A semantics for degree questions based on intervals - negative islands and their obviation

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0. Intro: negative islands and their obviation

- GOAL: provide a new account for negative islands in degree questions:

(1) How fast is Jack driving
(2) *How fast isn't Jack driving?

….and their **obviation** in certain cases (Fox & Hackl 2006)

(3) How fast are we not allowed to drive on this highway?
(4) * How fast are we allowed not to drive on this highway?

(5) ? How many children are you sure that Peter does not have?
(6) *How many children are you not sure that Peter has?

- Fox & Hackl's generalization:

Negative islands get obviated if negation immediately scopes over a possibility modal or if scopes immediately below a necessity modal

- **Core ideas to be developed**

  + **Interval-based semantics**: degree predicates may denote relations between individuals and intervals of degrees, rather than between individuals and degrees

(7) How fast is Jack driving ?
Standard view : for what degrees d of speed, is Jack driving d-fast ?
Present Proposal: for what intervals I, is Jack driving at a speed included in I

+ As in Fox & Hackl (2006): A question is inacceptable if it can never have a **maximally informative answer** (cf. Dayal 1996). This will be the case in cases like (2), but not in cases like (3) and (5)

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1. Background

1.1. Rulmann's (1995) maximality account of negative islands

- A monotonic semantics for scalar predicates:

  - For any x, d, d' d' ≤ d: tall(d)(x) => tall(d')(x)
  - [[tall]] = λd.λx. x is d-tall (= λd.λx. x is **at least** d-tall)
    Jack is six-feet tall ⇔ Jack *is at least six-feet tall*

- Maximality Condition:

(8) a. [How fast]$_d$ ϕ(d) ?
b. For what d, d is the **maximal degree** such that ϕ(d)
>> presupposes that there is a *maximal degree d* such that ϕ(d)

(9) How tall is Jack?
(10) a. For what d: d is the maximal degree such that Jack is d-tall?
b. For what d: Jack is at least d-tall and for no d'>d, Jack is at least d'-tall

(11) How tall isn't Jack
(12) For what d: d is the maximal degree such that Jack is not d-tall or more

>>> There is no such degree

<u>Predicted Generalization</u>: predicates of degree P that license an inference from P(d) to P(d'), with d < d' (*upward-scalar predicates*[2]), should be incompatible with degree-questions, i.e. questions of the form "For what d, P(d) ?" should be unacceptable with such a P.

1.2…..Wrong predictions

Beck & Rullman (1999):

(13) How tall is it sufficient to be (in order to play basketball)?

Suppose it is necessary and sufficient to be 7-feet tall. Then it is *a fortiori* sufficient to be 8-feet tall[3] . Hence *λd. it is sufficient to be d-tall* is, in first approximation, upward-scalar, and yet (13) is felicitous, but is predicted to be unacceptable.

[2] Counter-intuitively, upward-scalar predicates happen to be downward-monotonic in a more general sense, i.e. relatively to their individual, non-degree, argument: this is because with d<d', it turns out that the denotation of *d-tall* includes that denotation of *d'-tall*, not the reverse, since being at-least d'-tall entails being at least d-tall.

[3] First approximation: *It is sufficient S in order T* ⇔ *if S, then T* – that's the 'mathematical' interpretation of the notion of 'S is sufficient condition for T'; probably not correct for natural language.

<Interestingly, according to Rett (2006), a subclass of Romanian degree-questions happens to behave (more or less) as predicted by the maximality account>

Fox & Hackl (2006):

(14) How fast are we not allowed to drive ?

λd. we are not allowed to be d-fast is upward-scalar. Yet (14) is felicitous.

2. F & H's account: dense scales

2.1 . Replacing *Maximality* with *Maximal Informativity*

Dayal (1996)

- A question presupposes that it has a unique maximally informative answer (the complete answer), i.e. a true answer that entails all the other true answers.

- A question asks for the maximally informative answer

- A question is unacceptable if it is logically impossible that there be a maximally informative answer

Predicted generalization for degree-question

(15) $How_d\ \phi(d)$?

- If ϕ is downward-scalar (i.e. $\phi(d+\varepsilon)$ entails $\phi(d)$), the question asks for the *highest degree d* such that $\phi(d)$ is true
- If ϕ is upward-scalar (i.e. $\phi(d)$ entails $\phi(d+\varepsilon)$), the question asks for the *smallest degree d* such that $\phi(d)$ is true.

(16) How fast is it necessary do drive?
>> asks for the highest speed s such that it is necessary to drive at least at speed d

(17) How fast is it sufficient to drive
>> asks for the lowest speed s such that driving at speed s is sufficient

But then negative islands are not clearly predicted:

(18) a.* How tall isn't Jack?
b. For what d, Jack isn't d tall

The property λd. Jack is not d-tall is upward-scalar, hence the question should ask for the *smallest degree d such that Jack is not d-tall*. There should be no problem ***if there is such a degree.***

2.2. Dense scales

F&H: the smallest degree d such that Jack is not d-tall does not exist. Let h be Jack's height: suppose that h' = h + ε is the smallest degree such that Jack is not h'-tall. Take h'' = h + ε/2. Clearly, Jack is not h''-tall; but h'' is smaller than h', which is contradictory.

For concreteness: Let Jack's height be 180 cm. The set of all true propositions of the form 'Jack is not d-tall' is the following:
{…,Jack is not 180,000001 cm –tall, …., Jack is not 180,05 cm-tall, …., Jack is not 181 cm-tall,….}

It will be apparent that there is no *minimal* degree d such that Jack is not d-tall. This is simply because for any d > 180cm, there is a d' such that d > d' > 180cm[4].
So Dayal's condition is not met.

2.3. Accounting for the modal obviation facts

(19) How fast are we not allowed to drive?

Suppose that the law states that our speed should be lower than 65 mph, and says nothing more. It follows that the set of worlds compatible with the law is {w: our speed is lower than 65mph}. So for any speed <u>v</u> below 65 mph (however close to 65 mph), there is a permissible world in which our speed is <u>v</u>. Hence for any speed lower than 65mph, we are allowed to drive at that speed. On the other hand, we are not allowed to drive at 65mph. Hence 65 mph is the lowest speed <u>v</u> such that we are not allowed to drive at speed <u>v</u>. So Dayal's condition can be met.

More generally, predicates of the form $\lambda d.\neg POSSIBLE(P(d))$ *can* denote closed intervals. Likewise for $\lambda d.NEC(\neg P(d))$.

2.4. Apparently discrete scales, modularity and blindness to contextual information

F & H must extend this account even to cases where the domain of degrees is not "intuitively" dense, such as cardinality measures (a certain sort of degrees), as in:

(20) *How many children doesn't Jack have?

<u>Account:</u> suppose Jack has exactly 3 children. Then he does not have 4 children, but he also does not have 3.5 children, or 3.00001 children…

[4] The conjunction of the infinitely-many true propositions of the form *Jack does not have d children* obviously entails all the true answers. In fact this proposition can be expressed by means of a finite sentence, as it is the one expressed by *Jack is no more than 180cm-tall*. If *this* counted as an answer, the account would be lost.

Crucially, *if all scales are dense*, degree predicates such as $\lambda d.\neg P(d)$, where P is a syntactically simple degree predicate (*tall, d-many books, ...)*, always denote *open intervals*, hence have no minimal elements.

A natural objection: even granting that it makes sense to say that Jack has 3.5. children, yet the exact number of children someone has is always an integer. So *Jack does not have* $3+\varepsilon$ *children* is known to be equivalent to *Jack does not have 4 children*, and there is in fact a true answer that entails all the other ones.

F & H have to assume a very strong modularity assumption: presumably, the knowledge that the number of children someone has is an integer is a form of lexical/encyclopedic knowledge. Importantly, though, this knowledge is not purely logical, given some reasonable notion of logicality (one that is blind to lexical semantics/encyclopedic knowledge). F & H's central claim is that Dayal's condition is computed only on the basis of the purely logical meaning of the question, i.e. is blind to contextual, encyclopedic or lexical information.

While F & H do provide some intriguing arguments for this view (some of which are completely independent of degree-questions), we want to investigate an alternative. We'll see that even if F & H's account were right, we hope that some of the ideas that we will explore will have to be maintained on independent grounds.

3. The interval-based account (inspired by works on comparatives by Schwartzschild & Wilkinson 2002, Heim 2006)

3.1. The proposal

- **1st ingredient: interval-based semantics**

(21) $[[\text{tall}]] = \lambda D_{<d,t>}$: D is an **interval**.$\lambda x$. x's height $\in$ D

Given an ordered set (E, <), an *interval* on E is a set D included in E such that:
For all d, d', d'': if $d \in D$ & $d'' \in D$ & $d \leq d' \leq d''$, then $d' \in D$

NB: Intervals can be defined on discrete scales as well as on dense scales

(22) LF for *How tall.*:
$How_{D<d,t>}$ [………D-tall…….] ?, with the variable D ranging over intervals

- **2nd ingredient**: maximal informativity

  - A question presupposes that it has a maximally informative answer, i.e. a **true answer that is not entailed by the common ground and entails all true answers** (cf. Dayal 1996)

- A question that *cannot have* a maximally informative answer (i.e. for which Dayal's presupposition is contradictory) is inacceptable (cf. Fox & Hackl, Abrusan 2007)

- **Illustration**

(23) a. How tall is Mary?
b. For what interval I, Mary's height is in I?

------------------------------[---(--- x ---)---]--------------------------------
M's height

Most informative answer : take I = {Mary's height}

3.2. Explaining the basic patterns

3.2.1. Negative islands

(24) a. #How tall isn't Mary?
b. For what interval I, Mary's height is not in I?

[0--------(------------------)----------]---M's height---[------(----------(---)------------

Suppose Mary's height is d, with d ≠ 0 which.

The set of intervals such that Mary's height is not in them consists of:
- all the intervals strictly above d
- all the intervals strictly below d

- Now any answer based on an interval above d fails to logically entail an answer based on an interval below d, and vice versa. So there cannot be a true answer that entails all the true answers, and Dayal's presupposition can never be met…

- ……*unless d = 0*

So Dayal's presupposition amounts to the claim that d = 0. But in any context in which this presupposition is met, the most informative proposition (that Mary's height is not above 0) is already entailed by the common ground. So there can be no maximally informative answer in our sense.

3.2.2. F & H's obviation facts

- Fox and Hackl (2006) observe that existential modals below negation obviate negative islands:

(25) a. How fast are we not allowed to drive?
b. For what I, it is not allowed that our speed be in I?

- This fact is straightforwardly predicted by the present account:

  - Suppose that the law states that we must drive below 80 mph, and says nothing else

  - Now any I that is entirely above 80 mph is such that it is not allowed that our speed be in I.

  - In this case, there is a strongest true proposition in the denotation of (25): the answer based on]80, +∞).

  - Dayal's condition can be met

→Same for <u>universal modals above negation</u>: **How fast are we required not to drive?**

<u>3.2.3. No obviation if the existential modal scopes above negation</u>

(26) a. # How fast are we allowed not to drive?
b. For what I, it is allowed that our speed be not in I?

- FACT:

Not being allowed to drive at a speed in I_1 entails *Not being allowed to drive at a speed in I_2* iff I_2 is included in I_1

- HENCE: The most informative true answer, if it exists, is based on an interval that includes all the intervals that yield a true answer (call this interval the 'most informative true interval'):

(i) case a: there is no particular speed d such that we must drive at exactly d.

- for any d, we are allowed not to drive at a speed included in [d,d]
- given (ii), the most informative true interval, if it exists, is [0, +infinity[
- but this is impossible: in every possible world, our speed is in [0, + infinity[

(ii) case b: our speed must be exactly d.

- the for any d' distinct from d, we are allowed not to drive a speed included in [d'. d']
- Unless d = 0, given (ii), the most informative true interval, if it exists, is [0, +infinity[, which is impossible

(v) Dayal's presupposition can be met only in the degenerate case where d = 0, but in this case the question is vacuous (and so there is no maximally informative answer in our sense)

3.2.4. Discrete scales

Things work the same with discrete scales.

Examples:

(27) How many children doesn't Jack have ?
For what interval I of integers, the number of children Jack has is not in I ?

Suppose Jack has exactly 4 children: then the set of intervals that correspond to true answers consists of all the intervals strictly below 4 and every interval strictly above 4. But no interval in this set corresponds to a maximally informative answer (as before).

So the only situation where there could exist a maximally informative answer is the situation where Jack has no children. So the question would end up presupposing that Jack has no children, but then the question would be vacuous (and there can be no maximally informative answer)

3.3. The interval-based reading exists

(28) How fast are we required to drive?

Suppose that one the highway we should drive between 45mph and 75mph. Then the complete answer is predicted to state exactly this.

That the *interval reading* exists is shown by the following example:

< Jack and Peter are devising the perfect Republic. They argue about speed limits on highways. Jack believes that people should be required to drive at a speed between 50mph and 70mph. Peter believes that they should be required to drive at a speed between 50mph and 80mph. Therefore…>

(29) Jack and Peter do not agree on how fast people should be required to drive on highways

Note that the disagreement is about the *maximal* speed, not the *minimal speed*, as the standard account would have it.

<NB: there is also another reading, which corresponds to the 'standard' semantics assumed in previous works. So far we do not predict this reading. See APPENDIX>

4. <u>The overgeneration problem</u>

4.1. Problem # 1

(30) How fast are we required to drive?

Let us now consider two special cases:

- Case a: there is a minimal speed s : hence the maximally informative answer is the interval [s, +∞[, or [s, s'] if s'is the maximal permitted speed. This corresponds to our intuitions

- Case b: there is a *maximal* speed s and no minimal speed. There is a maximally informative answer, namely the one based on [0, s]. But in fact (30) is unnatural if it is known that there is a maximal speed and no minimal speed. Note that the corresponding question is perfectly fine in a language like French, where instead of *how fast/how slow* one finds *At what speed*. This is an *overgeneration problem*, in the sense that our account so far predicts a question like (30) to be felicitous in too many contexts.

4.2. Problem #2

(31) How fast are we not allowed to drive on this highway?

- Normally, one understands from (31) that one is not allowed to drive *too fast*, which corresponds to the case where the most informative answer is of the form [d, +∞[

- But suppose that the most informative answer is, say [0, 50]. This would mean that we are not allowed to have a speed in [0, 50], i.e. that the only obligation we have is to drive at a speed above 50mph. Yet (31) is not appropriate in such a situation.

- Again we fail to predict that a question like (31) imposes a further restriction, namely presupposes that there is a maximal speed.

4.3. Solving the overgeneration problem

<u>4.3.1 Proposed solution :</u>

Adding a presupposition that cares about the directionality of the relevant scale.

***$How_{I\{S,<\}}$ $\phi(I)$?* presupposes the following:**

There is a true answer $\phi(I)$ with I being an interval defined on scale S with ordering relation <, such that its lowest bound x is not 0 and for any $y > x$, $y \in I$.

- if S is an open scale upward (***fast***), I must be of the form $[x, +\infty)$, with x distinct from 0:

FAST: 0 < 1 < 2 < 3 < 4 < 5 < 6 < 7 < 8 < 9 < → ∞ **maximal fast**

if S is closed upward (***slow***: there is a maximal degree of slowness, namely a speed of 0): I must be of the form **[x, MAX]** (MAX: maximal member of the scale)

SLOW: **…** < 9 < 8 < 7 < 6 < 5 < 4 < 3 < 2 < 1 < → 0 **MAX**

4.3.2. Solving problem #1

(32) How fast are we required to drive?

Presup: there is an interval of the form $[x, +\infty)$ such that we are required to drive at a speed in $[x, +\infty)$, i.e there is a minimal speed.

This does not entail that there is no maximal speed. For suppose the actual regulation is that our speed should be between x and y. Then it follows that our speed must be above x, i.e. in the interval $[x, +\infty)$.
NB The interval whose existence is presupposed does not have to correspond to the most informative answer.

4.3.3. Solving problem #2

(33) How fast are we not allowed to drive on this highway?
Presup: for some interval $[x, +\infty)$, we are not allowed to drive at a speed in this interval
I.E: The regulations impose **a maximal speed**. This was again the desired result

Previous results are not lost:

(34) How fast did Jack drive?

Presupposes that for some interval $[x, +\infty)$, with x distinct from 0, Jack's speed was in this interval. This is true as long as Jack has a non-null speed. Hence (34) is predicted to presuppose that Jack has a non-null speed, which seems to be quite innocent.

4.3.3. *How fast / How slow*

The presupposition that we postulate ensures that *How fast* and *How slow* are not synonymous, because the interval whose existence is presupposed depends on the underlying ordering relation.

(35) How slow are we required to drive ?

<u>Presup</u> : there is an interval of slowness of the form [x, MAX] such that our degree of slowness must be in [x, MAX] (In the case of *slow*, MAX = 0).
In other words, there is a minimal degree of slowness, i.e. a **maximal permitted speed**.

4.4. *At what speed…*

In many languages, degree questions can be expressed naturally by means of expressions such as "at what speed"(French: *A quelle vitesse*). There is evidence that such degree questions are also based on the interval reading, but do not carry the same kind of presupposition:

(36) Marie sait à quelle vitesse on doit rouler sur l'autoroute
Marie knows at what speed one must drive on the higway

Situation #1: one must drive above 50 mph and below 80.

Judgment: if Mary only knows the minimal speed (and not the maximal speed), the sentence can be judged false.

Situation #2: it is known that there is no required minimal speed, only a required maximal speed, i.e. one must drive below a certain speed. Then the question *A quelle vitesse doit-on rouler sur l'autoroute* is natural and asks for the maximal permitted speed.

APPENDIX A
Deriving the 'standard' reading when needed: The PI-operator

<u>I. The undergeneration problem</u>

Problem #1

Suppose we are required to drive between 50mph and 80mph

The following utterance should express a contradiction:

(37) John knows how fast we are required to drive, but does not know what the maximal speed is.

But (37) seems to be fine. In fact, this is expected given the standard semantics, according to which the question asks for the maximal speed such that we are required to drive at that speed, i.e. the minimal permittedspeed. ("how fast are we required to drive?"= for what speed s, our speed must be at least d). But so far we cannot predict such a reading

Problem #2

(38) How fast are we allowed to drive?

Standard semantics for *allowed*

We are allowed to drive in I = there is a permissible world w such that our speed in w is in I.

- FACT: *we are allowed to drive in* I_1 entails *we are allowed to drive in* I_2 iff I_1 is included in I_2 [might be counterintuivie, because of a possible free-choice effect – see below]
- Let s be a speed such that it is allowed that our speed be exactly s. Given the above fact, the answer based on s cannot be entailed by any other true answer.
- Hence, if there is a maximally informative answer, it has to correspond to the interval {s}.
- But then s has to be the *only* speed such that we are allowed to drive at s
- So (38) is predicted to presuppose that there is a speed such that we have to drive at exactly that speed – clearly, a bad prediction

The 'standard' semantics seems to derive exactly the right interpretation:
For what speed s, are we allowed to drive at a speed above s?
>> the maximally informative answer turns out to be based on the maximal permitted speed.

<u>NB: Free-choice reading</u>

(39) We are allowed to drive between 50mph and 80mph
- without free-choice: there is a permissible world in which our speed is between 50mph and 80mph [does not exclude that we must actually drive at a speed between 60mph and 70mph]
- free-choice : for any speed s between 50mph and 80mph, we are allowed to drive at the speed s

So there might be another predicted reading for (38):

(40) a. How fast are we allowed to drive?
b. For what interval I, we are allowed to drive at *any* speed in I.

The presupposition introduced in section 3.3 then entails that there is an interval $[x, +\infty)$ such that we can drive at any speed in $[x, +\infty)$. In other words, there can be no *maximal permitted speed*. This again is counterintuitive.

II. Solving the undergeneration problem: the PI-operator

II.1. Revisiting the semantics of scalar predicates and the LF of degree questions

- Back to type <d, <e,t>> for scalar predicates:

(41) $[[\text{ fast}_1]]_{<d <e,t>>} = \lambda d.\ \lambda x.$ x's speed is at least d
(42) $[[\text{ fast}_2]]_{<<d,t>, <e,t>>} = \lambda D_{<d,t>}.\lambda x.$ x's speed is in D

- The PI-operator (point-to-interval: from Heim, S & W - reversing the order of arguments – this is harmless)

(43) $\Pi = \lambda P_{<d,t>}.\ \lambda I_{<d,t>}$: P has a maximum. $\max(P) \in I$

(44) $\Pi[\lambda d.$ Jack is at least d-fast$] = \lambda I.$ MAX{d: Jack is at least d-fast} $\in$ I
= λI. Jack's speed is in I.

(45) $[[\text{ fast}_2]]_{<<d,t>, <e,t>>} = \lambda D.\lambda x.\ (\Pi\ [\lambda d.\ \text{fast}_1(d)(x)])(D)$
The crucial point is that Π can in principle appear higher than just above the lexical degree predicate.

II. 2. Extension to degree questions

(46) $[[\text{ fast }]]_{<d <e,t>>} = \lambda d.\ \lambda x.$ x's speed is at least d

LF of degree questions:

(47) How fast is John?
(48) For what interval I, $(\Pi.(\lambda d.$ John is d-fast$)$ (I) ?

(49) How fast are we required to drive?

Two possible LFs:

(50) For what interval I, it is required that $(\Pi.(\lambda d.$ we are d-fast$)$ (I)
= For what interval I, it is required that our speed be in I?

(51) For what interval I, Π(λd. it is required that we drive at least d-fast) ?

'Π(λd. it is required that we drive at least d-fast)' denotes the set of intervals that include the maximal speed s such that we are required to drive at least s-fast. Suppose that on the highway we must drive between 45mph and 75mph; then this maximal speed is 45mph; and therefore'Π(λd. it is required that we drive at least d-fast)' denotes all the intervals that include 45mph. The most informative answer turns out to be the one you get by just taking I = {45mph}
>> This is the reading predicted by standard treatment

- Crucially, **Π(λd. Jack didn't drive d-fast) is not defined**, **because there is no maximum in 'λd. Jack didn't drive d-fast' (cf. Rullman)**. So Π cannot scope above negation, and negative islands are still accounted for.

II. 3. A potential problem (D. Fox, p.c.)

(52) How fast are we not allowed to drive ?

In this case, **Π** cannot scope above negation (because there is no maximum in **λd. we are not allowed to drive d-fast).**

So the only reading that we derive is the one derived in section 4.3.3, which presupposes that there is a maximal speed(Recall the the presupposition is: for some speed s, we are not allowed to drive in [s, +∞).)

Suppose there were both a minimal speed and a maximal speed, i.e. our speed must be in [x, y]. Then we are not allowed to drive in [0,x] and we are not allowed to drive in [y, +∞]. But in this case there isn't a maximally informative answer

Hence, the question is predicted (by Dayal's assumption) to presuppose that there is a maximal permitted speed and no minimal permitted speed. Therefore the following sentences are predicted to be presupposition failures:

(53) a. Jack knows how fast we are not allowed to drive, but he does not know what the minimal speed is
b. Jack knows how fast we arenot allowed to drive, but he does not know how slow

APPENDIX B: Comparaison of recent approaches with Szabolcsi and Zwarts (1993)

Similarities with Rullmann (1995), F & H (2006) and the present proposal:

- The difference between the island sensitive and non-island sensitive extractees resides in the structure of the domain of quantification of these elements

- The explanation for negative islands is connected to the fact that some operations are not always defined on certain domains

(Rullman: "the maximal degree such that…."
Fox & Hackl: "the degree that yields the maximally informative answer"
Present proposal : "the interval that yields the maximally informative answer)

Differences:

- Their explanation does not extend to obviation effects by modals.

- The interval account is independently motivated

- Under the more recent accounts, the unacceptability of negative islands results from the maximally informative answer **never** being defined (while for Sz&Z the unacceptability results from the fact that it cannot always be defined)

SELECTED REFERENCES

Abrusan, M., 2007, *Contradiction and Grammar: the case of weak islands*, PhD Diss, MIT

Beck, S., and H. Rullmann. 1999. A Flexible Approach to Exhaustivity in Questions. *Natural Language Semantics* 7:249-298.

Dayal, V. 1996. *Locality in WH quantification*: Kluwer Academic Publishers Boston.

Fox, D., and M. Hackl. 2006. The Universal Density of Measurement. *Linguistic and Philosophy*

Heim, I. 2006. Remarks on comparative clauses as generalized quantifiers. *ms. MIT*.

Rett, J. 2006. How *Many* maximizes in the Balkan Sprachbund, SALT 16

Rett, J. 2007, Antonymy and Evaluativity, SALT 17

Rullmann, H. 1995. Maximality in the semantics of wh-constructions, University of Massachusetts at Amherst Amherst, Mass.

Schwarzschild, R., and K. Wilkinson. 2002. Quantifiers in Comparatives: A Semantics of Degree Based on Intervals. *Natural Language Semantics* 10:1-41.

Spector, B. 2004. Intervention Effects in How-Many Questions and the Syntax/Semantics Interface. *3 page abstract for Sinn und Bedeutung* 9.

Spector, B. 2005/2006. Aspects de la pragmatique des operateurs logiques. PhD Diss, Paris 7.

Szabolcsi, A., and F. Zwarts. 1993. Weak islands and an algebraic semantics for scope taking. *Natural Language Semantics* 1:235-284.