The bi–polar *any*

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1 The problem

In the literature on *any*, there is a traditional distinction between Polarity Sensitive (PS) *any* and Free Choice (FC) any.
PS *any*
– ok in negative and interrogative contexts (*Mary didn't read any book*, *I doubt that she read any book*, *Did you read any book?*, etc.)

– Akin to an indefinite or an existential quantifier
FC *any*
– ok in some positive contexts and in generic contexts (*Mary read any book proposed by her advisor*, *Any owl hunts mice*, etc.)

– Akin to a universal quantifier

There have been quite a few attempts to 'unify' *any*, that is, to derive its overall distribution while postulating a single *any*. Some examples.

Existential *any*	Universal *any*
Ladusaw 1979, Carlson 1980 Kadmon & Landman 1993 Lee & Horn 1994 Giannakidou 1997a,b	Bolinger 1960 Vendler 1967, Lasnik 1972 Kroch 1974, Hintikka 1980 Eisner 1994, Tovena & Jayez 1997b

These attempts are extremely difficult to assess. For instance,
– The notion of 'indefinite' is not so clear.

– Indefinite *any* shows strong ∀ properties. There is no general agreement on the mechanism which would be responsible for the indefinite–∀ drift (see Haspelmath 1993 for a discussion).
– the properties of *any* as ∀ do not square with the observed distribution.

Moreover there are strange parallelisms between *any* and *le moindre* (French) (Tovena & Jayez 1998). However *le moindre* is not considered an indefinite nor a universal quantifier in French.

In this talk, we skirt the indefinite/∀ controversy and propose an uncommitted theory.

2 Bi–polar (strong) and weak *any*. Sketch

PS *any*	FC *any*	
bi–polar negative *any*	bi–polar positive *any*	weak *any*

The 'weak' *any* is Horn's (1996) indiscriminative, analogous to *n'importe quel* N in French. It is to be found at least in choice imperatives (*Pick any card*) and *may*–permissions (*You may pick any cake*).

The bi–polar or 'strong' *any* has positive and negative polarity.
Polarity means: informational emphaticness (Israel 1996).

Why 'strong'?
Strong *any* has *modal* properties: non–situationality (Eisner 1994, Dayal 1995,1998), non–individuation (Tovena 1996), arbitrariness (Kempson 1985, Tovena & Jayez 1997b,c, 1998), variation (Tovena & Jayez 1997b, Giannakidou 1997b). Those properties are *manifestations* of informational emphaticness at the model–theoretic (situation–theoretic) level.

An open question: can those 'manifestations' be derived in a strict sense or are they just 'motivated'? An answer would require (at least) a thorough cross–linguistic study. See Tovena & Jayez 1997a, Giannakidou 1997a, Lee (Chungmin) 1997 for some facts.

Some examples to get the flavour (Lee & Horn–style (1994))

Mary didn't read any book = 'Mary did not read (even) the book(s) she was

expected to read',
implicature: 'Mary read absolutely no book'.
Did Mary read any book? = 'I wonder whether Mary read even the book she might have reasonably read',
implicature: 'Really, I wonder whether Mary read some book'.
Mary read any book which was on the reading list = 'Mary read (even) the book(s) on the r.l. she was not expected to read',
implicature: 'Mary read absolutely every book on the reading list'.

See Horn 1972, Fauconnier 1978, Ducrot 1980, Kay 1990, Kadmon & Landman 1993, Lee & Horn 1994, Horn 1996, etc. All these people (the 'scalarists') draw our attention to a very important idea.

> Scalar implicatures are not pragmatic sugar. They form the semantic core of some lexical items. Polarity is the way in which scalar implicatures get lexicalized.

What about the 'modalists' (Eisner, Dayal, Giannakidou, the present authors)? They draw our attention to the fact that *any* hates plain episodic descriptive information in some cases: *Mary read* $^{??}$*any book*. They relate this fact to some modal strength conveyed by *any*.

Each party has explanations of its own, but we propose rather that the two cooperate.

3 The weak *any*

Just mentioned in passing in this talk, it deserves a study of its own. Some brief remarks.

(Partly?) parallel with *n'importe quel* N (lit. 'not matter wh–' N).

(1) a. Prends n'importe quelle carte
(*Pick any card*)
b. Tu peux prendre n'importe quel gâteau
(*You may pick any cake*)

The crucial point is that neither *any* nor *n'importe quel* are modally strong in (1): they do not mean 'any card in any possible situation' or 'any cake in any possible situation' ($\neq$ Dayal's analysis in her 1998 paper).

More debatable: is there a parallelism in (2)?

(2) a. N'importe quel étudiant sait ça
(*Any student knows that*)
b. Est-ce que Marie a lu n'importe lequel de ces livres ?
(*Did Mary read any of these books?*)
c. A la dernière course scolaire, Sandra a couru plus vite que n'importe quelle autre fille de sa classe
(*At the last college race, Sandra ran faster than any other girl in her class*)

For a general approach to FC items, see Giannakidou 1997a,b.

4 A scalar tale

We rephrase the affinity between *any* and scalar implicatures in an information–based terminology (see Krifka 1995, Israel 1996 for a general introduction to the connection).

4.1 Definitions

Our basic constructs are total orders $S = (\Delta, \leq)$, where Δ is a set of *degrees*. N.B. We assume that $\leq$ is total to simplify the presentation. Nothing essential hinges on this choice.

Let P be a gradable property of form $\lambda x, \delta.\, \phi(x, \delta)$, where $\phi(x, \delta)$ means that x satisfies ϕ at some degree δ. We note ϕ_{δ_i} the property of satisfying ϕ at a degree δ_i, i.e. $\phi_{\delta_i} = \lambda x.\, \phi(x, \delta_i)$

(3) **Expectation ordering**
An expectation ordering (e.o.) on an order S w.r.t. properties P and Q, is an order $S'_{S,P,Q} = (\Delta_{S'}, \leq_{S'})$ such that $\Delta_{S'} = \{\langle P_{\delta_i}, Q\rangle : \delta_i \in \Delta_S\}$.

Intuitively, an e.o. is an ordering of how likely it is for an object o to be a Q–object if it is a P–object at some given degree.
$\langle P_{\delta_i}, Q\rangle \leq_{S'} \langle P_{\delta_j}, Q\rangle$ means that an object o which has the property P (a P–object) at a degree δ_i is not likelier to be a Q–object than an object o' which has P at a degree δ_j.

Example.
$P = \lambda x, \delta.$ interesting–book(x, δ), $Q = \lambda x.\, \exists y(\text{read}(y, x))$
Suppose we have an isomorphism

$$\langle P_{\delta_i}, Q\rangle \leq_{S'} \langle P_{\delta_j}, Q\rangle \text{ iff } \delta_i \leq_S \delta_j$$

For books b, b', if b is not more interesting than b', then b is not likelier to be read than b'.

(4) **Scalar domain**
Let $S'_{S,P,Q}$ be an e.o. The scalar domain (s–domain) in S' of a property P_{δ_i} is the set $\{\delta_j : \langle P_{\delta_j}, Q\rangle \geq_{S'} \langle P_{\delta_i}, Q\rangle\}$.

Intuitively, a *s*–domain is the set of degrees which plausibly 'trigger' Q given that the degree δ_i of P has triggered Q. It's a sort of *a fortiori* classification: if you have Q when you reach a δ_i of P–ness, then you have also Q when your reach a greater degree of P–ness.

A proposition is s–relevant whenever it has a maximal s–domain.

(5) **s–relevance**
Let $S'_{S,P,Q}$ be an e.o. P_{δ_i} is s–relevant in S' when its s–domain is Δ itself.

Associated with predicates and dimensions, there are *normal* e.o. For instance, interesting/relevant/epochal books are more likely to be read than dull/irrelevant/insignificant ones, etc.

(6) **Informational relevance for strong** *any*
$\phi(\textit{any}\ \text{N})$ is felicitous w.r.t. some gradable property P iff
a. P entails N,
b. for some δ_i, P_{δ_i} is s–relevant in some normal $S'_{S,P,\phi}$.

(7) $\forall$ **value of strong** *any* (first version)
If $\phi(\textit{any}\ \text{N})$ is felicitous w.r.t. some property P, it triggers the usual scalar conventional implicature $\forall x(\text{N}(x) \Rightarrow \phi(x))$.

4.2 Examples

(8) a. Mary read any book which was on the reading list
b. Mary didn't read any book
c. Any student knows that

d. At most two students read any book
e. Did Mary read any book?

(8-a)
Let $P = \lambda x, y.$book on the r.l.$(x) \wedge$(book on the r.l.$(x) \Rightarrow$ likely to be read(x, y))
and
$Q = \lambda x.$ Mary read(x).
P selects all pairs (x, y) such that x is a book on the r.l. and y is the plausibility of x being read if x is a book on the r.l. P obviously entails the property of being a book on the r.l., that is, P entails N.
Let δ_i be $\min \Delta$ and S' be the normal e.o. defined by the isomorphism above

$$\delta_i \leq_S \delta_j \text{ iff } \langle P_{\delta_i}, Q\rangle \leq_{S'} \langle P_{\delta_j}, Q\rangle$$

Then *any* is appropriate w.r.t. P, Q and S'. The scalar domain of $P(\delta_i)$ is, by def. (4), $\{\delta_j : \langle P_{\delta_j}, Q\rangle \geq_{S'} \langle P_{\delta_i}, Q\rangle\}$. By the postulated isomorphism, this set is the set of degrees, Δ itself. So $P(\delta_i)$ is s–relevant by def. (5) and *any* is appropriate by def. (6).

(8-b)
Let $P = \lambda x, y.$ book$(x) \wedge$ (book$(x) \Rightarrow$ likely to be read(x, y)) and
$Q = \lambda x.$ Mary didn't read(x).
The reasoning is analogous with $\delta_i = \max \Delta$ and the reverse isomorphism this time.

(8-c)
Let $P = \lambda x, y.$ student$(x) \wedge$ (student$(x) \Rightarrow$ likely to know that(x, y)) and
$Q = \lambda x.\ x$ knows that.
Let $\delta_i = \min \Delta$ and an isomorphism as in (8-a). The reasoning is similar to the (8-a) case.

(8-d)
Let $P = \lambda x, y.$ book$(x) \wedge$ (book$(x) \Rightarrow$ likely to be read(x, y)) and
$Q = \lambda x.$ at most 2 students read(x).
$\delta_i = \max \Delta$.

N.B. There are two residual problems with this (kind of) example. First, unexpectedly, *le moindre* is not felicitous in the corresponding French examples: *Deux étudiants au plus ont lu ?le moindre livre.* Examples such as *Il n'y a que deux étudiants qui aient lu le moindre livre* ('There are only...') are ok, however. Second, there is an additional scope constraint since (8-d) entails but is not equivalent to $\forall x$(book$(x) \Rightarrow$ at most two students read(x)).

(8-e)
Let $P = \lambda x, y.\ \text{book}(x) \wedge (\text{book}(x) \Rightarrow \text{likely to be read}(x, y))$ and
$Q = \lambda x.$ I wonder whether Mary read(x).
δ_i is $\min \Delta$.

5 A modal tale

5.1 Scalar suicide

Eisner's (1994) and Dayal's (1998) intuition: *any* is in some cases too strong. *Any* N says something like 'any possible N in any possible world/situation'.

The scalar treatement presented here is consonant with this assumption. Consider (9).

(9) Mary read ??any book

If (9) is analyzed as (8-a), we have that Mary read the least likely book on the scale of plausibility of reading. By scalar implicature, Mary turns out to have read 'all' the books, which is certainly strange.
N.B. In the case of *every*, there is no such implicature, so accomodation procedures can be freely applied (see von Fintel, 1994 for a general discussion).

How is it that we cannot fix a domain before applying the scalar implicature? In (10), there is no implicature that 'all' the books of the world have been read. (10) is compatible with a situation in which Mary read all the books of a fixed, finite, domain.

(10) Mary read even the most difficult books

In fact, the definite determiner of (10) points to individuals, while our formulation of *any*'s scalar properties does not mention individuals, but only property–degree pairs (P_{δ_i}). We take into account the modal character of *any*, not by universal quantification on situation–individual pairs (Eisner's and Dayal's solution), but by considering absolute scales. The advantage is to make the connection with negative polar *any* much easier.

Other examples where the strong *any* forces us to climb the scale up to the top are obligations (*You must read* ??*any book*), or, in general, upward entailing contexts (*At least two students read* ??*any book*).

Contrary to Dayal (1998), we need not assume that *may*–permissions and choice imperatives have modal properties, since we ascribe them to *weak any*. So we avoid the counter–intuitive assumption that *You may pick any card* or *Pick any card* might at some level refer to any card in the world. This move is corroborated by the difference in French between the strong *tout* and the weak *n'importe quel*.

(11) a. Tu peux prendre ??toute carte
(Really? Any card I find in the world?)
b. Tu peux prendre n'importe quelle carte ($\approx$ (1-b))
(From the pack, of course)

5.2 Subtrigging

Dayal (1995, 1998) emphasizes the importance of *subtrigging*, i.e. the fact that certain types of postnominal modifiers (for instance, relative clauses and postnominal adjectives) redeem *any*–sentences which would be anomalous otherwise. Subtrigging is illustrated by the contrast in (12).

(12) a. Mary read ??any book (= (9))
b. Mary read any book which was on the reading list (=(8-a))
c. Mary read any book proposed by her advisor
d. Mary checked any result which depends on Craig's theorem
e. Mary touched ??any book which was on the shelf

The most obvious effect of subtrigging is to restrict the domain. In (12-b), the infelicitous implicature that 'all' books have been read is replaced by the more natural implicature that all books on the r.l. have been read.

However, not just any restriction redeems the *any* phrase, since 'accidental' modifications of the N, as in (12-e), do not improve the sentence. What happens in (12-e) is that no clear connection between being touched by Mary and being on the shelf emerges. Accidentality in ϕ(*any* N) = contingent connection between the N–property and ϕ.

5.2.1 Modal force and arbitrariness

Any forces an unrestricted ∀ reading. In (12-a), the fact that Mary read every book is not presented as a simple enumeration of facts (Mary read the book A and the book B and ...), because simple enumerations ignore the scalar hierarchy.

Is emphaticness compatible with contingency? Not really. Let's look at (12-b) again. If Mary read absolutely every book on the r.l., she must have had some reason/disposition/obligation for/of doing that. Problem: why can't we understand (12-b) as meaning 'it turned out (by luck) that Mary read every book on the r.l.'?

We consider the notion of *arbitrariness* (Fine 1985,1988,1989, Meyer Viol 1985). Arbitrary objects = objects which possess all and only the properties that define their object–class. They are deprived of all individual properties (Plato's Ideas are not very different).
(12-b) = 'Mary read even the book(s) on the r.l. that she was not likely to read'.
Thus, the individual (negative) characteristics of books on the r.l. did not impinge on Mary's reading.
Implicature of arbitrariness: so, it's *in virtue of* being books on the r.l. that books are read by Mary, not in virtue of being this or that book. Otherwise, some of the books (the least interesting, relevant, etc.) wouldn't have been read.
So, there is an essential connection between being a book on the r.l. and being read by Mary (Fine again, 1995, on the logic of essence).
So, accidental modifiers are not welcome: they conflict with the natural implicature of arbitrariness.

An open question: is this implicature 'active' or lexicalized (or both!)? It is difficult to say. It seems that the same implicature is available independently from the use of *any*.

(10) Mary read even the most difficult books

(10) strongly suggests that Mary didn't just happen to read difficult books by luck (or misfortune).
Technically, 'arbitrarification' consists of making the set of properties of individuals vary (one then gets 'slim' or 'fat' individuals), and show that putting individuals 'on a diet' does not change anything essential as long as the slim

individuals keep some properties which are essential to them (Fine 1988). Interestingly, ∀ has then a modal force.

5.2.2 What is subtrigging?

The nature of subtrigging remains somewhat mysterious. In some cases, the subtrigger points to a particular set (the books on the r.l.). But in (12-d), this is far from clear. The sentence should mean 'Mary checked any result in the world which depends on Craig's theorem'. However, we are not committed to this interpretation. If Mary works on a mathematical project which produced a particular set of results, (12-d) is fine (see Tovena & Jayez 1998 for some reservation on Dayal's (1998) approach from this point of view).

In (12-d), we may assume that the dependency is between the property of being a result (from a fixed set) checked by Mary and the property of depending on Craig's theorem. In general, in a form $\phi(\textit{any}\ \mathrm{N}\ \text{wh- S})$, we may assume if needed that the dependency is between ϕ–ing N and (wh- S)–ing. Now, the scalar movement does not take us too far because the implicature is on the minimal/maximal element which Ss *inside* a fixed set. This suggests that we modify the definition (7).

(7)bis ∀ **value of strong** *any*
If $\phi(\textit{any}\ \mathrm{N})$ is felicitous w.r.t. some property P, it triggers the usual scalar conventional implicature $\forall x(\psi(\mathrm{N})(x) \Rightarrow \phi(x))$ for $\psi(\mathrm{N}) = \mathrm{N}$ or $\mathrm{N}^0_{fixed} \wedge \textit{restr}(\mathrm{N}^0)$, where N^0_{fixed} is the characteristic predicated of a fixed set of N^0–objects and $\textit{restr}(\mathrm{N}^0)$ that of the restriction (subtrigger) in N.

5.2.3 Negation and Non–Locality

At first sight, there are no problem with (8-b).

(8-b) Mary didn't read any book

If we consider a fixed domain of books, the strong scalar implicature (that Mary didn't read any book at all in the world) entails that Mary didn't read the books in the fixed domain. But,
1. The meaning assigned to (8-b) is not the right one if the speaker is supposed to refer to a fixed set of books. We have the same problem as

Dayal with *Pick any card* and *You may pick any cake.*
2. The meaning assigned to (13) may perfectly be 'accidental'. If Mary is absent, she didn't touch any object on her desk, but she had possibly no special intention or disposition. Arbitrariness is not required with negation.

(13) Mary didn't touch any object on her desk

However, there is a weaker notion which includes arbitrariness as a special case.

Non–Locality (NL)
A proposition is non–local when its truth in a situation is 'global', that is, not dependent on any particular spatio–temporal region of the situation. NL is best expressed in situation semantics (Barwise & Perry 1983, Devlin 1991) where the notion of region is built in the representation.

Intuitively:
(13) respects NL because there is no set of events which can prove this proposition. One may not select a set of spatio–temporal regions in the situation where (13) is true, and conclude that Mary didn't touch any object on her desk by inspecting those regions. One has to select ALL the regions, or a set of regions which cover the WHOLE situation, that is, one has to consider the whole situation.
(12-b) respects NL because the dependency it expresses may not be proven by selecting a set of spatio–temporal regions. A dependency always presuppose some logical 'glue' to connect causal factors and observed effects, and, in a sense, logics is everywhere.

NL in a simplified version of situation semantics

All we need is the notion of *infon*: propositional objects which are spatio–temporally situated. p, q, etc. denote infons. The spatio–temporal location of an infon represents the spatio–temporal interval at which its propositional content is true.
For instance the infon 'Mary read Vineland at 3 in the garden' is situated in the garden at 3. We note $r(p)$ the spatio–temporal interval at which an infon holds.

A situation s is described by a collection of infons Σ. When an infon p is true in a situation s, s is said to *support* p (written as $s \models p$). Infons can be atomic or complex. Usually, complex infons are obtained from quantification and boolean combination. Σ^s_{at} is the set of atomic infons supported by s.

Infons which pertain to the same spatio–temporal region define a *regional view.* Let r (a *region*) be a spatio–temporal interval on a situation s.

(14) **Regional view**
Let s be a situation. A regional view $\Sigma^r(s)$ on s is the set of atomic infons defined by: $p \in \Sigma^r(s)$ iff $p \in \Sigma^s_{at}$ and $r(p) \sqsubseteq r$.

(15) **Omitting regions**
The situation s *omits* a region r whenever it supports no infon at r, or, equivalently, its regional view $\Sigma^r(s)$ is empty (the situation is 'blind' at r).

Now, we makes situations 'shrink', that is, we suppress some regions.

(16) **Shrinking**
Let s be a situation. A shrinking of s is any situation s' such that:
1. s' omits a region r that s does not omit,
2. s' is like s for all regions that s does not omit, i.e., if s does not omit r, $\Sigma^r(s') = \Sigma^r(s)$.

Finally, we say that a proposition is non–local in s if it may be proved in any shrinking of s.

(17) **Non–locality**
Let s be a situation. An infon p is non–local in s iff no shrinking of s supports p.

For (13), suppose that the region of *Mary didn't touch any object on her desk* is r. Consider the situation at r (the set of 'facts' at r). Make it shrink. How do we know that, in the subregions we erase, Mary did not touch an object on her desk? We don't, therefore by shrinking we destroy the possibility of proving (13), or, alternatively, (13) does not depend on a set, be it infinite, of particular regions of the initial situation. Note the difference with Nelson's (1946) strong negation, which is precisely, not situational.

For (12-b), suppose that we make the initial situation shrink. We might still keep the episodes in which Mary read the books from the r.l. So, *prima facie*, we might prove (12-b). But we have also the dependency between properties. This information is not local. We may not prove a dependency if we do not assume logical principles/laws, which are 'everywhere' (*Russellian* in the situation semantics jargon). The dependency evades the initial situation itself

because it resorts to principles valid in all situations. Therefore, shrinking may not affect the non–locality of a dependency–based judgment.

Finally, we impose a condition which purports to capture the modal strength common to positive and negative polar *any*.

(18) **Non–locality of** *any*
A sentence ϕ(*any* N) is felicitous only if it expresses a non–local infon.

Note that, in the case of *Mary read* ?? *any book*, either the sentence refers to a fixed set of books and non–locality is violated or it refers to all possible books and it is strange for that reason.

6 Conclusion

The distribution of *any* may be best understood by replacing the traditional NPI and FC partition with a classification that groups together positive and negative polarity (strong) manifestations while keeping apart indiscriminative (weak) uses.

The talk has concentrated on strong *any* and has shown that analyses based on scalar and on modal properties of *any* both support this new perception of the polarity sensitivity of the item.

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