Negating Gradable Adjectives

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Abstract: In this squib, I give an analysis of the syntax and semantics of the prefix *un-* with gradable adjectives like *unhappy*, *unfriendly*, *unsafe*, *uninteresting*, and compare it to the syntax and semantics of *not*. I propose that *un-* and *not* have the same semantics but negate different constituents.

Key Words: gradable adjectives, negation, degree quantification, quantifier domain restriction, litotes, Klima tests

1. Introduction

Consider the following two sentences:

(1) a. John is unhappy.
b. John is not happy.

In both cases there is a negative morpheme, *un-* in (1a) and *not* in (1b). And furthermore, the two sentences overlap in truth conditions. It seems that (1a) entails (1b) but not vice a versa. Certainly, if John is unhappy, we can conclude that he is not happy. But if he is not happy, he may not be unhappy either (but somewhere in the middle of the scale of happiness ranging from very unhappy to very happy).

I suggest that both *un-* and *not* are negative morphemes of the category NEG (see Collins and Postal 2014). But in (1a) *un-* modifies the adjective while in (1b) *not* modifies a covert degree quantifier phrase. I show how the difference in interpretation between (1a) and (1b) follows from this structural assumption.

This paper focusses on gradable adjectives like *happy*. Whether its conclusions extend to the use of *un-* with non-gradable adjectives is left for future research (on the range of adjectives taking *un-* prefixation see Horn 2001). For more on the syntax of *un-*, see Kayne 2017.

In section 2, I introduce the Scale of Happiness which is partitioned by the two predicates *happy* and *unhappy*. Section 3 addresses a compositionality issue that arises in introducing the external argument. Section 4 motivates a covert degree quantifier. Section 5 shows how the truth conditions of litotes examples are calculated. Section 6 shows how the Klima tests provide support for my analysis. Section 7 is the conclusion.

2. Scale of Happiness

A standard way to define the semantic value of a gradable adjective is as follows (see Kennedy and McNally 2007: 349):

(2) $[\![\text{happy}]\!] = \lambda d \lambda x.x \text{ is happy to degree } d$

This means that *happy* takes two arguments, a degree and an individual, and is true if the individual x is happy to degree d. I will need to modify this semantic value below in light of facts concerning *un-* modification.

Whether *un-* combines with an adjective or a whole adjective phrase is not relevant to the present paper:

(3) a. [NEG ADJ]
b. [NEG ADJP]

Since *un-* is NEG, I assume that its semantics is given by the semantics of negation in Collins and Postal 2014:

(4) If X has a semantic type ending in <t>, then
NEG takes X with semantic value: $\lambda P_1 \ldots \lambda P_n$ […]
And returns Y with semantic value: $\lambda P_1 \ldots \lambda P_n \neg$ […]

Assuming the structure (3a) for convenience, and applying (4), the semantics of *un-* are given below:

(5) a. ⟦un-⟧ = $\lambda X .\lambda d.\lambda x.\neg X(d)(x)$
b. ⟦un-happy⟧ = $\lambda d \lambda x. \neg$ happy(d)(x)

The problem with (5b) is that it makes the claim that x is unhappy to degree d if it is not the case that x is happy to degree d, and hence does not distinguish (1a) and (1b).

I propose instead that *happy* should be defined as a predicate of degrees. DEGREE_h is true of degrees that are located on the scale of happiness (see (8)):

(6) ⟦happy⟧ = $\lambda d: \text{DEGREE}_h(d).\ d > 0$

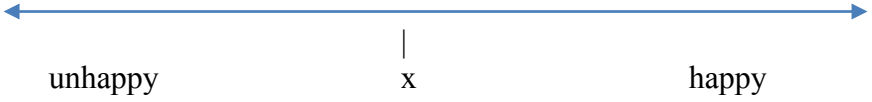
Paraphrasing, this means that *happy* is a predicate of degrees on the scale of happiness which is true of d iff d is greater than zero. In the remainder of the paper, I leave out the DEGREE_h restriction of λd. Also, I will also write (d > 0) as happy(d) in the meta-language.

Applying (4) to (6) we have:

(7) a. ⟦un-⟧ = $\lambda P .\lambda d.\neg P(d)$
b. ⟦un-happy⟧ = $\lambda d.\neg (d > 0)$
= $\lambda d.\neg$ happy(d)
= $\lambda d.\ d \leq 0$

These semantic values can be diagrammed as follows (contrary to Horn 2001: 275, 2017: 86 who takes *un-* prefixation to yield a contrary, not a contradictory):

(8) **Scale of Happiness**



Anything to the right of x is happy and anything to the left of x (including x) is unhappy. Krifka (2007: 170) reached a similar conclusion, based on different grounds: "…*happy* and

unhappy completely divide the scale of emotions along the dimension of happiness…". As we will see below, it is convenient to interpret x as zero, values to the right of x as positive and values to the left of x as negative.

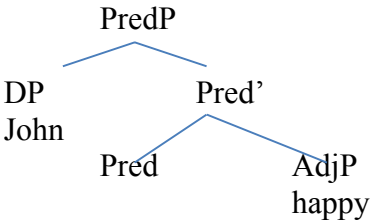
3. Adding the External Argument

Given the semantics in (6), *happy* is a function of a degree variable argument. So the question is how to incorporate an external argument as in sentences like (9):

(9) John is happy.

Following Bowers 1993 (see also Kratzer 1996 for related ideas), I propose that part of the structure of sentences like (9) is (leaving out the copula verb and TP):

(10)



Given this tree, I define the semantic value of Pred in (11). $\text{degree}_h(x)$ is a function which takes an individual and returns its position on the scale of happiness.

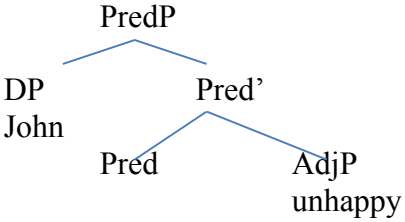
(11) $[\![\text{Pred}]\!] = \lambda P.\lambda x.\lambda d.\ \text{degree}_h(x) = d \wedge P(d)$

For example, the semantic value of (10) is calculated as follows:

(12) $[\![(10)]\!] = [\lambda P.\lambda x.\lambda d.\ \text{degree}_h(x) = d \wedge P(d)]([\![\text{happy}]\!])([\![\text{John}]\!])$
$= \lambda d.\ \text{degree}_h(\text{John}) = d \wedge \text{happy}(d)$

Consider now *unhappy*:

(13) John is unhappy



The semantic value of (13) is the following:

(14) $[\![(13)]\!] = \lambda d.\ \text{degree}_h(\text{John}) = d \wedge \neg\text{happy}(d)$

With these preliminaries out of the way, I return now to providing an analysis of the difference between (1a) and (1b).

4. Covert Degree Quantifier

Consider first (15a) which can be paraphrased as (15b):

(15) a. John is happy.
b. John is happy to some degree.

I suggest that (15a) involves existential quantification over degrees, as in the overt degree phrase in (15b), so that (15a) has the syntactic structure in (16a) or (16b), where caps indicate non-pronunciation.

(16) a. John is happy [TO [SOME DEGREE]]
b. John is [SOME DEGREE] happy.

See (24)-(26) below for evidence supporting (16b), where the covert degree quantifier phrase precedes the adjective.

Furthermore, I suggest that this existential quantification has a restricted domain. Normally, when one says (15a) one does not mean that John is happy to some small or insignificant degree, but rather he is happy to some significant extent. This range of degrees of happiness is seen in expressions such as the following:

(17) a. John is a tiny bit happy.
b. John is sort of happy.
c. John is somewhat happy.
d. John is reasonably happy.
e. John is happy.
f. John is quite happy.
g. John is very/really happy.
h. John is really very happy.
i. John is extremely happy.

Without any degree modification, and minimal context, (17e) falls in the middle of the range of possibilities. So I suggest that the existential quantifier in (15a) is the following:

(18) some degree greater than a contextually given degree n_1

I use n_1 to distinguish it from n_2 which will be introduced below. This quantifier domain restriction can be represented as follows:

(19) $[\![\text{SOME DEGREE}_h]\!] = \lambda P\, [\exists d\, (P(d) \wedge \text{DEGREE}_h(d) \wedge d \geq n_1)]$

The DEGREE_h predicate is true or false of degrees falling on the scale of happiness (see (8)), and undefined otherwise. Since all quantification in this paper is over the degrees on the scale of happiness, I will leave DEGREE_h out of the sematic values.

An additional question, which I will not deal with in this paper, is how the domain restriction $(d \geq n_1)$ in (19) is syntactically represented. There is a large literature on this topic,

and it is not relevant to the analysis in this paper (see Elbourne (forthcoming) for discussion and references).

In the literature on gradable adjectives, the function of (19) is attributed to POS, as in Kennedy and McNally (2005: 350): "…unmodified APs actually contain a null degree morpheme *pos* (for positive form) whose function is to relate the degree argument of the adjective to an appropriate standard of comparison…".

Given (19), the truth conditions of (15a) are as follows:

(20) John is happy
$[\lambda P.\exists d\ (P(d) \wedge d \geq n_1)]\ (\lambda d.\ degree_h(John) = d \wedge happy(d))$
$= \quad \exists d(degree_h(John) = d \wedge happy(d) \wedge d \geq n_1)$

This can be paraphrased as follows: there is some degree d on the happiness scale, greater than a contextually given degree n_1, such that John is happy to degree d. The conclusion in (20) is similar to Krifka's (2007: 172) conclusion that "As a consequence of this uncertainty about the location of the border between happiness and unhappiness, the use of *unhappy* and *happy* is pragmatically restricted to those areas for which the interlocutors can assume to be in mutual agreement, to ensure communication."

One difference is that I locate this strengthening in the domain restriction of a degree quantifier, which allows me to say that both *un-* and *not* are negation with the semantic value defined by Collins and Postal 2014. Krifka did not give a compositional treatment, so it is unclear where he would locate the strengthening.

Another difference is that I do not necessarily link quantifier domain restriction to uncertainty about the border between *happy* and *unhappy*. Rather, quantifier domain restriction is influenced by contextual factors, one of which may be uncertainty, but there may be other factors as well (as in other cases of quantifier domain restriction). For example, consider the following exchange:

(21) a. Is John happy with the hiring decision?
b. I guess you could say that, but he is not overjoyed.

(21b) says that John is happy, but n_1 is being pushed down from its normal or expected position by use of the phrase 'I guess' and by the continuation, 'but he is not overjoyed'.

Once again following Collins and Postal 2014, the negation of (19) is as follows:

(22) $[\![[\text{NEG SOME}]\ \text{DEGREE}_h]\!] \quad = \quad \lambda P\ \neg[\exists d\ (P(d) \wedge d \geq n_1)]$

Then (1b) has the following truth conditions:

(23) $\neg\exists d(degree_h(John) = d \wedge happy(d) \wedge d \geq n_1)$

Some evidence for a negative degree quantifier phrase in examples like (1b) is provide by the following sentence:

(24) John is not at all happy.

Note that *at all* usually modifies negative DP such as the following:

(25) a. Nobody at all was there.
b. *Every person at all showed up.
c. *Some people at all showed up.

At all has the effect of strengthening the quantification by lifting domain restrictions. So the claim is that (24) involves a negative existential degree quantifier modified by *at all*, which has the effect of lowering n_1 to x (see the chart in (30)).

Another piece of evidence for a degree quantifier phrase in examples like (1b) is that the degree quantifier phrase sometimes appears overtly:

(26) a. John is not a bit happy.
b. John is not the least bit happy.

In these examples, the expressions [not a bit] and [not the least bit] seem to be overt occurrences of the degree quantifier phrase postulated in (22).

Now consider adding an existential quantifier to examples with *unhappy*. Just adding an existential quantifier as in (20) yields the wrong result:

(27) John is unhappy
$\exists d(\text{degree}_h(\text{John}) = d \wedge \neg \text{happy}(d) \wedge d \geq n_2)$

This would mean that John is unhappy to a degree greater than some contextually given degree n_2, but that could mean that he is not very unhappy at all (that he is almost neutral). Rather, I propose (28) (with a less than sign instead of a greater than sign) so that the contextual degree establishes the upper bound of John's state of unhappiness.

(28) John is unhappy
$\exists d(\text{degree}_h(\text{John}) = d \wedge \neg \text{happy}(d) \wedge d \leq n_2)$

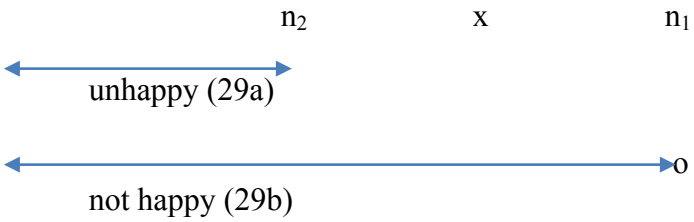
The flip in equality sign would follow from stating the domain restriction in (19) in terms of absolute values: $|d| \geq |n|$) (where d and n have the same sign). In effect, the domain restriction is placing a constraint the distance between degrees and the zero point on the scale of happiness.

So now compare the two sentences in (1) and their semantic values:

(29) a. John is unhappy.
$\exists d(\text{degree}_h(\text{John}) = d \wedge \neg \text{happy}(d) \wedge d \leq n_2)$
b. John is not happy.
$\neg \exists d(\text{degree}_h(\text{John}) = d \wedge \text{happy}(d) \wedge d \geq n_1)$

One can now see what accounts for the difference between (29a) and (29b). Consider the diagram in (30) (the o at the end of the second horizontal arrow represents not equal to):

(30)



The horizontal arrows under the scale in (30) are to be interpreted as follows: (29a) would be true if degree_h(John) were less than or equal to n_2. Similarly, (29b) would be true if degree_h(John) were less than n_1.

From the diagram, it is clear that (29a) entails (29b), since the range of degrees of (29a) is a subset of the range of degrees of (29b).

5. Litotes: *not unhappy*

Horn 2017 cites the OED definition of litotes as 'a figure of speech in which an affirmative is expressed by the negative of a contrary.' A typical example of litotes is an expression like that in (31):

(31) John is not unhappy.

If both *not* and *un-* modified the adjective unhappy, then under the semantics of negation in Collins and Postal 2014, (31) should be equivalent to 'John is happy', but it is not. Rather, (31) is weaker than the positive (without double negation) (see Horn 2017: 89).

(32) a. She was happy, or at least not unhappy.
b. #She was not unhappy, or at least happy.

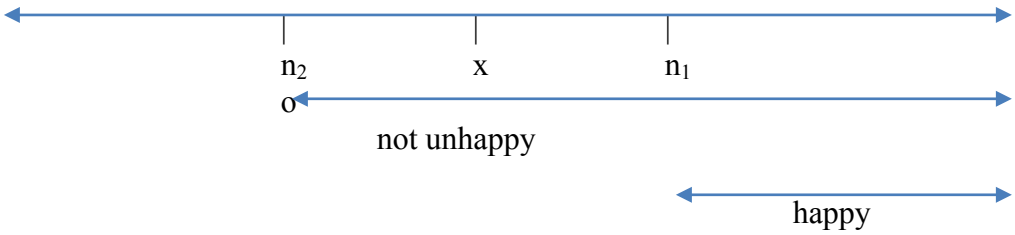
In these examples, the *at least* phrase introduces the weaker alternative. If she was happy, then she was not unhappy. But if she was not unhappy, it does not follow that she was happy.

According to the theory developed so far, (31) has the following truth conditions:

(33) $\neg\ \exists d(\text{degree}_h(\text{John}) = d \wedge \neg\text{happy}(d) \wedge d \leq n_2)$

This can be diagrammed as follows:

(34)



I propose that in (31) n_2 is taken to be equal to x, so that (31) comes out as the same as:

(35) John is happy to some (possible very small) degree.

These seems like the right truth conditions. The reason to use a sentence like (31), instead of the simple non-negative sentence in (9) is that (31) allows one to avoid the implicit contextual domain restriction found in regular uses of (9) (which means that John is happy to some significant extent).

From the diagram one can see that 'John is happy' entails that 'John is not unhappy', since the range of degrees consistent with 'John is happy' is a subset of the range of degrees consistent with 'John is not unhappy'.

6. Klima Tests

Another fortunate consequence of the semantic values in (29) is that they explain why (29a) does not count as sentential negation in the sense of Klima (1964). Consider the following generalization (from Collins and Postal 2016):

(36) A sentence S is an instance of sentential negation only if some NEG or negative quantifier DP takes widest scope in the matrix clause of S.

In (29a), the existential quantifier takes widest scope, and so (29a) does not count as sentential negation. In (29b), the negation takes widest scope, so (29b) counts as sentential negation. These predictions are correct, as shown below:

(37) a. John is unhappy, isn't he?/I think.
b. John is not happy, is he?/I don't think.

In (37a), the negative tag-question and the positive parenthetical are used, as is expected when there is no sentential negation. In (37b), a positive tag-question and negative parenthetical are used, as is expected when there is sentential negation.

7. Conclusion

I have shown how it is possible to analyze *un-* and *not* as negative morphemes with the semantics of negation given in Collins and Postal 2014. The crucial difference is that *un-* modifies an adjective directly, whereas *not* modifies a covert degree quantifier (in the examples under consideration). I showed how my analysis carries over to explain the interpretation of litotes and the Klima tests with *un-* and *not*.

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