# Compositionality and Expletives

Takashi Sugimoto

# 「意味と虚辞」

杉本孝司

Abstract

This paper is an attempt to maintain and argue for the principle of compositionality with respect to certain types of sentences containing occurrences of the so-called expletive *it*; an analysis is presented whereby such an expletive does not necessarily have to be regarded as being semantically null; it will be shown that, when pitted against other proposals, our analysis does not possess shortcomings that are inherent in them. The proposed analysis will then be extended to certain other types of sentences. Finally it will be suggested that there is another way of dealing with an expletive element that is different from the proposed analysis and yet is possessed of the meaning that will be assigned to an expletive by our original anlysis. The entire framework the present paper is based on is a combined Montague and transformational generative grammar.

§1. Idioms and some formulaic expressions aside, the validity of the principle of compositionality, that the meaning of the whole sentence is a function of the meanings of its parts, seems generally well established.(1) Where this principle was seemingly untenable, generative grammarians often invoked grammatical transformations which served to introduce designated elements into structures underlying surface sentences. Consider for instance the occurrence of the expletive *it* in the following sentence:

(1) It surprised John that Mary was determined to sit on it forever.

The initial *it* is semantically null while syntactically it functions as a surface subject. The reconciliation of these semantic and syntactic facts is achieved by deriving (1) via the application of a grammatical transformation often called *Extraposition*(2) on a structure underlying the following sentence:

(2) That Mary was determined to sit on it forever surprised John.

Both (1) and (2) share the congnitive meaning, if not the thematic relationship of the terms involved, and their truth values are always the same; one is true if and only if (iff) the other is true, or there is no state of affairs such that one would be made true without the other also

being made true. Hence the expletive *it* is shown to be genuinely expletive by this transformational analysis, for it does not even exist in the deep structure; there is no way *it* can contribute to the determination of the entire meaning of (1) because it depends on (2) for its semantic interpretation. This is all fine so far as we have a set of formally related sentences like (1) and (2), related in the sense that they each comprise a similar group of words and formatives. In fact the existence of a set of formally relatable sentences has always been one of the strongest reasons for positing a grammatical transformation. Many of the so-called "standard" transformations serving to account for the paraphrastic relationship of sentences actually relate sentences that consist of more or less a similar set of words.

§2. Let us now turn to other types of sentences that contain expletive elements.

(3) It rains.[3]

There is someone in the garden.

Grammarians generally agree that expletives *per se* in (3) are semantically null, contributing in no way to the semantic computation of the meanings of the whole sentences.[4] Neither *it* nor *there* refers to anything, and they are neither anaphoric nor cataphoric. Thus in the intended senses of those sentences,[5] the expletives in (3) can be neither questioned nor clefted, which is typical of nonreferring subjects:

(4) *What rains?

*It is it that rains.

*What is someone in the garden?

*It is there that is someone in the garden.

The point that the fact that the nonreferring (dummy) subjects cannot be questioned is a general restriction on English is also noted in Emonds (1972). Thus the following data confirm this (drawn from Emonds (1972, p. 56) with the addition, where appropriate, of explicatory sentences attached to the right):

(5) *What is raining?

*What is John that he is talking to? cf. It is John that he is talking to.

*What was to the boy that I was speaking? cf. It was to the boy that I was speaking.

*What's you? cf. It's me.

*What is the Beatles? cf. Is it the Beatles?
Who is it?

*What seemed to John was that the food was stale.

*What happens is that I don't have any money.

*What appeared to him was that the train had left.

Semantics aside, when we turn to the syntax of those expletives in (3), we note that in a significant way they behave like a full-fledged grammatical subject in English.[6] Particularly notable is the fact that they both participate in *Subject-Auxiliary Inversion* and *Raising*.

(6) *Subject-Auxiliary Inversion*:

Does it rain?

Isn't it raining?

Is there someone in the garden?

Isn't there someone in the garden?

*Raising* (The examples are drawn from Postal (1974)):

Max expected that Irving would believe there to be a bagel in his lunch box. (p. 199)

Joe believes Melvin found it to be raining in Madrid. (p. 199)

There seems to be a man in your bed. (p. 369)

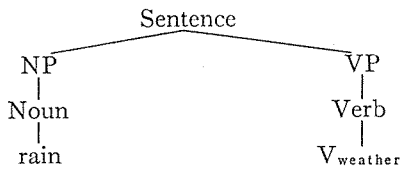
It seems to be snowing/sleeting. (p. 370)

The situation then seems again typical of those cases where generative grammarians are most happy about: we want those expletives in our syntax, but not in our semantics; this is exactly where the grammatical transformations are necessary. And indeed the existential sentence in (3) is often derived from a structure underlying (7).

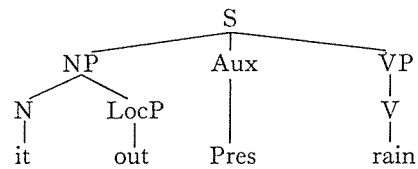
(7) Someone is in the garden.

The transformation that does the job in question is of course the time-honored *there-Insertion*. In spite of some apparent syntactic problems involved in this transformational analysis (see for instance Jenkins (1972), especially Chapter 2, Part J), it would have the combined advantage of doing away with the problem of semantic interpretation of expletive *there* and of maintaining the principle of compositionality. Again, as was the case with *Extraposition* that related (1) and (2), such an analysis has some initial plausibility. The situation has a completely different outlook when we turn to the other expletive in (3). Nobody, it seems, could think of a plausible paraphrastic sentence that would be related to it both formally and semantically. And, the *it* being expletive, we find a variety of analyses presented to reconcile syntax and semantics of expletive *it* that appears in that type of sentences, which, for ease of reference, I shall call "weather sentences". Some that have appeared in print are:

(8) a) Postal (1966, p. 98; 1974, p. 300[7]; Darden (1973))




b) Langendoen (1966, p. 211; irrelevant points omitted)



c) Emonds (1976, p. 103 fn. 7)

$[[\Delta]_{NP}$ rain$]_S$

Each analysis is presented with its own syntactic arguments though no semantic justification is to be found anywhere in the works cited. This of course does not mean that each author agrees on points of semantics of *it rains*. On closer look, we find each proposal has different semantic claims. Thus (8a) claims that "there is a noun *rain* which is predicated a verb with a meaning similar to 'fall', a verb which...itself never appears in Surface phrase markers (Postal (1966, p. 98 fn. 8)." In other words, there is here a predication that is claimed between a noun and a verb. Though Postal (1966, 1974) does not touch upon the nature of the noun itself, it is presumably a mass noun. The conspicuous absence of analysis of mass nouns in either of his work makes it impossible to semantically evaluate his proposal, but it is not difficult to imagine that he considers the expletive element *it* to be semantically vacuous since it does not appear in the proposed deep structure of weather sentences. Probably a notion like "fall" represented by $V_{weather}$ is compatible with the notion of mass, but it is not clear to me how his analysis would work for other weather verbs like *thunder, clear up*, etc. as in

(9) It thunders.
It clears up.

Obviously no notion of mass falling down from the sky is involved in the meaning represented by these sentences. Thus, in spite of some syntactic motivations presented for (8a) in Postal (1974, esp. p. 300 fn. 9), we must conclude that the proposed analysis is not satisfactory. Turning now to (8b), here we find the semantic claim made by the analysis is clearly different from that made by (8a) and, as we will see immediately below, by (8c). While (8a) claims the existence of predication between mass and whatever is represented by $V_{weather}$, (8b) says that the predication involved in the sentence *it rains* is between a place and whatever is designated by *rain*. Put differently, "raining" is claimed to be a property of a place. Though I see much truth in this claim, I do not wish to accept it for the following reason. Note that the correctness of Langendoen's (1966) analysis lies heavily on the interpretation of the designated element *out*, which, used intransitively, i.e., without any object, is a deictic word. Its meaning is a function of contexts. Nonetheless, the truth value of the following sentence, it seems to me, remains constant under the circumstances described below.

(10) It is raining in Cincinnati now.

Suppose 1) A lives in Cincinnati and B in Chicago, 2) that A and B utter the sentence (10) at the same time, and 3) it is raining in Cincinnati at the time the utterances are made. Clearly the truth value of the sentence uttered by A and that uttered by B are the same in spite of the fact that they are contextually located in different places with respect to the deictic notion represented by *out*. So there must be something wrong with the proposed analysis. What is crucial here is probably the supposition 2) above, which we will later have an occasion to touch upon. So unless some plausible interpretation of the word *out* is provided with respect to the deep structure (8b), we cannot so readily accept the proposal, again in spite of several syntactic

advantages the analysis purports to offer (: for details, see Langendoen (1966), especially pp. 208–211). Finally let us examine (8c). The semantic claim that one can infer from the structure is that, the problem of tense aside, the meaning of *it rains* is solely determined by whatever is represented by *rain* in the deep structure (8c). This is tantamount to saying that *rain* is semantically a proposition, for note that the sentence *it rains*, which is a surface manifestation of (8c), represents a proposition capable of having a truth value assigned to it. But this is really a weird claim so far as I can see. Just how a verb gets assigned a truth value on its own is anyone's guess. But suppose this were possible; the analysis would then face another serious problem. Consider the sentence:

(11) It rains hard.

Intuitively the word *hard* is a manner adverb, restricting the way it rains. But since the analysis (8c) requires that the verb *rain* be semantically a proposition once and for all, there is no obvious way it can guarantee that *hard* modifies the verbal notion represented by *rain*. Thus the proposal would have to incorporate some ad hoc restriction on the verb *rain*, or equivalently, the adverb *hard*; else the analysis would end up making a couter-factual and counter-intuitive claim that the adverb *hard* in (11) is semantically a sentential adverb. This of course does not mean that we do not have a mechanism that would enable us to treat a verb phrase adverb as a sentential adverb, and vice versa.[8] The point is that so far as the analysis (8c) goes such a way out is precluded, for *rain* is there treated as an unanalyzable single verb, not amenable to further decomposition (, which I understand is characteristic of grammarians like Emonds). Thus I conclude that (8c) is the least desirable of the three analyses in (8) on the simple ground that it trivially does not even meet descriptive adequacy on the semantic level.

§3. Probably the reason why we have had such a variety of analyses for a relatively simple sentence like *it rains* is that generative grammars have not been formally precise and rigorous enough in their semantics. True there has been done an almost unbelievably enormous amount of in-depth research in the area of English syntax, and more is to come for sure, but this fact stands all the more in sharp contrast with the relative paucity of research in formal semantics. Never, for instance, was the semantic interpretation that was to be functionally bound with the syntax in the overall description of a language formulated in formally precise and rigorous terms. Rather semantic interpretation always depended on one's intuition for its actual reading. This is true of both interpretive semantics and generative semantics.[9] Furthermore there is the fact that linguists in general had not been in close contact with logicians and philosophers working on problems of language until relatively recently. But the picture has been gradually changing, with an increasing number of linguists and philosophers collaborating on problems of their mutual concern. Particularly significant in this context has been the series of works done by a group of linguists and philosophers originally in California, of which Montague (1974) stands out head and shoulders above the rest for "the incredible theoretical edifice (Dowty (1978), p.v)" he has constructed, possessing "a remarkable aesthetic appeal in the overall simplicity and elgeance with which it achieves great richness in

detail (*ibid.*)."[10] And it is within Montague's framework that I wish to tackle below the by now familiar weather sentence *it rains*, together with the insights afforded by generative grammarians. (For such a combined approach of Montague and generative grammars, see among others Partee (1975) and Bennett (1974).) Furthermore I would like to follow Bennett (1974) in dispensing with individual concepts; though the problem of individuals themselves does not appear as such in the ensuing discussion, the approach thus taken will be certainly in line with the analysis I shall give with respect to the semantics of *it rains*, and the parallelism will be fairly obvious. Thus I give below the three basic categories in syntax in Bennett (1975, p. 8).

(12) t is the category of declarative sentences
CN is the category of common nouns and common noun phrases
IV is the category of intransitive verbs and certain other verb phrases.

The mapping f from the syntactic categories to the types of intensional logic is then (*op. cit.*, p. 22):

(13) $f(t)=t$
$f(CN)=f(IV)=\langle e, t\rangle$
$f(A/B)=f(A//B)=\langle\langle s, f(B)\rangle, f(A)\rangle$
whenever $A, B\in Cat$

It is true that the system that is a consequence of (12) and (13) cannot *per se* deal with the *the temperature is ninety and the temperature rises* puzzle, but at the same time it is also true that the resultant system is far simpler than the original PTQ model and is much more in accord with our intuition.

§4 Of the two expletive sentences in (3), the second we presume is to receive a transformational analysis; it would be derived from a sentence like (7) via the application of *there-Insertion*, which is semantically an identity mapping, that is, if (7) translates into $\phi'$, then the result of applying *there-Insertion*, the existential sentence in (3), also translates into $\phi'$.[11] And we will devote the remainder of this paper to the discussion of the other expletive sentence in (3), repeated below:

(14) It rains.

You will recall that, as was touched upon in §2, there does not seem to be any easy transform of (14) that may be related to it by a syntactic transformation. If there be such, we would probably adopt it for an object of our semantic interpretation if for no other reason than that it would enable us to maintain the principle of compositionality. But in the absence of such a transform, we would like to consider that (14) should be interpretable on its own, the whole meaning being a function of the meanings of its parts; for note that, unlike some frozen idioms and formulaic expressions, weather sentences like (14), as we have seen in §2, are possessed of grammatically significant syntactic versatility. The problem we face then is obviously this: Since the syntactic pattern of (14) is completely in parallel with the following sentences:

(15) John walks.
The man runs.
Every woman talks.

it is to be derived by a rule like PTQ S4, which is:

S4. If $\alpha \in P_{t/IV}$ and $\delta \in P_{IV}$, then $F_4(\alpha, \delta) \in P_t$, where $F_4(\alpha, \delta) = \alpha\delta'$ and $\delta'$ is the result of replacing the first *verb* (i.e., member of $B_{IV}$, $B_{TV}$, $B_{IV/t}$, or $B_{IV//IV}$) in $\delta$ by its third person singular present.

If so, then its translation into intensional logic would be by T4, which is:

T4. If $\delta \in P_{t/IV}$, $\beta \in P_{IV}$, and $\delta$, $\beta$ translate into $\delta'$, $\beta'$ respectively, then $F_4(\alpha, \beta)$ translates into $\delta'(\hat{}\beta')$.

But *it* in *it rains* is an expletive element, which, at its face value at least, is semantically null. Thus we are here unable to maintain the otherwise plausible principle of compositionality. Furthermore, as it stands, this would mean that we cannot compute out the meaning of *it rains*, which, in its turn, would mean we cannot assign any truth value to it at any world-time index $\langle i, j \rangle$. So something must be wrong here, for clearly *it rains* denotes a proposition, capable of being assigned a truth value t any world-time index $\langle i, j \rangle$. For reasons mentioned in §2 with respect to (8c), we do not wish to say *rains* in *it rains* translates into a proposition; nor do we wish to say that *rain* denotes a property of a place, the point which was discussed and rejected with respect to (8b), though this may be possible. But it cannot be a property of individuals, for we do not say (cf. (15) above):

(16) John rains.
The man rains.
Every woman rains.

Let us then for a moment reflect upon sentences in (15). There it is understood within Montague grammar that walking, running, and talking are the respective properties of John, the unique object that has a property of being a man, and everything that has a property of being a woman. Now if we believe in the correctness of the principle of compositionality and syntactic/semantic analyses of simple intransitive sentences, S4 and T4, it must be that a similar thing is going on in (14). Specifically *rain* must be designating a property of something. What this something is may seem a little diffucult to find out, but the only reasonable entity here capable of being predicated of such a property as is designated by *rain* is, it seems, a moment of time or a time interval. *It* then probably is not after all an expletive element devoid of any semantic content, but rather a linguistic expression referring to a moment or an interval of time, or equivalently a set of properties thereof. Though it is perhaps easy to incorporate both moments and intervals of time, let us below assume that it is only a moment of time that the so-called expletive *it* in weather sentences refers to.[12] *Rain* then denotes, at a world-time index $\langle i, j \rangle$, a set of moments of time, or a characteristic function thereof. The intension of *rain* is thus a property of moments of time. This way of interpreting weather sentences can

overcome the shortcomings that are inherent in analyses like (8a, b, c) and yield a reasonable assignment of truth values thereto, which point will be discussed in §6 after a brief sketch of formalism in §5. Thus while I do not believe that the expletive *it* in weather sentences like *it rains* is semantically null, a different analysis will be also suggested toward the end of §7 based on the one to be given in the next section that interprets the weather sentences in exactly the same way as in §5 and yet makes *it* in weather sentences expletive on the surface.

§5. To generate representative weather sentences within the PTQ framework, augmented of course with a transformational component (: see comments and references in §3), it will be necessary to enrich the vocabulary with adequate expressions of the following kind. Let us for the present paper adopt the convention of drawing a bar above a symbol to indicate that the symbol that appears below the bar is to be an expression of time level (: an analogous convention is adopted in Delacruz (1974) for expressions of proposition level). This would make the parallelism between our rules and PTQ S4 and T4 above obvious, and also that between our position on the concept of moments of time and that of Bennett (1974) on the concept of individuals (cf. §3).

Basic syntactic categories (cf. (12))

$\overline{\text{IV}}$ is the category of time level intransitive verbs and certain other verb phrases.

Basic expressions of category A, i.e., $B_A$

$B_{\overline{\text{IV}}}$= {**rain, snow, thunder, clear up**}
$B_{\overline{\text{T}}}$= {**it**$_0$, **it**$_1$, **it**$_2$, ... **it**$_n$, ...} (Note that $\overline{\text{T}}$ is a derived syntactic category $t/\overline{\text{IV}}$.)
$B_{\overline{\text{IV}}/\overline{\text{IV}}}$= {**hard**}

The mapping f from the syntactic categories to the types of intensional logic (cf. (13))

$f(\overline{\text{IV}})=\langle m, t\rangle$ (where m is a fixed object distinct from s, e, and t.)

Rules of functional application

S4′. If $\alpha\in P_{t/\overline{\text{IV}}}$ and $\delta\in P_{\overline{\text{IV}}}$, then $F_4$, $(\alpha, \delta)\in P_t$, where $F_4'(\alpha, \delta)$=**it** $\delta'$ and $\delta'$ is the result of replacing the verb by its third person singular present. (Similarly with S17′)

S10′. If $\delta\in P_{\overline{\text{IV}}/\overline{\text{IV}}}$ and $\beta\in P_{\overline{\text{IV}}}$, then $F_7(\delta, \beta)\in P_{\overline{\text{IV}}}$, where $F_7(\delta, \beta)=\beta\delta$.

Translation rules

Basic rules

**it**$_n$ translates into $\hat{\bar{R}}\bar{R}\{\bar{r}_n\}$ ($\bar{R}$ is a variable of type $\langle s, \langle m, t\rangle\rangle$; $\bar{r}_n$ is a variable of type $\langle m\rangle$.)

Rules of functional application

T4′. If $\delta\in P_{t/\overline{\text{IV}}}$, $\beta\in P_{\overline{\text{IV}}}$, and $\delta, \beta$ translate into $\delta', \beta'$ respectively, then $F_{4'}(\delta, \beta)$ translates into $\delta'(\hat{}\beta')$. (Similarly with T17′)

T10′. If $\delta\in P_{\overline{\text{IV}}/\overline{\text{IV}}}$, $\beta\in P_{\overline{\text{IV}}}$, and $\delta, \beta$ translate into $\delta', \beta'$ respectively, then $F_7(\delta, \beta)$

translates into $\delta'(\hat{}\beta')$.

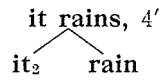
Since we have introduced a new fixed object m into our intensional logic, we need further addition to the system. Let A, I, J be any sets, which may be regarded as the set of individuals, the set of possible worlds, and the set of moments of time respectively. Then $D_{m,A,I,J}$, or the set of possible denotations of type $\langle m\rangle$ corresponding to A, I, J is:

$$D_{m,A,I,J}=J$$

In addition to the assignment function g whose domain is a set of individual variables and whose range is A, we have another assignment function $\bar{g}$ that assigns to every variable of type $\langle m\rangle$ a particular moment of time j such that $j\in J$. Suppose $\mathcal{M}$ is an interpretation (or intensional model) of the form $\langle A, I, J, \leqslant, F\rangle$ of the usual sort, then, whereas $\alpha^{M,i,j,g}$ (i.e., the extension of $\alpha$ with respect to $\mathcal{M}$, i, j, and g) is $g(\alpha)$ where $\alpha$ is a variable of the appropriate te, yp $\beta^{M,i,j,\bar{g}}$ is $\bar{g}(\beta)$—moreover, $\bar{g}(\beta)=j$, where $\beta$ is a variable of type $\langle m\rangle$. Since we do not have a constant of type $\langle m\rangle$ in this fragment, we do not have to worry about the definition of its intension.

We can now give a syntactic and semantic analysis of (14) *it rains*:

An analysis tree:




Translation: $\mathbf{rain} \longrightarrow \mathbf{rain}'$

$\mathbf{it}_2 \longrightarrow \hat{\bar{P}}\bar{P}\{\bar{x}_2\}$

$\mathbf{it\ rains} \longrightarrow \hat{\bar{P}}\bar{P}\{\bar{x}_2\}\ (\hat{}\mathbf{rain}')$ :T4′

The denotation of *it rains* at the index $\langle i, j\rangle$ is then:

$$[\hat{\bar{P}}\bar{P}\{\bar{x}_2\}(\hat{}\mathbf{rain}')]^{M,i,j,g,\bar{g}}$$

Though logically equivalent, we can give a more conspicuous translation of *it rains* above by means of the usual logical reductions, and its denotation at the given index. Read the dotted arrow "⇢" as "converts to"; then we have:

$\hat{\bar{P}}\bar{P}\{\bar{x}_2\}(\hat{}\mathbf{rain}')$

⇢ $\hat{}\mathbf{rain}'\{\bar{x}_2\}$

⇢ $\check{}\hat{}\mathbf{rain}'(\bar{x}_2)$

⇢ $\mathbf{rain}'(\bar{x}_2)$

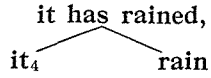
Thus the denotation of *it rains* is any of the following equivalents:

$$[\hat{\bar{P}}\bar{P}\{\bar{x}_2\}(\hat{}\mathbf{rain}')]^{M,i,j,g,\bar{g}}=[\mathbf{rain}'(\bar{x}_2)]^{M,i,j,g,\bar{g}}=\mathbf{rain}'^{M,i,j}(\bar{x}_2)^{M,i,j,\bar{g}}$$
$$=\mathbf{rain}'^{M,i,j}(j)$$

The last formula (, and thus, equivalently, any other formula above) says that the moment of time j has the property of raining at the given index $\langle i, j\rangle$. So the expression *it rains* is true at the index $\langle i, j\rangle$ iff it is raining at the moment j in the possible world j, i.e., iff $j\in[F(\mathbf{rain}')](\langle i, j\rangle)$.

Similarly *it has rained*, for instance, is analyzable as follows.

An analysis tree: **it has rained,** 14′




Translation: **rain** ⟶ **rain′**

$\mathbf{it}_4 \longrightarrow \hat{\bar{P}}\bar{P}\{\bar{x}_4\}$

**it has rained** ⟶ $H\,\hat{\bar{P}}\bar{P}\{\bar{x}_4\}(\hat{}\mathbf{rain}')$ :T17′

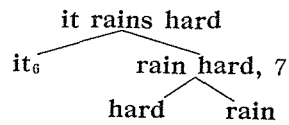
The denotation $[H\hat{\bar{P}}\bar{P}\{_4\bar{x}\}(\mathbf{rain}')]^{M,i,j,g,\bar{g}}$ is 1 iff

$[\hat{\bar{P}}\bar{P}\{\bar{x}_4\}(\mathbf{rain}')]^{M,i,j,g,\bar{g}}$ is 1 for some j′ such that $j' \leqslant j$ and $j' \neq j$.

As we have seen above, the sentence *it has rained* is then true iff $j' \in [F(\mathbf{rain}')]$ $(\langle i, j' \rangle)$.

§6. The analysis of weather sentences in §5 is free from the shortcomings that those in (8) possess. Unlike (8a), our analysis also works for sentences like *it thunders, it has cleared up*, etc. for which (8a), as we have noted, does not seem to have any unified solution. But clearly these sentences ought to be treated on a par with *it rains* type sentences. Note that we can generate them in a completely parallel fashion since the verbs **rain**, **snow**, **thunder**, **clear up** are all members of $B_{IV}$.

Unlike (8b), our analysis assigns the same truth value with respect to (10) under those circumstances described there. Thus regardless of the deictic orientation of the constant *out* (or, for that matter, any deictic word or expression of place), it is true at the time t the utterance is made iff it is raining in Cincinnatti at t. That this is the interpretation our fragment assigns is clear from the brief exposition of our grammar in §5. Unlike (8c), our analysis captures the fact that *rain* is an intransitive verb and that *hard* is a manner adverb that goes with a verb phrase. Thus *it rains hard* is generated in the following fashion:




which is translated into:

$\hat{\bar{P}}\bar{P}\{\bar{x}_6\}(\hat{}\mathbf{hard}'(\hat{}\mathbf{rain}'))$

Clearly **hard** is nothing but a verb phrase adverb in our analysis in contradistinction to the counter-intuitive claim made by (8c) that it is a sentential adverb. We see then that our proposed fragment of English syntax and semantics for weather sentences is to be preferred to those given in (8), the latter suffering from several syntactic and semantic drawbacks that ours is free from.

§7. As I have indicated in §5, there is a way open for us to maintain that the expeltive *it* that appears in weather sentences is really expletive and yet give the right kind of semantic interpretation as outlined above. And of course the key to such solution is the use of syntactic transformations. But before we come to this problem, several comments are probably in order here since I believe the essentials of our analysis to be correct.

The introduction of barred categories like $\overline{\text{IV}}$, $\bar{\text{T}}$, etc. may be objected to on the grounds that it would lose the linguistically significant generalization in that a category like $\overline{\text{IV}}$ is no different than IV and that accordingly they are to be so treated in syntax. The objection is well taken, but we have to bear in mind that it is also a significant fact that expressions like **walk**, **go**, **find the woman** of the category IV denote, at a given index, a set of individuals and are clearly different from verbs like **snow**, **rain**, **thunder**, which belong to $\overline{\text{IV}}$. In Montague grammar, to claim that these two are of the same syntactic category is to claim that they translate into expressions of the same intensional type, which probably nobody would wish to maintain. But to say that these two claims do not necessarily have to be entertained at the same time would be to say that the mapping f from syntactic categories to intensional types ceases to be a function, which would be even more undesirable and devastating. So the putative generalization has to be achieved in some other way. Perhaps the linguistically significant generalization that IV and $\overline{\text{IV}}$ behave syntactically alike should be captured by setting up some convention to the effect that every syntactic rule that would affect X would also affect $\bar{\text{X}}$, $\bar{\bar{\text{X}}}$, etc. (but probably not vice versa) (See Delacruz (1976) for example of proposition level verbs, common nouns, etc.).

While I said a verb like **rain** translates into the constant **rain′**, which denotes at $\langle i, j\rangle$ a set of moments of time, the translation actually would cover only those cases where there is no overt time expression present. But now consider sentences like:

It rained at seven o'clock.

The sentence would be true iff $s \in [F(\textbf{rain}')]$ $(\langle i, j'\rangle)$. Thus we would have to be able to say that $[\bar{x}]^{M, i, j', \bar{g}} = s$. Though we need to have further analyses of prepositional expressions of time, such reading may be assigned if we analyzed **rain** as translating into:

$$\lambda\bar{y}\lambda\bar{x}\ [\textbf{rain}'\ (\bar{x})\ \&\ \bar{x}=\bar{y}]$$

and equated $\bar{y}$ with the denotation of **seven o'clock**.[13] Other modifications might be necessary, but I do not wish to go into them here since the point of the present paper is to bring up the point that a verb like **rain** denotes a set of moments of time.

Bringing in names like **seven o'clock**, **8:30**, etc. will enable us to treat a set of sentences of another kind that also contain an occurrence of the so-called expletive *it*; they are sentences like:

It is seven o'clock.
It is 8 : 30.

Suppose we have the following translation:

$$\textbf{be} \longrightarrow \lambda\bar{P}\lambda\bar{x}\bar{P}\{\hat{\bar{y}}[\bar{x}=\bar{y}]\}$$
$$\textbf{seven o'clock} \longrightarrow \hat{\bar{P}}\bar{P}\{s\} \quad (s \in J)$$

then, given our analysis of *it* as above, **it is seven o'clock** would translate into:

$$\hat{\bar{P}}\bar{P}\{\bar{x}_0\}[\hat{}\lambda\bar{P}\lambda\bar{x}\bar{P}\{\hat{\bar{y}}[\bar{x}=\bar{y}]\}\ (\hat{}\hat{\bar{Q}}\bar{Q}\{s\})]$$

which is equivalent to:

$\bar{x}_0 = s$

Thus, **it is seven o'clock** is true at a given index $\langle i, j \rangle$ iff:

$j = s$

which is precisely what we wish to have.

Now I shall turn to the problem brought up in the first paragraph of this section. While we have been assuming that English temporal specification involves only one notion of time with respect to a sentence, this would ultimately turn out to be wrong. For instance, according to Reichenbach (1947), Smith (1978), etc., at least three notions of time are involved in the temporal specification: speech time, reference time, and event time. "Speech Time (ST) is...the moment of utterance. Reference Time (RT) is the time indicated by a sentence,.... Event Time (ET) refers to the moment at which the relevant event or state occurs,..... In (2) all three times are different:

(2) Marilyn had already won the prize last week.

...ST is the moment of utterance, RT is last week, and ET is an unspecified time prior to last week. (Smith *op. cit.* p. 44)" To incorporate such notions with their due ramifications is regrettably beyond the scope of the present paper (for details see the above work). Recall here now that Montague (1974) identifies "events with properties of moments (p. 150)." In this respect then our semantic analysis of **rain**, F(**rain'**), is also an event, for [F(**rain'**)] ($\langle i, j \rangle$) denotes a set of moments of time. Probably events like **rising** is of the category $\overline{CN}$, and $f(\overline{IV}) = f(\overline{CN}) = \langle m, t \rangle$. The noun **rain** thus is a member of $B_{\overline{CN}}$, while the verb **rain** is, as we have seen above, a member of $B_{\overline{IV}}$. Such conjecture is partly confirmed by using some of Vendler's (1967) diagnostic frames for testing event-hood:[14]

| | |
|---|---|
| The rain | was sudden |
| | occurred |
| | lasted |
| I heard | the rain |
| I observed | |
| before | the rain |
| after | |

The introduction of $\overline{CN}$ thus seems fairly straightforward, but actually we would face one immediate difficulty here, for observe that we do not say:

| | |
|---|---|
| The rain | snows |
| | thunders |
| | snowed |
| | sleeted |

nor do we say:

| | |
|---|---|
| The rising of the sun | rained |
| | snowed |
| | cleared up |

| | |
|---|---|
| John's singing of the Marseillaise | rained |
| | thunders |
| | snows. |

It is when we try to clean up this mess that we come upon a possible solution to the problem alluded to at the very outset of this section. Suppose we invoke a syntactic transformation that would have the effect of obligatorily postposing a constant of category $\bar{T}$ and making it a sentence final prepositional phrase with the head preposition **at**. Upon application of this transformation, $T_{time}$, the following changes would take place:

**The rain snows. → It snows at the rain.**
**The rain thunders. → It rains at the thunder.**
**The rising of the sun rained. → It rained at the rising of the sun.**
**Joh's singing of the Marseillaise rained. → It rained at John's singing of the Marseillaise.**

The introduction of **it** in the subject position here follows the general convention regarding the vacated NP position (cf. (1) and (2) in §1). Such a transformation would obviate the necessity of analyzing *rain* as $\lambda\bar{y}\lambda\bar{x}[rain'(\bar{x}) \,\&\, \bar{x}=\bar{y}]$, mentioned a few paragraphs ago because of the following conversion:

**Seven o'clock rained. → It rained at seven o'clock.**

One consequence of this approach is that while **it** in **it rains** corresponds to $\hat{\bar{P}}\bar{P}\{\bar{x}\}$, **it** in **it rains at seven o'clock** correspons to nothing of semantic significance but is a designated element introduced by a syntactic transformation. But then if one would like to make $\bar{T}_{time}$ a little more general, one could drop the restriction of constant-hood of the moved category T from the structural description, with the convention that a surface variable be deleted (or, equivalently, that a subscripted expression be deleted).[15] This would enable us to say that all the occurrences of *it* in

**It rains.**
**It is seven o'clock.**
**It rains at the thunder.**
**It rained at the rising of the sun.**

are genuinely expletive. Thus this solution is another way of maintaining the compositionality principle with respect to **it rains** and expressions of that ilk. We seem then to have gone the whole cycle: we started out with the expletive *it*, rejected it, and then resurrected it. Whichever may be the more preferable analysis, our net gain is the following semantic representations of the four sentences above.

$\hat{\bar{P}}\bar{P}\{\bar{x}\}(\hat{}\mathbf{rain}')$
$\hat{\bar{P}}\bar{P}\{\bar{x}\}[\lambda P\lambda\bar{x}P\{\hat{\bar{y}}[\bar{x}=\bar{y}]\}(\hat{}\hat{\bar{Q}}\bar{Q}\{s\})$
$\hat{\bar{P}}\vee\bar{y}[\wedge\bar{x}[\mathbf{thunder}'(\bar{x}) \leftrightarrow \bar{x}=\bar{y}] \,\&\, \bar{P}\{\bar{y}\}](\hat{}\mathbf{rain}')$
$\hat{\bar{P}}\vee\bar{y}[\wedge\bar{x}[\mathbf{rising\ of\ the\ sun}'(\bar{x}) \leftrightarrow \bar{x}=\bar{y}] \,\&\, \bar{P}\{\bar{y}\}](\hat{}\mathbf{rain}')$

## Notes

1. For discussion of this principle, see for instance Cresswell (1973), in which it is also called Frege's principle. Katz (1973) takes up the problem of compositionality from the viewpoint of the computation of meanings of idioms. While Bolinger (1977) contains excellent essays attempting to prove "that any word which a language permits to survive must make its semantic contribution (p. ix)," the approach there taken is from the standpoint of functional sentence perspective, differing in significant respects from ours and thus had to be excluded from the general discussion below. Readers interested in the pragmatic account of the reference of the so-called expletive *it* may wish to turn to Chapter 4 of his book.
2. The remark regarding the status of the empletive *it* also applies to the *Intraposition* approach, but not to the position that maintains that *it-that* complementizer is present in the deep structure; such a position has the burden of giving the semantic interpretation of *it* and *that* as they exist in the deep structure, else it is forced to abandon the priciple of compositionality.
3. I take the verb *rain* as a representative word of a set of similar words like *snow*, *thunder*, *sleet*, *clear up*, etc., which in one way or another have to do with the weather.
4. Jespersen (1924, 1927) seems to consider that "it (i. e., the expletive *it*/TS) really refers to something definite (Jespersen (1927) Part VII, p. 149)," and he cites from Shakespeare's *Twelfth Night* "The raine it raineth euery day." Another example of the expletive *it* being used anaphorically is:

> The rain is rainig all around
> It falls on field and tree
> It rains on the umbrellas here,
> And on the ships at sea.— R. L. Stevenson.

But such anaphoric or referential use is at best marginal in modern English, and indeed Jespersen (1933, p. 155) says, "But in agreat many cases *it* is used in such a way that it is not possible in this way to point to something specifically referred to." And he gives sets of sentences that contain an occurrence of such "unspecified" it, which are worth reproducing here:

> Natural phenomena:
> It rains (snows, freezes, clears up, etc.).
> It is cold today. It has been cloudy all day.
> Time:
> It is half-past six.
> It was a long time before he came to.
> It is Sunday tomorrow.
> Space:
> How far is it to Charing Cross?
> It is a long way to Tipperary.
> Objects of idiomatic verb phrases:
> We must have it out some day.
> That is coming it rather strong.
> I say, you are going it!
> I will give it him hot.
> If you are found out, you will catch it.

To lord it, queen it.

etc.

Prepositional phrases:

M ke a day of it.

Make a clean breast of it.

There is nothing for it but to submit.

You are in for it.

It is only the first set of sentences that is taken up in this paper, with the second one treated in an analogous fashion in §7. The last two sets are probably to be taken as idioms. As for *it* in expressions of space, perhaps it is possible to maintain the principle of compositionality and say that *it* in those instances really refers to something. But I shall not deal with this problem in this paper. Re idioms and the principle of compositionality, see Katz (1973). With respect to pragmatic account of *it* in these and several other types of sentences, see Bolinger (1977), Chapter 4.

5. Under normal circumstances, the intended senses of those sentences in (3) appear most obvious when the initial word is destressed.
6. For the notion of subject in general from the viewpoint of universals I refer the reader to Keenan (1976), where, incidentally, one can find remarks regarding the reference of expletives (: see for instance p. 317).
7. Postal (1974) adopts an English-as-a-VSO-language hypothesis, but the point of our discussion is not affected in any way whether one takes the VSO or SVO hypothesis.
8. Dowty (1976, p. 230) for instance has a postulate that has such an effect.
9. It is of course erroneous to believe that the semantic representation as proposed by generative semantics grammarians does not have to be interpreted, a point which is well appreciated by a grammarian like Lakoff (a talk given in 1975 MSSB Workshop on syntax and semantics at Berkely, California) but which so often seems to go neglected.
10. I do not wish to be taken that I am belittling works done by other researchers. There is no article or book, if seriously written, that is not worth reading. The best and most excellent introduction to date to Montague grammar is, in my mind, Dowty (1978) though of course Partee (1975) is also indispensable.
11. For more specific proposal of syntactic trnsformations within the general framework of Montague grammar, see Partee (1975, 1976), Bennett (1974), etc.
12. We are thus regarding a sentence like *it rains* as an instantaneous event; there is probably no harm in this choice, the interval being a set of continuous moments of time. Aside from the question of whether there really is an instantaneous rain, which I think there is, if need be, we can for instance let variables like $\bar{x}$, $\bar{y}$, etc.,which will be introduced soon, range over time intervals; this would of course necessitate changes in other parts of the grammar to be presented, but we will not go into this in this paper.
13. Here, and in what follows, we assume, contrary to the fact, that expressions like **seven o'clock**, **8:30**, etc. are proper names. Thus **seven o'clock**, for instance, is equivalent to **seven o'clock a.m, may 25, A.D. 1980** (among many others). This simplifying assumption does not affect in any way, the point argued for in this section.
14. For details, see Vendler (1967), Chapter 5.
15. Note that as it stands, the **it** introduced in S4′ is neither a constant nor a variable of category $\overline{T}$: it is rather a syncategoramatic element grammatically belonging to no category. So, for the suggestion to work properly, we have to replace the part in S4′ that reads $F4'(\alpha, \delta) = \mathbf{it}\ \delta'$ by $F4(\alpha, \delta) = \alpha\delta'$, which revision is assumed to have been made in the following discussion.

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