Anyone doesn't help me.
- (25) At no time did anyone see me.

Of these only (24) is not preceded by some entity from which a relation can be constructed to provide a dependent interpretation for the any expression; and only (24) is unacceptable. In (19) Sue c-commands any linguistics books so the antecedent clause of (19) can be assigned the form:

- (19') read (s , d)  
 $r(d) \subseteq \{x \mid \text{linguistics book}(x)\}$

a form which directly reflects the configuration from which it is constructed. From the semantic rule associated with dependent A-names we know that the range of d is dependent on there being a nonempty relation R which fixes its range to some subset of the set of linguistics books. This relation is displayed as though part of the syntactic specification of the logical form in the equivalent form:

- (19'')  $\exists R \forall \langle i, j \rangle \in R$  read(s , j) & linguistics book(j)

By the stipulated pragmatic restriction that the domain of the relation R has to be reconstructed from the utterance itself, we take this relation R to be a relation between Sue and linguistics books - in other words the argument of R not explicitly given by the linguistic configuration is identified as Sue. So we construe the antecedent of (19) as:

(19'")  $\exists R \forall \langle i, j \rangle (i \neq s \ \& \ \text{read}(s, j) \ \& \ \text{linguistics book}(j))$   
 $\langle i, j \rangle \in R$

(in words 'There is a relation between Sue and some set of linguistics books such that she read them'), in effect restricting the set of entities satisfying the form

$\text{read}(s, d)$   
 $r(d) \subseteq \{x \mid \text{linguistics book}(x)\}$

to some subset of linguistics books, those linguistics books that Sue read. Hence the 'existential' construal of negative polarity any. If this form (19'") were asserted to be true, it would immediately give rise to the inference that there was a set of linguistics books that Sue read in virtue of the assertion of there being a relation between Sue and linguistics books, an inference which the second of our pragmatic restrictions debar. In (19) however this form is given as a premise, not as an inference, so there is no restriction against its occurrence in this environment.

In (20) similarly, any buns is c-commanded and preceded by Mark so we construe any buns as an A-name dependent for its construal on the construal of Mark as follows:

(20') ?  $\text{ate}(m, d)$   
 $r(d) \subseteq \{x \mid \text{bun}(x)\}$   
 $\equiv \ ? \exists R \forall \langle i, j \rangle (i = m \ \& \ \text{bun}(j) \ \& \ \text{ate}(m, j))$   
 $\langle i, j \rangle \in R$

(in words, 'Is there a relation between Mark and some set of buns such that Mark ate all of them?') As before, there is no existential inference: this is a question to that effect.

In (21) no NP precedes the subject, but the auxiliary does, and this is sufficient to provide a question as to the existence of a relation between some point in time and a set of people being sick at that time, More precisely, the relation in virtue of which anyone is construed as a dependent A-name is a relation on some time variable introduced by the tense operator.<sup>15</sup> Thus (21) has the form:

(21') ?  $\text{past sick}(d)$   
 $r(d) \subseteq \{x \mid \text{person}(x)\}$   
 $\equiv \ ? \exists R \forall \langle i, j \rangle (i = t_k \ \& \ t_k < t_U \ \& \ \text{person}(j) \ \& \ j \ \text{sick at } t_k)$   
 $\langle i, j \rangle \in R$            $t_k = \text{time of utterance}$   
                                   $< = \text{precedes}$

In (22) I take the conditional, along the lines of Heim 1982, to involve quantification over times, the if therefore providing a time variable on which anyone in subject position can, as in (21) be dependent. So we have a form for (22) approximating to:<sup>16</sup>

$$\begin{aligned} (22') \quad & t( d \text{ open at } t \quad \rightarrow \quad s \text{ stop at } t) \\ & r(d) \subseteq \{x \mid \text{liquor store}(x)\} \\ \equiv & \quad \forall t (\exists R \forall \langle i, j \rangle (i=t \ \& \ \text{liquor store}(j) \ \& \ j \text{ open at } t) \rightarrow s \text{ stop} \\ & \quad \quad \quad \langle i, j \rangle \in R \quad \quad \quad \text{at } t) \end{aligned}$$

Negative sentences too are unproblematic (though there is the problem of specifying the interaction between the A-name and the falsity operator). (23) has the form:

$$(23') \quad \neg \text{ate}(m, d) \\ r(d) \subseteq \{x \mid \text{bun}(x)\}$$

This can be construed as:

$$\begin{aligned} (23'') \quad & \neg \exists R \forall \langle i, j \rangle (i=m \ \& \ \text{bun}(j) \ \& \ \text{ate}(m, j)) \\ & \quad \quad \quad \langle i, j \rangle \in R \\ \equiv & \quad \forall R \exists \langle i, j \rangle \neg (i=m \ \& \ \text{bun}(j) \ \& \ \text{ate}(m, j)) \\ & \quad \quad \quad \langle i, j \rangle \in R \end{aligned}$$

So we reconstruct the de Morgan equivalence appropriately.<sup>17</sup> In the case of negatives such as (24) where nothing precedes the any expression in subject position, the s-structure configuration does not provide an entity on which the A-name associated with any could be dependent. But in (25) where a negative adverbial expression is preposed, such an interpretation becomes available.

Exactly the same pattern of analysis applies in quantified NP's. In (26)

(26) Every student who read any linguistics books passed the exam.

any linguistics books can be construed as depending on the variable associated with every student (according to the pragmatic restriction that the dependency be reconstructed from the form of the utterance). Hence we have as the content of the complement clause:

$$\lambda x [ \text{read}(x, d) ] \\ r(d) \subseteq \{x \mid \text{linguistics book}(x)\}$$

or equivalently

$$\lambda x [ \exists R \forall \langle i, j \rangle (i=x \ \& \ \text{read}(x, j) \ \& \ \text{linguistics book}(j)) ] \\ \langle i, j \rangle \in R$$

yielding for (26) the form:

$$\begin{aligned} (26') \quad & \forall x (\text{student}(x) \ \& \ \text{read}(x, d) \quad \rightarrow \quad x \text{ passed the exam}) \\ & \quad \quad \quad r(d) \subseteq \{y \mid \text{linguistics book}(y)\} \\ \equiv & \quad \forall x (\exists R \forall \langle i, j \rangle (i=x \ \& \ \text{student}(x) \ \& \ \text{read}(x, j) \ \& \ \text{linguistics book}(j)) \\ & \quad \quad \quad \langle i, j \rangle \in R \end{aligned}$$

The only NP's where such a dependent construal of the contained any expression is debarred are those cases where such a dependency would give rise directly to the precluded existential implication in virtue of the existential quantification associated with these NP's - i.e. NP's with many, some, or the numerals as determiners: this was the second of the pragmatic restrictions.

A further problem for an account of negative-polarity any as a dependent A-name is the asymmetry between every and only in:

- (27) Only Sue had any answers.  
 (28) Every student had any answers.

Both only Sue and every student c-command the material in their respective VP's so in principle either could give rise to a dependent construal of any as long as no existential inferences resulted from such a construal; But in (28) they do. If we assume that the domain restriction on the set of students is indexically fixed (by relevance) the interpretation of (28) as an utterance will give rise to 'A<sub>1</sub> had any answers', 'A<sub>2</sub> had any answers' and so on for each member of the relevant indexically fixed set of students; and each one of these inferences is debarred by the second of the pragmatic restrictions. The syntactic configuration of (27) is the same. Yet (27) is normally taken to imply 'Sue had some answers'. So why is any 'existentially' construed in (27)? While I do not pretend to fully understand the properties of only, the asymmetry between every and only is predictable from an orthodox analysis of only in which (28) is assigned a form corresponding to:

- (28')  $\forall x (x \text{ had any answers} \rightarrow x=j)$

(cf. Rooth 1984 among others); On this view the assignment of a logical form to a sentence containing only involves a noncompositional operation which constructs a conditional conclusion in which all nonfocussed constituents are used to provide the premise, and the focussed constituent is used to provide the conclusion. In the case of (27), with only in subject position, the premise is constructed out of had any answers. This immediately gives us the answer we want - any is not being used to give rise directly to an existential inference, but to the construction of a premise for a conditional conclusion. No existential inference follows from this form (though it might from an inference rule associated directly with only itself). Moreover the use of any is the most transparent way of conveying the information that the interpretation of answers must be construed as dependent on some other entity; essential to the interpretation of (27). Though some would give the existential inference that the use of only gives rise to, it does not have the same dependency property. As we shall see shortly, the compatibility of any with an associated existential inference in cases such as (27) is not in conflict with the pragmatic restrictions on the use of dependent A-names. So from the basis of an uncontroversial analysis of only the asymmetry of interpretations in (27) and (28) is predicted. In particular, (27) allows the construction of the premise:

had(s, d)  
 $r(d) \subseteq \{x \mid \text{answer}(x)\}$

In all these negative polarity environments, simple and complex, where this dependent construal of any is made available by the s-structure configuration, the information presented by the syntactic configuration can be counteracted by the effects of contrastive stress and focus to yield an independent any interpretation. The focus rule I adopt is in essence that of Chomsky 1971 reinterpreted as an instruction on the construction of propositional inference. It is a rule which for any minimal S-string with a focussed constituent yields an existential inference with respect to that constituent. There are two alternatives I can envisage for formalising this rule, one generating a compositionally induced pair of inferences, the other generating a pair by a rule of inference operating on the string; and on either formulation the rule would give for (29)<sup>8</sup>

(29) Sue doesn't like ANYONE

the pair (29'):

(29') { - like(s,  $\alpha$ )     $\alpha$  a variable over A-names  
           Ex like(s, x) }

in words, the pair 'Sue doesn't like anyone' and 'Sue likes someone'. Transparently any in (29) cannot be interpreted as a dependent A-name giving a form equivalent to 'Sue likes no-one' - the inference generated by the focus device is debarred both by the pragmatic restriction and by the assertion itself. Indeed the only possible interpretation compatible with the rule of focus is that in which any is taken to be an independent A-name construed within the scope of the falsity operator. Questions and conditionals fall out similarly. Quite generally, the inference associated with the focus rule always leads to conflict with the interpretation of any as a dependent A-name, because the inference invariably provides a satisfaction set for the dependent A-name, but in the 'universally' construed interpretation this isn't so since there is no connection between the range of individuals assigned to the independent A-name and the inference which arises as the effect of focus. Thus in (30)

(30) Does Sue like ANYONE?

if the question is 'Is there a dependency between Sue and some set of people such that she likes them?', the inference associated with focus itself provides the answer to the question - that 'Sue likes someone'. However with anyone construed as an independent A-name ranging over the total set of people, the question is whether Sue likes them all and the focus rule providing as an inference from the question itself that she likes at least one person is straightforwardly compatible.;

Like any, ever can occur in negative polarity environments, but unlike any it is restricted to these environments. Accordingly, I analyse ever as an obligatorily dependent A-name over times.<sup>19</sup> From this it follows that ever never gives rise to universal construal even when contrastively stressed, and that

it is acceptable only if a dependency can be constructed in the manner of 'existentially' construed any from the content of the sentence in which it is contained.

I now come to the two pragmatic restrictions (i) the restriction on existential inference characteristic of dependent any expressions and of ever, (ii) the requirement that the relation R intrinsic to the dependency be reconstructed from the utterance itself, and not, say, indexically from some other individual in context. Fine's logic as I have manipulated it (cf. fn. 12) allows the precluded kind of dependency, for a formula of the type  $H(j, d)$ ,  $d$  a dependent A-name, is wellformed and allows a construal in which  $d$  is dependent on the first argument  $j$ , in which case it implies the existence of a set of entities denoted by  $d$ . So there is nothing in my system to preclude the dependent interpretation of any in (31) nor to preclude (32):

- (31) Mark ate any buns.  
 (32) Jo was ever sick.

There are two ways in which this prohibition of existential inference could be characterised. The first is to assume that the logic is not an extensional system, but intensional. That's to say, one might construe arbitrary objects not as individuals in any sense, but as intensions of A-names, a means of fixing the range of values for such names.<sup>20</sup> With this move, the dependency relation required for a dependent arbitrary object could then be specified as a relation between intensions and for this reason never giving rise to existential inferences associated with the any expressions.<sup>21</sup> However this account though plausible is too weak. We need to predict the unacceptability of (32) and too of (31) on the problematic construal, not merely an intensional interpretation of them.

The other move is to characterise the restriction in terms of the mapping from some any-containing expression onto the formulae of the logic. On this analysis, it is the interaction between pragmatic principles and the linguistic content of the string in question that determines the restriction. Put crudely, using any would be pointless not to say misleading if what you mean to convey is an existential inference associated with that NP directly. Put in less theory-neutral terms, the principle of relevance as defined by Sperber and Wilson (forthcoming) is an assumption of a guarantee by the speaker of intended maximal efficiency in the presentation of the information to be recovered. This predicts that any use of an expression whose content is a dependent A-name intending that A-name itself to convey an existential inference will always be in violation of the principle of relevance: to use it in this way would be perversely a denial of the dependency implicit in its content in the face of a more direct way of presenting the intended information. Since this

principle is always assumed to be operative, any will never be construed by the hearer in such a way. Any buns in (31) for example cannot be interpreted as dependent on Mark: so to interpret it involves interpreting any buns as fixed by a dependency relation on some entity, fixing the value of that entity as Mark, and so finally via the assertion of that relation, establishing the existential inference that there was a set of buns that Mark ate. It is not merely that such a derivation of the existential inference would be indirect, but that it contradicts the essential dependency in this interpretation of any; for any such existential inference associated with the any expression means that the expression denotes a set of individuals directly and is not essentially dependent, so the communicative effect of construing any as a dependent A-name is lost; To intend such an interpretation in (31) would therefore fail to convey the type of information which the dependent interpretation makes available, and in this sense so to use any would be pointless. The principle of relevance requires that speakers select the most direct means of conveying the proposition they wish their utterance to express. If then the speaker intends to convey the information that there is a set of buns that Mark ate, she must not select any buns, but an expression which would provide that information directly - to wit some buns. Quite generally, in all environments where interpreting any as dependent would convey the information that the dependency was not essential to extracting the information conveyed by the utterance, any is not used but rather an expression which can convey the required information directly.<sup>22</sup> In the case of compound sentences, this same restriction applies. In particular, conditionals are treated by the deductive mechanism as conditional assertions, the consequent being independently assessed for relevance, and because the occurrence of dependent any in such assertions would lead to deducing (albeit conditional) existential inferences by the same roundabout route, any will always be avoided in favour of some.<sup>23</sup> This explanation predicts immediately the acceptability of dependent any in the VP of sentences containing only in subject position such as (27). In (27), despite the existential inference triggered by only itself, the dependency was essential to conveying the inference required. Hence its acceptability.

The restriction on domain selection associated with the relation R intrinsic to a dependent A-name follows immediately from this relevance-imposed restriction. One of the functions of the principle of relevance is to govern the selection of those aspects of propositional content not specified by the explicit content of the linguistic configuration itself. So in particular the interpretation of a domain set against which some utterance (or utterance part) is supposed to be evaluated, in so far as it is not fully determined by the linguistic content of the utterance, is assumed to be immediately accessible to the hearer. Now in the case of the relation R used in fixing the interpretation of a dependent any expressions, this leaves the hearer no choice at all. For if the domain set could be identified as immediately accessible to the hearer from the utterance context rather than constructed from

the utterance itself (indexically, as with indexical pronouns or demonstratives) then this would immediately give rise to the other problem of providing an existential inference associated directly with the any expression. So the hearer's only option is to identify the domain of R as provided by a relation constructed from the expressions of the utterance itself.

So the two restrictions on the dependent any interpretation which cannot themselves be predicted on the basis of Fine's logic, turn out to be immediate consequences of the principle of relevance. It is for relevance reasons that any if dependent is invariably construed as dependent on some entity provided by the preceding expressions of the utterance. It is for relevance reasons that any is never construed in simple affirmatives as dependent on some other NP, even when in a suitable c-commanded configuration, and that it is never construed as dependent on an indexical element, and that it is never construed as dependent on variables associated with the determiners some, many and the numerals. These are not grammaticality data to which rules of grammar should be sensitive. What we have is a pragmatic filter (induced by the principle of relevance) on the logical forms available for an utterance of the given type.

For the same reasons which preclude a dependent interpretation of the A-name associated with any in non-negative-polarity environments, ever, an obligatorily dependent A-name, is predicted to be unacceptable in just these environments, because they will fail to provide a logical form compatible with the communicative effect of using a dependent A-name. (32) is then predicted to be grammatical but to have no realisable logical form unless embedded in a linguistic context which provides the basis for effectively interpreting ever as dependent. So it is not necessary to impose a restriction on the logic to exclude such cases, nor to add a stipulation on the lexical item in question (other than that it ranges over A-names, dependent A-names in the case of ever). It is simply the principle of relevance constraining the mapping from s-structure configurations onto logical form, as relevance theory predicts it should.<sup>24</sup>

Finally, the propositional-attitude predicates such as regret. These are apparently problematic because they allow any expressions to occur even in subject position of their complements with no apparent entity on which to interpret any as dependent, and the majority of the predicates involved are factive and so do give rise to an existential inference associated with the any expression induced by the factivity of the predicate. Not all propositional-attitude predicates allow such an 'existential' construal of any. Those that do have one striking property in common: they all have a negative aspect to their meaning. As Linebarger suggested (1981), they allude to a negative proposition. In her framework, this is mere stipulation, but Sperber and Wilson provide a general framework in which this can be explained. They claim that natural-language use falls into two distinguishable categories: descriptive and interpretive. The interpretive use is the use of one proposition to represent another proposition it resembles. This interpretive use is, they argue, the basis for summary, free paraphrase, reports, parody, and too the relation between a question



and its answer. One property common to all interpretive uses is that they do not allow inferences to be straightforwardly drawn from what would be the propositional content of that same sentence used descriptively. I suggest that the use of any in such propositional-attitude cases is exceptional among the negative polarity environments in being an example of interpretive use. The form of the resemblance relation I suggest along the following lines. By means of the postulate associated with regret stated informally as:

X regret that P → X want ( past -P )

(33) is construed interpretively to allude to (33'):

(33) Sam regretted he had eaten any buns.

(33') PAST s want ( -ate(s , d) )  
                     r(d) ∈ { x | bun(x) }

Three factors come together to make such a proposition accessible. First, propositional-attitude predicates invariably constitute an interpretive use of language. In reporting other people's beliefs and their attitudes to their beliefs, the best we can do is to choose some sentence which we believe most closely resembles the belief or attitude we are reporting. Second, the presence of any/ever requires there to be some proposition with an appropriate inference-blocking operator in default of any such entity being explicitly available so it acts as an explicit trigger for an interpretive use alluding to a proposition in which the pragmatic conditions for interpreting any/ever as dependent are fulfilled. Thirdly, it is because the negation-containing equivalent so closely resembles that of the triggering predicate that it can replace it as the proposition actually expressed by the sentence. Thus (33) can be construed as alluding to (33') by the postulate associated with regret. Similar postulates are associated with all these predicates. The use of any/ever is then a trigger used to allude to the associated negative-containing proposition via the relevant postulate. Moreover, since its use makes an essential contribution to the interpretation of the utterance, this use is not in violation of the principle of relevance despite the existential inference generated from the factive content of the predicate.<sup>25</sup>

This completes the account of the negative-polarity environments. So my proposal stands as follows: any is a variable over A-names; ever which only occurs in the negative polarity environments is a dependent A-name. This analysis applies straightforwardly except in the case of propositional-attitude predicates where I invoke the concept of interpretive use, itself independently motivated. This under-determination of propositional form presented by the linguistic content of any commits us to the position that the propositions which any and ever are used to express, articulated as they are at the level of logical form, are not generated directly by the grammar but only by interaction between principles of grammar and pragmatic principles, which, among other things, assign values to any such translation-variables which constitute their linguistic meaning. It is only on this view I would urge that

we can make sense of items like any both being linguistically unambiguous and yet ambiguous in interpretation. A bonus for this view is that the concept of inference on which the detailed articulation of logical forms depends is essentially context-dependent, so the pragmatic restriction on entailment for which Ladusaw had no explanation is predicted on this account.

The interest of any and ever does not of course lie merely in getting the facts right. They were supposed to constitute an argument for the necessity of concepts such as denotation function as part of the vocabulary for articulating rules of grammar. The concept of denotation function, or indeed that of downward-entailing, has however played no part in the characterisation of any and ever given here. Indeed in so far as Ladusaw's account is correct, it is a consequence of the analysis proposed here. Hence this proposal serves as a reply to Ladusaw 1982.

Hornstein's contrary view was that the name-like properties of any at LF provide evidence that configurational properties of logical form may actually be opaque with respect to the semantic properties of the entities involved, and it is for this reason that semantic properties are irrelevant to the articulation of grammars of natural language. The arguments of this paper support this view. According to the framework advocated here, linguistic meaning is a translation algorithm from s-structure sequences onto logical forms, a purely syntactic algorithm which moreover demands interaction with pragmatic principles in order to generate such logical forms. It is because this level of logical form is not even syntactically generated as part of grammar directly that the model theoretic concepts which give that level its semantic content are not part of the grammar either. It follows on this view that model-theoretic properties are only relevant to articulating formal properties of grammars in so far as the syntactic properties of the selected logic reflect those semantic properties. If the arguments of this paper are correct, this prediction is confirmed: the restrictions on the acceptability of any and ever and their associated interpretations provide no direct evidence for the appropriate vocabulary for stating rules of grammar, because the restrictions involve restrictions on the mapping from the output of the grammar onto associated logical forms, a mapping which is sensitive not merely to specifications stipulated by the grammar but also to the general cognitive mechanism of the principle of relevance. Any such restrictions might well have a model-theoretic image within a non-syntactic model-theoretic account of inference. But such model-theoretic images of the syntactic account of inference will have no consequences for a formal theory of grammar. For the heart of the matter is, simply, that natural languages are not directly interpreted objects.<sup>26</sup>

## FOOTNOTES

<sup>1</sup>In considering Ladusaw's claim, which covers all negative polarity items, I shall take account only of any and ever because there is good reason to consider expressions like budge an inch, lift a finger as metaphorical (cf. Sperber and Wilson forthcoming for arguments that metaphor is not an all-or-nothing phenomenon but an extreme form of an effect displayed across a wide range of data, an effect they label 'interpretive' use).

<sup>2</sup>Since in the analysis to be given here, this construal is not due to existential quantification over the individuals in question, I shall consistently use quotes to refer to the 'universal' interpretation (= "free-choice" any) and to the 'existential' interpretation (= "negative-polarity" any).

<sup>3</sup>Cf. Heim 1984 for a discussion of the context sensitivity intrinsic to this inference.

<sup>4</sup>Examples such as (i) are only apparent counter-examples:  
(i) Some students don't like any books.  
These Hornstein treats by analysing the quantification associated with the interpretation of any as branching quantification. Thus the interpretation of (i) which in standard notation is

$$\exists x \forall y \text{ -like}(x, y)$$

is assigned an interpretation

$$\exists x \forall y > \text{ -like}(x, y)$$

As he points out, the interpretation of the universal quantifier is independent of the existential quantifier even though in standard notation it is syntactically contained within the scope of the existential quantifier.

<sup>5</sup>This example is due to Hans Kamp.

<sup>6</sup>Or if there are other pragmatic reasons for that interpretation being the most accessible, as in the following exchange:

A Absolutely no-one has any difficulty in reading this passage.

B Well, if anyone can read it, then I guess Hugh can.

(pointed out to me by Larry Horn)

<sup>7</sup>Hornstein has an ad-hoc stipulation that questions contain an implicit negation.

<sup>8</sup>For further arguments to this effect, cf. Ladusaw 1979, Taglicht 1980.

<sup>9</sup>The system as defined is extensional, but there is nothing to preclude an intensional enrichment of it (cf. fns. 14 and 21).

<sup>10</sup>For a detailed discussion of the truth-rule for A-names and its interaction with the logical operators, cf. Fine 1983.

<sup>11</sup>Throughout, I shall articulate restrictions on the range of  $d$  a dependent A-name by giving an equivalent form in the more orthodox logic. This is merely for purposes of exegesis. In particular I do not intend these forms to be taken as presenting a precise proposal for a syntactic specification of domain restrictions. I take it the question as to the form in which domain restrictions on nonreferring expressions are reconstructed in utterance interpretation remains entirely open.

<sup>12</sup>This move is a modification of Fine 1983. In Fine 1983 A-names can only be dependent on other A-names.

<sup>13</sup>There is some doubt as to whether this equivalence is legitimate. The problem is whether the truth-rule for dependent A-names depends on some fixed relation  $R$  determining its range or on the weaker requirement of there being a relation  $R$  which determines its range. It may seem as though it is clearly the stronger statement that is required, an A-name being name-like in having a fixed arbitrary object as value, albeit one with a range of individuals satisfying it. However, the evidence from negative-polarity any suggests that the weaker truth-rule is what is required since in all cases the embedding of the dependent A-name within a larger environment requires that the dependent name and hence its range of values is not independently fixed as the stronger condition would require, but has to be construed compositionally within the environment in which it is embedded. Thus the question Did Mary eat any buns, the denial expressed by Mark didn't eat any buns and the conditional premise If Mark ate any buns all require the relation itself to be construed within the scope of the main operator and not independently fixed (even on another A-name); and the embedding of any buns as a dependent A-name in the complement clauses of those quantifiers that allow it, as in Everyone who ate any buns was sick, requires that the relation  $R$  fixing the range of any buns be assigned relative to each value of the superordinate quantifier. This difficulty of detail as to how best to state the analysis in effect provides confirmation that the account is at least correct in outline. For the essence of an A-name is that if it has a satisfaction set at all, then, name-like, its denotation will have a fixed value, namely that arbitrary object which takes the entire satisfaction set as range. I have elected to state the interpretation of the A-name by the weaker form of the truth rule constraining the range of the relation  $R$  pragmatically so that all irrelevant relations are excluded. (This is one of the two pragmatic restrictions.) Should this restriction fall out from the semantics of A-names directly, the formal and pragmatic explanations will coincide.

<sup>14</sup>This extensional version of Fine's logic is not rich enough to provide a basis for explaining the characteristic property of independent any that it is construed over more than one point in time. With regret, I leave this aspect on one side (though cf. fn.21).

15. Here and throughout, the specification of time is informal.

16. The formal details here depend not only on decisions about time dependencies but also the question of whether conditionals should be analysed as involving unselective quantification binding any variables free in their antecedent (cf. Lewis 1975, Heim 1982). Neither of these decisions affects the substance of my claim.

$$17 \quad \forall X \exists x - \phi(x) \equiv - \exists X \forall x \phi(x)$$

$$\quad \quad \quad x \in X \quad \quad \quad x \in X$$

in virtue of  $\exists x - \phi(x)$  being true of all sets (including 1-member sets).

18 (i) via a set of rules which as part of the framework outlined in Kempson 1984 compositionally induces a pair of propositions simultaneously projected from the constituent parts of the sentence. For some minimal sentence-string '...[ any  $\bar{N}_i$  ]<sub>NP<sub>i</sub></sub>...' with focus on NP<sub>i</sub> the focus rule yields:

$$\{ \dots \bar{N}(\alpha_i) \dots, \bar{N}'(x_i) \}$$

$$\quad \quad \quad \exists_i \in_i \text{QST}(S)$$

which will ultimately generate either the pair ' $\dots \bar{N}'(a_i) \dots$ ', ' $\exists x \bar{N}'(x)$ ' or the pair ' $\dots \bar{N}'(d_i) \dots$ ', ' $\exists x \bar{N}'(x)$ ' depending on the value selected for  $\alpha$  (this route would be the syntactic analogue of Rooth 1984):

(ii) via an inference rule:  $\dots [\text{det } \bar{N}]_{\text{NP}_i} \dots \rightarrow \exists x \bar{N}'(x)$

19. I assume the expressions for ever, ever after, ever since involve a lexically distinct ever, the sense of ever which now no longer exists apart from these examples and the frozen whenever, whoever, etc. The justification for this is that these expressions display no ambiguity in negative polarity environments but retain their independent A-name interpretation. Were they happy ever after? They haven't been here ever since John left are unambiguous.

20. This possibility was suggested to me by Kit Fine.

21. It is possible also that the distinctive property of independent any that it induces an interpretation over more than one point in time can be characterised in an intensional system. For the range of an independent A-name is simply that of the  $\bar{N}$  content, and as long as we assume this is intensional, we shall achieve the required result.

22. One possible counterexample to this analysis is the comparative construction, it being arguable that John's arrows hit the target more often than anyone else's entails Someone else's arrows hit the target. I have no proposals whatever as to the internal logical structure of comparatives - it is not even clear to me that any in comparatives should be analysed as a dependent A-name - so I leave these on one side.

<sup>23</sup>Antecedents are independently assessed for relevance, but in a case such as (19) the antecedent If Sue read any linguistics books will only be relevant if it combines with some independent proposition of the form:

read(s , d)

$r(d) \subseteq \{ x \mid \text{linguistics book}(x) \}$

But in virtue of the restriction against such forms occurring in isolation, its relevance will only be established as part of the whole conditional. Hence the asymmetry between antecedent and consequent. (This analysis was suggested to me by Deirdre Wilson.)

<sup>24</sup>The problems raised by Hintikka's any thesis (1980) are also defused by this analysis, since it is not the grammaticality of a sentence such as (32) that is in doubt. So no consequences for the formal properties of grammars arise from its status as an utterance. This is merely a case where acceptability judgments do not stand in a one to one relation with predictions of grammaticality.

<sup>25</sup>The essential difference between this analysis and that of Linebarger 1981 is that here an analysis in terms of allusion is only invoked for propositional attitude predicates whereas her allusion analysis applies in all cases other than explicitly negative ones.

<sup>26</sup>This paper is heavily dependent on conversations with Annabel Cormack and Deirdre Wilson, though at least one of them might not wish to be associated with its conclusions. I am also grateful to Kit Fine for the prompt and extensive answers he gave to the questions I asked him. This paper was part of an ESRC funded research project - HR6835.

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