The anti-rogativity of non-veridical preferential predicates*

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Abstract

Clause-embedding predicates come in three major varieties: (i) *responsive predicates* (e.g. *know*) are compatible with both declarative and interrogative complements, (ii) *rogative predicates* (e.g. *wonder*) are only compatible with interrogative complements, and (iii) *anti-rogative predicates* (e.g. *hope*) are only compatible with declarative complements. It has recently been suggested that these selectional properties are at least partly semantic in nature. In particular, it is proposed that the anti-rogativity of neg-raising predicates like *believe* comes from the triviality in meaning that would arise with interrogative complements. This paper puts forward a similar analysis for non-veridical preferential predicates such as *hope*. In so doing we also aim at explaining the fact that their veridical counterparts such as *be happy* are responsive.

1 Introduction

Clause-embedding predicates can be classified into three types ([14, 22, 31]):

- Responsive predicates can embed both declarative and interrogative complements, e.g. *know*.
- Rogative predicates can only embed interrogative complements, e.g. *wonder*.
- Anti-rogative predicates can only embed declarative complements, e.g. *believe*.

The main question we would like to tackle in this paper is how this variation should be accounted for. One possibility is to assume that each clause-embedding predicate comes with a lexical specification as to what type of clause it syntactically selects for. A purely syntactic theory of this kind, however, would be unsatisfactory given the stability and predictability of selectional patterns both intra- and cross-linguistically in the sense that predicates that have similar meanings generally exhibit the same selectional properties. For instance, such a theory would not necessarily rule out a version of *know* that is rogative or a version of *wonder* that is responsive. These considerations are taken as evidence that the core selectional properties come from the lexical semantics of the predicates, although idiosyncratic syntactic properties are not necessarily excluded (see [14, 25, 24, 35]).

Recent developments in the area of question semantics have prompted linguists to tackle the issue of complement clause selection from a more semantic perspective, but there are some open issues. In order to illustrate the issue, let us first consider the following type-theoretic approach. One of the standard views of question semantics championed by [19] and others holds that declarative and interrogative clauses denote different kinds of semantic objects.

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Specifically, declarative clauses denote propositions, while interrogative clauses denote sets of propositions. In this setting, anti-rogative predicates like *believe* can then be analyzed as those whose denotations exclusively select for propositions, and rogative predicates like *wonder* as those whose denotations exclusively select for sets of propositions, as illustrated in (1). Throughout this paper, we write $\hat{\tau}$ for the type of sets of type-τ objects.[1]

(1) a. $[\![\text{believe}]\!]^w = \lambda p_{\langle s,t\rangle}.\lambda x_e.\ B_w(x,p)$ b. $[\![\text{wonder}]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}.\lambda x_e.\ W_w(Q)$

This analysis needs to make an extra assumption about responsive predicates, which are compatible with both types of embedded clauses. The most popular take on this is to assume that when they combine with an interrogative clause, the meaning of the interrogative clause is converted to a specific proposition that represents an 'answer' to the question ([16, 10, 5, 29]). We will put aside the interesting but complicated issue of what counts as an appropriate answer to a question here, but if any such mechanism that converts sets of propositions to propositions is available, it becomes unclear why anti-rogative predicates cannot combine with interrogative clauses. That is, just like (2-a) means roughly 'John doesn't know the true answer to the question *Who danced?*', (2-b) should be able to mean something like 'John doesn't believe the true answer to the question *Who danced?*'.

(2) a. John doesn't know who danced. b. *John doesn't believe who danced.

Some recent theories of question semantics do not make a type distinction between declarative and interrogative clauses ([8, 32, 30]). Specifically, on these accounts, both declarative and interrogative clauses denote sets of propositions, which are taken to represent *issues*, and the difference between declarative and interrogative clauses boils down to whether the issue has been resolved. Then, rogative predicates can be analyzed as those that exclusively select for unresolved issues, anti-rogative predicates as those that exclusively select for resolved issues, and responsive predicates as those that are insensitive to resolvedness. To be more concrete, these restrictions could be encoded as sortal presuppositions as in (3).

(3) a. $[\![\text{believe}]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}:\ \texttt{resolved}(Q).\lambda x_e.\ B_w(x,Q)$
b. $[\![\text{wonder}]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}:\ \neg\texttt{resolved}(Q).\lambda x_e.\ W_w(Q)$
c. $[\![\text{know}]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}.\lambda x_e.\ K_w(Q)$

For such a theory to be truly explanatory, however, it needs to be able to predict which predicates have what restrictions, but this turns out to be a rather vexing issue. For instance, *know* and *believe* have very similar meanings, but why is it that the former is responsive while the latter is anti-rogative?

Recently, [31] and [23] propose a partial answer to this question that concerns the anti-rogativity of neg-raising predicates. As originally noticed by [36], neg-raising predicates are all anti-rogative, e.g. *believe, think, expect, assume, presume, reckon, advisable, desirable, likely.* To explain this robust generalization, [31] and [23] put forward semantic accounts, according to which, such predicates give rise to logically trivial interpretations with interrogative complements, due to their neg-raising property. We do not go into the details of these accounts here, but in our view they are conceptually attractive, as they reduce the selectional properties of these predicates to their independent semantic property. Of course, it needs to be explained which predicates are neg-raising and which ones are not, but that is an independent problem

[1] Since the domain of partial functions of type $\langle \sigma, t\rangle$ and the domain of sets of objects of type-σ are not isomorphic, we will explicitly distinguish sets and their characteristic functions in the present paper.

	Representational	Non-representational (preferential)
Veridical	*know, forget, remember*	*be glad, be surprised, be happy*
Non-veridical	*believe, be certain, doubt*	*hope, wish, demand*

Table 1: Examples of four classes of attitude predicates generated by veridicality and representationality.

that every semantic theory needs to account for.

One limitation of these accounts, however, is that they only explain a subset of anti-rogative predicates. That is, while neg-raising predicates are all anti-rogative, not all anti-rogative predicates are neg-raising. Concretely, predicates like *wish, fear, deny* and *regret* are not neg-raising but are still anti-rogative. It is also interesting to note that English *hope* and its Dutch cognate *hopen* have similar meanings but crucially differ in the neg-raising property ([18]). Nonetheless, both of them are anti-rogative.

In sum, it is conceptually appealing to explain anti-rogativity in semantic terms, and some recent accounts achieve this for neg-raising predicates like *believe*. However, the explanations they offer are not applicable to all anti-rogative predicates. This of course does not mean that these accounts should be dismissed. In fact, we think it is not unlikely that different anti-rogative predicates are anti-rogative for different semantic reasons. In this paper, we will develop a semantic analysis of the anti-rogativity of preferential predicates like *hope* and *fear*. If successful, it will complement the analyses of the anti-rogativity of neg-raising predicates, although we admit that there still will be some anti-rogative predicates that are left unexplained by either account, e.g. *regret* and *deny*.

The idea we will pursue in this paper is similar in nature to the aforementioned accounts of neg-raising predicates: non-veridical preferential predicates like *hope* are prohibited from combining with interrogative clauses, because such combinations are bound to result in trivial meanings. We will furthermore show that this analysis also accounts for the fact that their veridical counterparts like *be happy* are responsive.

2 Veridicality and Anti-Rogativity

Following previous studies on the typology of attitude predicates, especially [1] (see also [6, 15, 34]), we recognize two major semantic classes among them. We say an attitude predicate is *representational* if it expresses a 'propositionally consistent attitudinal state' ([1], p. 3) and is *non-representational* otherwise.[2] For instance, predicates of (un)acceptance (e.g. *know, believe, be certain, deny*) are all representational. Of particular interest for us in this paper are *preferential predicates* which constitute a sub-class of non-representational predicates. Preferential predicates express comparisons of alternatives based on preference orders. They include desideratives (e.g. *hope, wish, want, fear, be surprised, be happy*) and directives (e.g. *demand*).

We observe that veridicality correlates with anti-rogativity in the domain of preferential predicates. We say that a clause embedding predicate V is *veridical* if $\ulcorner \alpha\ V$s that $p \urcorner$ entails $\ulcorner \mathrm{p} \urcorner$. Veridicality crosscuts the representational vs. non-representational distinction, giving rise to four classes of attitude predicates, as in Table 1.

[2] [1] lists some linguistic phenomena (namely, mood selection, parenthetical uses, compatibility with epistemic modals) that could be used as diagnostics for representationality of attitude predicates, but space prevents us from discussing them in detail here. It should nonetheless be mentioned that the empirical landscape is not as clear as one might wish. For example, as [1] discusses, mood selection might not be an entirely reliable test, especially given its cross-linguistic variability.

We submit that all non-veridical preferential predicates are anti-rogative. Let us consider some examples. Firstly, non-factive preferential predicates are generally anti-rogative.

(4) a. *Alice prefers which students will be invited to the party.
 b. *Ben hopes/wishes which students will be invited to the party.
 c. *Chris expects/fears how many students will be invited to the party.

All of these predicates are compatible with finite declarative complements.

(5) a. Alice prefers that Andrew will be invited to the party.
 b. Ben hopes/wishes that Becky is invited to the party.
 c. Chris expects/fears that Cathy is invited to the party.

It should be remarked that there are preferential predicates that cannot (easily) take finite complements, declarative or interrogative, e.g. such as *want* and *be uneasy*. These predicates are neither anti-rogative nor responsive, and their selectional restrictions need to be somehow lexically stipulated, perhaps as a syntactic condition.

Finally, let us look at preferential predicates that are compatible with interrogative complements. The ones in the following examples are all responsive and veridical (factive, in fact) when combined with declarative complements.[3]

(6) a. Andy is surprised (at/by) which students are invited to the party.
 b. Ben is glad/happy which students are invited to the party.
 c. Chris liked/hated how many students were invited to the party.

These data corroborate our generalization, but two limitations need to be mentioned. Firstly, the generalization is not exception-less. One notable exception is *regret*, which is factive but anti-rogative. Secondly, there are still some anti-rogative predicates that are not amenable to our generalization or [36]'s generalization concerning neg-raising predicates. For instance, *deny* is neither preferential or neg-raising but is still anti-rogative. These predicates require a yet another account.

Before leaving this section, it should be stressed that our generalization has nothing to say about the veridicality of representational predicates and their selectional properties. However, it is noticeable that veridicality generally implies compatibility with interrogative clauses in the domain of representational predicates as well. As mentioned above, neg-raising matters for non-veridical representational predicates. For instance, *believe* and *predict* are both non-veridical, but the former is anti-rogative, while the latter is responsive. Veridical representational predicates (e.g. *know*), on the other hand, are both non-neg-raising and responsive. We have nothing new to add here, and refer the interested reader to [11], [31] and [23].

3 Why Veridicality Matters for Preferential Predicates

We will now explain why veridical preferential predicates are responsive, while non-veridical ones are anti-rogative. The explanation will be based on the idea that non-veridical preferential predicates with an interrogative clause give rise to trivial meaning while veridical preferentials

[3] Some of these cases sound better with a preposition like *about*, but we should be careful as *about* itself might make an interrogative complement available. For instance, while *think* is anti-rogative, *think about* is responsive. This might or might not be because of the meaning of *about* (see [26] for relevant discussion) or because *think* is neg-raising while *think about* is not. We will leave this issue open here, and avoid examples containing *about*.

don't, regardless of the complement clause-type, assuming (i) a uniform approach to clause-embedding [8, 32, 30] (§3.1) and (ii) the degree-based semantics for preferentials [27] (§3.2).

3.1 A Uniform Approach to Clausal Embedding

We follow [8, 32, 30] and take a uniform approach to clause-embedding where both declarative and interrogative complements denote sets of propositions and all clause-embedding predicates take sets of propositions as arguments. We assume that declarative sentences denote singleton sets of propositions, while interrogative clauses denote non-singleton sets of propositions.[4,5]

(7) a. $[\![\textsf{Alice jumped}]\!]^w = \{\, \lambda w.\ J_w(a) \,\}$
b. $[\![\textsf{whether Alice jumped}]\!]^w = \{\, \lambda w.\ J_w(a),\ \lambda w.\ \neg J_w(a) \,\}$
c. $[\![\textsf{who jumped}]\!]^w = \{\, \lambda w.\ J_w(x) \mid x \in D \,\} \cup \{\, \lambda w.\ \neg\exists x J_w(x) \,\}$

In this setting, representational predicates like *be certain* and *know* have an existential semantics, as in (8).[6]

(8) a. $[\![\textsf{be certain}]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}.\lambda x_e.\ \exists p \in Q[B_w(x,p)]$
b. $[\![\textsf{know}]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}.\lambda x_e:\ \exists p \in Q[p(w)].\ \exists p \in Q[p(w) \wedge K_w(x,p)]$

All clause-embedding predicates take a set of propositions, so they are all type-compatible with both interrogative and declarative complements. For instance, the denotation of *believe* is of the same type as that of *know*:

(9) $[\![\textsf{believe}]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}.\lambda x_e.\ \exists p \in Q[B_w(x,p)]$

The anti-rogativity of *believe*, therefore, needs to be explained by other means than type incompatibility. As mentioned before, [31] and [23] propose to reduce it to its neg-raising property. For reasons of space we will not review these analyses here.

3.2 Degree-Based Semantics for Preferential Predicates

Now we are in a position to discuss our analysis of preferential predicates. We follow [27]'s degree-based semantics, which is an adaptation of [34]'s ordering-based analysis of preferentials. The degree-based semantics offers an attractive account of the anti-rogativity of non-veridical preferential predicates with a reasonable assumption about the semantics of degree constructions in general.

Before jumping to the concrete analysis, we mention an important aspect of the semantics of preferential predicates: focus-sensitivity. [34] observes that focus has truth-conditional effects with bouletic predicates ([27]). Here's an example illustrating this (modeled after [27]):

(10) CONTEXT: Natasha does not like teaching logic, and prefers syntax, but she is not allowed to teach both. This year, it is likely that she needs to teach logic, and if so, she prefers to do so in the morning, as she prefers to have all her teaching in the morning.
a. Natasha hopes that she'll teach logic in the MORning. TRUE
b. Natasha hopes that she'll teach LOgic in the morning. FALSE

[4] We could include all non-trivial stronger propositions in the denotations, as in certain versions of Inquisitive Semantics, but such elaborate structure is unnecessary for the purposes of this paper.
[5] Following [13], we assume that exhaustive readings of embedded questions result from (optional) operators. See [30].
[6] Following [17], we write presuppositions after the colon in lambda terms.

Similar observations suggest preferential predicates are generally focus sensitive. [27] provides the following example for *surprise*:

(11) CONTEXT: Lisa knew that syntax was going to be taught. She expected syntax to be taught by John, since he is the best syntactician around. Also, she expected syntax to be taught on Mondays, since that is the rule.

a. It surprised Lisa that John taught syntax on TUESdays. TRUE

b. It surprised Lisa that JOHN taught syntax on Tuesdays. FALSE

These observation show that the alternatives that are compared in the semantics of preferential predicates are partly determined by the focus structure.

The degree-based semantics for preferentials by [27] builds on this insight, and treats the focus structure of the complement as providing the *comparison class* against which the subject's preferences are compared. Concretely, assuming the Roothian focus semantics ([28]), we take the context to provide a set of alternatives C, which preferential predicates refer to.[7] For example, the semantics for *be happy* looks like (12) with the auxiliary definitions for functions Pref and θ in (13):[8]

(12) $$[\![\textsf{be happy}_C]\!]^w = \lambda p_{\langle s,t\rangle}.\lambda x\colon\ p(w) \wedge B_w(x,p) \wedge p \in C.\ \texttt{Pref}_w(x,p) > \theta(\{\texttt{Pref}_w(x,p') \mid p' \in C\})$$

(13) a. $\texttt{Pref}_w(x,p) :=$ the degree to which x prefers p at w

b. $\theta(\{d_1, d_2, ..., d_n\}) := \sum_{i=1}^{n} d_i/n$

In prose, x *is happy that* p presupposes that p is true, x believes that p, and p is a member of the focus alternatives C,[9] and asserts that the degree to which x prefers p at w is greater than the *average* degree of $x's$ preferences for alternatives in C.

Note that (12) assumes that *be happy* semantically selects for a proposition. To reformulate the analysis to fit the uniform approach to clausal embedding introduced in the previous section, we make the predicate select for a set of propositions and relate the subject and the set using (13) via existential quantification:[10]

(14) $$[\![\textsf{be happy}_C]\!]^w = \lambda Q_{\widehat{\langle s,t\rangle}}.\ \lambda x\colon\ \exists p \in Q[p(w) \wedge B_w(x,p) \wedge p \in C].\ \exists p'' \in Q \left[\begin{array}{c} p''(w) \wedge B_w(x,p'') \wedge p'' \in C \wedge \\ \texttt{Pref}(x,p'') > \theta(\{\texttt{Pref}(x,p') \mid p' \in C\}) \end{array}\right]$$

Let us see how (14) works with concrete interrogative and declarative complements. First, following [4], we take *wh*-items to be necessarily focused. Given this, in our semantics, the focus-semantic value of a *wh*-complement turns out to be equivalent to its ordinary-semantic value, as in (15).[11] Letting $\mathcal{Q}$ be the focus/ordinary semantic value of the interrogative complement,

[7] We assume for the sake of exposition that focus association with preferential predicates is conventional (in the sense of [3]), but nothing crucial hinges on this. See [27] for discussion. Also to avoid clutter, we conflate variables in the object language and meta-language.

[8] The formulation in (i) uses a *measure function* that returns degrees from individuals/propositions à la [20] instead of relations between degrees and individuals/propositions used in [27]. This is because of presentational reasons (the former formulation results in shorter formulae) and nothing hinges on this technical choice.

[9] As [27] argues, the last presupposition is an instance of a presupposition existing in degree constructions in general, that the comparison class includes the comparison term.

[10] In (i), to avoid the 'binding problem' concerning the existential quantifications in the presupposition and the assertion, the conditions in the presupposition are 'repeated' in the scope of the existential quantification in the assertion. See [29] for a similar solution to the binding problem in the domain of question-embedding.

[11] Whether this equivalence can be maintained for singular-*which* questions is unclear. The question denota-

be happy with an interrogative complement can be analyzed as in (16):

(15) $\mathcal{Q} := [\![\textsf{who jumped}]\!]^w = [\![[\textsf{who}]_F \textsf{ jumped}]\!]^f$

(16) $[\![\textsf{John is happy}_C \ [[\textsf{who}]_F \textsf{ jumped}]{\sim}C]\!]^w$ is

- defined only if $\exists p \in \mathcal{Q}[p(w) \wedge B_w(j,p) \wedge p \in C]$; if defined,
- true iff $\exists p'' \in \mathcal{Q}\left[\begin{array}{c} p''(w) \wedge B_w(j,p'') \wedge p'' \in C \\ \texttt{Pref}(j,p'') > \theta(\{\texttt{Pref}(j,p') \mid p' \in C\}) \end{array}\right]$

Given the definition of the $\sim$-operator in (17) ([27]; cf. [28]), C in (16) is constrained as in (18).

(17) a. $[\![\alpha{\sim}C]\!]^o$ is defined only if $C \subseteq [\![\alpha]\!]^f$; if defined, $[\![\alpha{\sim}C]\!]^o = [\![\alpha]\!]^o$
b. $[\![\alpha{\sim}C]\!]^f$ is defined only if $C \subseteq [\![\alpha]\!]^f$; if defined, $[\![\alpha{\sim}C]\!]^f = [\![\alpha]\!]^f$

(18) $C \subseteq [\![\textsf{who jumped}]\!]^f = \mathcal{Q}$

All in all, (16) presupposes that there is a true answer of $\mathcal{Q}$ which John believes, and asserts that a true answer of $\mathcal{Q}$ which John believes is such that he prefers it to a greater extent than his average preferences for the alternatives in C, which in turn is a subset of $\mathcal{Q}$.

Next, a declarative-embedding sentence would be analyzed as in (19), with the variable C constrained by the focus structure as in (20). (Here, we let $A := \lambda w.J_w(a)$.)

(19) $[\![\textsf{John is happy}_C \textsf{ that } [[\textsf{Alice}]_F \textsf{ jumped}]{\sim}C]\!]^w$ is

- defined only if $\exists p \in \{A\}[p(w) \wedge B_w(j,p) \wedge p \in C]$
$\equiv A(w) \wedge B_w(j,A) \wedge A \in C$; if defined
- true iff $\exists p'' \in \{A\}\left[\begin{array}{c} p''(w) \wedge B_w(j,p'') \wedge p'' \in C \wedge \\ \texttt{Pref}(j,p'') > \theta(\{\texttt{Pref}(j,p') \mid p' \in C\}) \end{array}\right]$
$\equiv A(w) \wedge B_w(j,A) \wedge A \in C \wedge \texttt{Pref}(j,A) > \theta(\{\texttt{Pref}(j,p') \mid p' \in C\})$

(20) $C \subseteq [\![\textsf{that } [\textsf{Alice}]_F \textsf{ jumped}]\!]^f = \mathcal{Q}$

That is, (19) presupposes that Alice jumped and that John believes that Alice danced, and asserts that John prefers Alice's jumping to a greater extent than his preferences for the alternatives in C, which again is constrained by $\mathcal{Q}$.

Thus, the degree-based analysis provides a straightforward account of both declarative and interrogative-complementation under veridical preferentials. [27] shows that the degree-based analysis enables an attractive account of two puzzles concerning veridical preferentials: (i) incompatibility with *whether*-complements and (ii) (typical) incompatibility with strongly-exhaustive embedded questions. Another virtue of the degree-based analysis is that (with a suitable syntax-semantics assumptions) it can account for the behavior of preferential predicates as gradable predicates, as in their occurrence in comparatives:

(21) a. Andrew is happier that Alice jumped than Bill is.
b. Ben liked/hated that Alice jumped more than Bill did.

3.3 Deriving the Anti-rogativity of Non-veridical Preferentials

Building on the semantics for veridical preferentials in the previous section, we propose the semantics of non-veridical preferential, such as *hope*, as follows:

tion only contains 'singular' answers [10] while the focus alternatives may contain 'plural' answers depending on the analysis of the focus value of *which*-NPs. We thank Henriette de Swart for pointing out this potential issue.

(22) $[\![\mathsf{hope}_C]\!]^w$
$= \lambda Q_{\widehat{\langle s,t\rangle}}.\lambda x : \exists p \in Q[p \in C].\ \exists p'' \in Q[p'' \in C \wedge \mathtt{Pref}(x, p'') > \theta(\{\mathtt{Pref}(x, p') \mid p' \in C\})]$

In contrast to the veridical preferential *be happy* in (14), which requires that the preferred answer is *true* and is *believed by the subject*, the non-veridical preferential *hope* in (22) lacks such requirements. The body of the function simply states that there is an answer (which is also a member of C) that the subject prefers to a greater extent than the average given C.

With a declarative complement, (22) derives the meaning that the subject prefers the proposition denoted by the complement to a greater degree than the average given focus alternatives:

(23) $[\![\mathsf{John\ hopes}_C\ \mathsf{that\ [[Alice]}_F\ \mathsf{jumped]}{\sim}C]\!]^w$ is

- defined only if $A \in C$; if defined,
- true iff $\mathtt{Pref}(j, A) > \theta(\{\mathtt{Pref}(j, p') \mid p' \in C\})$

On the other hand, the meaning predicted for (22) with an interrogative complement, exemplified in (24), turns out to be systematically trivial, assuming an additional presupposition triggered by θ, given in (25).

(24) $[\![\mathsf{John\ hopes}_C\ \mathsf{[[who]}_F\ \mathsf{jumped]}{\sim}C]\!]^w = 1$ iff

- defined only if $\exists p \in \mathcal{Q}[p \in C]$; if defined,
- true iff $\exists p'' \in \mathcal{Q}[p'' \in C \wedge \mathtt{Pref}(j, p'') > \theta(\{\mathtt{Pref}(j, p') \mid p' \in C\})]$

(25) $\theta(\{d_1, d_2, ..., d_n\})$ is defined only if $\neg\exists d \forall d' \in \{d_1, d_2, ..., d_n\}[d = d']$

The presupposition states that the degrees in the comparison class cannot be all equal. In other words, in order for comparison to make sense, there has to be variability in the relevant degrees.[12] This amounts to (26) in the case of (24), i.e., that John's preferences vary.

(26) $\neg\exists d \forall d' \in \{\mathtt{Pref}(j, p') \mid p' \in C\}[d = d']$

Given the variability presupposition, (25) turns out to be necessarily true whenever it is defined. This is so since whenever John's preferences for the alternatives in C vary, there is always a proposition in $C \subseteq \mathcal{Q}$ which John prefers more than his average preference for C.

We follow [2, 12, 7] in assuming that systematic logical triviality leads to ungrammaticality. In particular, we assume the following principles from [12], where (27-a) is modified from the original to encompass presuppositional denotations.[13]

[12] The oddness of the following kind of example may empirically motivate the variability presupposition in degree constructions in general:

(i) #No Japanese semanticist is tall for a Japanese semanticist.

If it were not for the variability presupposition, (i) would be a felicitous sentence conveying that all Japanese semanticists are of the same height. However, we have to be inconclusive as to whether (i) counts as strong evidence for the variability presupposition, as the oddness of (i) could be explained differently (e.g., maxim of manner), as an anonymous reviewer for the Amsterdam Colloquium pointed out.

[13] We also need the definition of LOGICAL SKELETONS, which in turn requires the criteria for logical vocabularies. Following [33], [12] defines logical vocabularies in terms of *permutation invariance*. The present analysis can be made compatible with this view, by assuming (i) that the external argument of a predicate is introduced by a designated head (say v) [21] and that the clause-type operators !/? [8] are in charge of making sure whether the proposition-set denoted by the complement is singleton or multiple. In other words, (i) would be the logical skeleton for (23) and (24) where v, *hope* and !/? are the logical vocabularies.

(i) $[\ X_i\ [_{v'}\ v\ [_{\mathrm{VP}}\ \text{hope}\ [_{\mathrm{CP}}\ !/?\ X_j]\ ]\ ]\ ]$

(27) a. An LF constituent a of type t is L-ANALYTIC iff a's logical skeleton receives the denotation 1 (or 0) under every variable assignment *when the denotation is defined.*
b. A sentence is ungrammatical if its Logical Form contains a L-analytic constituent.

Hence, the L-analyticity ensures that (24) is ungrammatical. On the other hand, even with the variability presupposition, the declarative-embedding variant is *not* L-analytic because of the singleton restriction on existential quantification. That is, (23) is contingent on whether John prefers A more than the average. This explains the anti-rogativity of non-veridical preferentials. Finally, veridical preferentials do not induce L-analyticity regardless of the complement clause type, due to the veridical restriction on existential quantification. The assertion of *be happy*+interrogative in (16) above is non-trivial (even with the variability presupposition) since its truth is contingent on whether John prefers a *true* answer. Similarly to the non-veridical case, *be happy*+declarative is non-trivial because of the singleton restriction.

4 Conclusions

In this paper, we have put forward a generalization that all non-veridical preferential predicates are anti-rogative, and provided a semantic explanation for this generalization using the uniform semantics of clausal-embedding predicates [8, 32, 30] and the degree-based semantics for preferential predicates [27]. The paper thus advances the currently active research into the semantic roots of selectional restrictions [9, 32, 31, 23].

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