ON *WH*-ISLANDS

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GOAL This paper offers a semantic solution to the classic problem of *wh*-islands (c.f. (1)-(2)) i.e. the fact that interrogative infinitival complement clauses create islands of which *wh*-words ranging over individuals can move out, however *wh* degree or manner constituents cannot.

(1) a. *Who does Mary wonder/know whether to invite?*
b. **How is Mary wondering/does Mary know whether to behave?*
c. **How tall is the magician wondering/does Mary know whether to be?*

(2) *a.* *?Which problem do you wonder/know how to solve?*
b. **How do you wonder/know which problem to solve?*
c. **How tall do you wonder/know who should be?*

Semantic accounts of weak islands (e.g. Szabolcsi and Zwarts 1993, Honcoop 1998) haven't so far offered more than a tentative solution to the problem of *wh*-islands. An exception is Cresti (1995), who however only offers a proposal tailored for *wh*-islands created by *how*-many questions. I will also show that the present proposal is preferable to syntactic accounts (e.g. Rizzi 1990 and others), because the oddness of the sentences above follows directly from independently motivated semantic properties of these questions.

PREVIEW OF THE SOLUTION Dayal (1996) has proposed that a question presupposes that it has a most informative true answer, i.e. a true answer that entails all the other true ones. I show that in the case of *wh*-island violations this condition can never be met and therefore a complete answer (i.e. the most informative answer coupled with the negation of all the alternatives in the H/K denotation of the question that are not entailed by it) will always state a contradiction. The difference between questions ranging over individuals on the one hand and the ones ranging over degrees and manners on the other stems from a fundamental difference in the domain of quantification of these elements: in the case of manners and degrees there are always sets of alternatives in the H/K denotation which "exhaust the logical space", and whose truth therefore is not independent of each other.

BACKGROUND ASSUMPTIONS <u>*Degrees:*</u> Following Schwarzschild and Wilkinson (2002) and Heim (2006), I assume that degree predicates are actually not predicates of degrees but predicates of *intervals* of degrees:

(3) $[[tall]] = \lambda I_{<d,t>}$: *I is an interval.* λx. *x's height* $\in I$

As a result, the variable bound by a degree operator also ranges over intervals, and a positive degree question receives the following interpretation:

(4) *How tall is John?*

(5) *For what interval I, John's height is in I?*

<u>*Manners*</u>*:* The domain of manner predicates contains *contraries:*

(6) *The set of manners* (D_M) *in a context C is a subset of* $[\{f \mid E \rightarrow \{1,0\}\} = \wp(E)]$ *such that*

(a) *for each predicate of manners* $P \in D_M$*, there is at least one contrary predicate of manners* $P' \in D_M$*, such that P and P' do not overlap:* $P \cap P' = \varnothing$.

(b) *for each pair (P, P'), where P is a manner predicate and P'is a contrary of P, and* $P \in D_M$ *and* $P' \in D_M$ *, there is a set of events* $P^M \in D_M$*, such that for every event e in* $P^M \in D_M$ $[e \notin P \in D_M \ \& \ e \notin P' \in D_M]$.

The context might implicitly restrict the domain of manners, just as the domain of individuals, but for any member in the set $\{P, P', P^M\}$, the other two members are alternatives to it in any context. An example of such a triplet is e.g. *{wisely, unwisely, neither wisely nor unwisely}.*

SOLUTION Observe first the case of movement of a *wh* ranging over individuals out of a *whether* clause:

(7) a. *Who does Mary know whether she should invite?*

b. $\lambda q.\exists x\ [person(x) \wedge\ q=\lambda w.\ knows\ (Mary, \lambda p.[\ p=\lambda w'.\ she_m\ should\ invite$
$x\ \ in\ w' \vee p=\lambda w'.\ she_m\ should\ not\ invite\ x\ in\ w'])\ in\ w$

Let's imagine now that we assert *Mary knows whether she should invite Bill* as an answer to the question in (7). The statement that this answer is the complete answer means that we in fact assert that the rest of the alternative propositions in Q are false: i.e. we assert that Mary knows whether she should invite Bill and that she does not know whether she should invite John and that she does not know whether she should invite Fred:

(8) *Mary knows whether she should invite Bill*

$\forall w' \in Dox_M(w)$, if $invB$ in w, $invB$ in w' $\wedge$ if $\neg invB$ in w, $\neg invB$ in w' *and*

$\exists w' \in Dox_M(w)$, ($invJ$ in w $\wedge$ $\neg invJ$ in w') $\vee$ ($\neg invJ$ in w $\wedge$ $invJ$ in w'), *and*

$\exists w' \in Dox_M(w)$,($invF$ in w $\wedge$ $\neg invF$ in w') $\vee$ ($\neg invF$ in w $\wedge$ $invF$ in w')

In the case of questions about individuals thus no problem arises with complete answers: the meaning expressed above is a coherent one. This is because the truth of the alternatives in the question denotation is independent from each other: whether or not Bill is invited in the actual world is completely independent from whether or not Fred is invited etc.

EMBEDDED *WHETHER* QUESTIONS WITH *KNOW* ABOUT DEGREES Given the assumption according to which degree questions range over intervals, any complete answer to a question such as the one below will lead to a contradiction:

(9) a. *How tall does Mary know whether to be?*

b. $\lambda q.\exists I\ [I \in D_I \wedge\ q=\lambda w.\ knows\ (Mary, \lambda p.[p=\lambda w'.\ her_m\ height$
$be\ in\ I\ in\ w' \vee p=\lambda w'.\ \neg\ her_m\ height\ be\ in\ I\ in\ w'\ ])\ in\ w$

Imagine now that we were to state *Mary knows whether her height should be in* I_1 as a complete answer. Now let's take 3 intervals: interval 1, interval 2 which is fully contained in 1 and interval 3 which is fully contained in the complement of 1:

(10) |__**1**__________________|_____¬1____________________|
|_____**2**_____|__¬2__________________________________|
|______¬3________________________|_____**3**__________|

The propositions that Mary knows whether her height is in I_1 and that Mary knows whether her height is in I_2 and that Mary knows whether her height is in I_3 do not entail each other. Given this, asserting that *Mary knows whether her height be in* I_1 as a complete answer would amount to asserting the conjunction that she knows whether her height should be in I_1 and that she does not know whether her height should be in I_2 or I_3:

(11) $\forall w' \in Dox\ M(w),\ \ [if\ I_1(w)=1,\ I_1\ (w')=1] \wedge [\ if\ \neg I_1(w)=1,\ \neg I_1\ (w')=1]\ and$

$\exists w' \in Dox\ _M(w),\ (I_2\ (w)=1\ \wedge \neg I_2\ (w')\neq 1) \vee\ (\neg I_2\ (w)=1 \wedge \neg I_2\ (w')\neq 1)\ \ and$

$\exists w' \in Dox\ _M(w),\ (I_3\ (w)=1\ \wedge \neg I_3\ (w')\neq 1) \vee\ (\neg I_3\ (w)=1 \wedge \neg I_3\ (w')\neq 1)$

However, the meaning expressed by the tentative complete answer above is not coherent. Suppose first that Mary's height is in I_1. The complete answer states that Mary does not know that her height is in $\neg I_3$, i.e. the complement of interval I_3. From this it follows, that for any interval contained in I_3, Mary does not know that her height is in it. Interval I_1 is contained in interval $\neg I_3$. But now we have derived that the complete answer states a contradiction: this is because it states that Mary knows that her height is in I_1 **and** that she does not know that her height is in $\neg I_3$, which is a contradiction. If Mary's height were to be in the complement of interval I_1, the same problem would be recreated, but this time with interval I_2.

EXTENSIONS: In the paper I show how the account can be extended to manner predicates, to cases like (2) [the same problem as with *whether* reappears, just multiply] and predicates other than *know*, such as *wonder*.