

Factives and Intensionality

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Summary: One of the empirical observations concerning factives is that factive predicates when completed by the subject NP form intensional sentential operators. In other words, factive predicates are verbs of propositional attitudes. In this talk I give a formal justification for this correlation: making more precise some ideas from Zuber 1980, 1982, I show that any sentential operator which entails its argument and which is intensional (in the strong sense to be precised below) must presuppose it (that is the appropriate negation of the factive operator also entails the sentential complement). I also show how the machinery used to show this fact can be used to make a difference between emotive and non-emotive factives. Finally I will show why factives are different from implicative verbs (Karttunen 1971), which in principle do not presuppose their argument (they entail it or its negation).

It is well-known that verbs of propositional attitude are more strongly intensional than for instance the classical modal operator of necessity. One way to show this difference is to point out that intensionality of verbs of propositional attitudes can be tested by a pair of materially equivalent sentences such that both members of the pair are contingent sentences. This is not the case with the operator of necessity: we can show that this operator is intensional only using a pair of equivalent sentences such that one of the sentences is contingent and the other one non-contingent (necessarily true). This observation leads to the following definition of *normal intensionality*:

D1: A sentential operator O (an expression of the category S/S) is *normally intensional* iff for every contingent sentence P and every possible world w , if $O(P)$ is true in w , then there exists a contingent sentence P' such that P and P' have the same truth-value in w and $O(P')$ is false in w .

The second step is to define a *normal negation* $n - O$ of a normally intensional operator O . Roughly speaking, we want the operator n to be an expression (of category $(S/S)/(S/S)$) which when applied to a normally intensional sentential operator gives as result an expression which is also a normally intensional sentential operator. More precisely we have the following definition:

D2: For any P , any world w , and any operator O , $n - O(P)$ in w is defined by the two following conditions:

- (i) $v(n - O(P)) = v(\neg(O(P)))$ in w
- (ii) $n - O$ is normally intensional

Obviously normal intensional negation n entails the "ordinary" extensional negation

\neg (the clause (i)) but not the other way around^{oo}(because, in addition the normal negation \neg preserves the normal intensionality).

We can now prove the main result of this talk:

P 1: If O is a normally intensional operator such that for any P , $O(P)$ entails P , then $n - O(P)$ also entails P .

Proof: Suppose *a contrario* that there exists a world w such that $n - O(P)$ is true in w and P is false. This means, given D2, that there exists P' with the same truth value as P in w and such that $O(P')$ is true in w . But this is impossible since $O(P')$ entails P' .

A distinction has been made between non-emotive and emotive factives. Non-emotive factives are formed from predicates like *to know*, *to forget*, etc. whereas emotive factives from the predicates like *to regret*, *be surprising*, *be strange*, etc. One difference between those two classes is that, informally, emotive factives seem to be sensitive to more contingent sentences than non-emotive ones. Consequently emotive factives presuppose "more" than non-emotive ones (Zuber 1977). Consider the following examples:

- (1a) Bill knows that the bottle is half empty.
- (1b) Bill knows that the bottle is half full.
- (2a) Bill regrets that the bottle is half empty.
- (2b) Bill regrets that the bottle is half full.
- (3) Bill knows whether the bottle is half empty

Very likely sentences in (1) have both the same truth value whereas those in (2) have different truth values. We express this by saying that *Bill regrets that* is intensionally stronger than *Bill knows that*. The following definitions make more precise the notion of the "strength of intensionality":

D3: The pair of sentences $\{P, P'\}$ is a detector of intensionality of the operator O (in the world w) iff P and P' have the same truth value in w but $O(P)$ and $O(P')$ have different truth values in w .

D4: The sentential operator O is intensionally stronger than the intensional operator O' iff the set of detectors of intensionality of O' is strictly included in the set of detectors of intensionality of O (in a given world w). If these sets are equal O and O' have the same intensional strength.

Given these definitions the following can be proven:

P2: If O is intensionally stronger than O' and for any P , $O(P)$ entails $O'(P)$ then $n - O(P)$ entails $O'(P)$.

P3: If O and O' have the same intensional strength and $O(P)$ entails $O'(P)$ then $n - O(P)$ entails $n - O'(P)$.

Thus if (2a) entails (1a) and *Bill regrets that* is intensionally stronger than *Bill knows that* then (2a) presupposes (1a). Similarly since (1a) entails (3) and *Bill knows that* and *Bill knows whether* have the same intensional strength, we have to conclude, given P3, that the intensional negation of (1a) entails the intensional negation of (3).

Let me illustrate this fact more precisely. Consider:

- (4a) Leo knows that P.
- (4b) Leo knows whether P.
- (5a) Leo does not know that P.
- (5b) Leo does not know whether P.

It is generally accepted, also by logicians, that (4a) entails (4b). Although it has not been often claimed so, it is also true that (5a), taken as presupposing P, entails (5b). Indeed, suppose *a contrario* that (5a) is true and (5b) is false. The falsity of (5b) means that either (1) Leo knows that P or (2) Leo knows that not-P. This is, however, impossible: (1) cannot be true because (5a) is true and (2) cannot be true because (5a) presupposes the truth of P.

Observe in addition that emotive factives seem to presuppose knowledge (or at least believe: if you do not agree that (2a) entails (1a) you should agree that (2a) entails a sentence corresponding to (1a) in which *knows* has been replaced by *believes*).

Finally, normal negation can be used to explain the semantic relation to which give rise Neg-transportable predicates (Zuber 1982, 1983, Gajewski 2007).

The above tools cannot be applied to implicative verbs (Karttunen 1971). The reason is that they are not normally intensional (at the predicate level). More specifically it is not true that given an implicative verb (*to manage, to forget, etc.*) and a predicate to which it applies, one can always find another co-extensional predicate such that the substitution of the one predicate by the other one will (systematically) lead to the change of the extension of the whole complex (modified by the implicative verb) predicate. And indeed implicatives give rise to different implications than factives.

References

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