SOME ASPECTS OF ADVERBS OF FREQUENCY

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In an article on quantifier structures in English Keenan (1971) suggests a treatment of adverbs of frequency as quantifiers and demonstrates that they possess the three basic quantifier properties: binding, predication and relative scope. Keenan's list includes, in addition to *always*, such forms as *usually, occasionally, rarely, never* and *sometimes*. Lakoff (1970) analyses the behaviour of *frequently* with respect to quantified noun phrases and definite descriptions and also concludes that this adverb should be regarded as a quantifier, paraphrasable by 'at many times t'. The list can no doubt be extended by the addition of items like *often, seldom* and *ever*.

Grammarians have occasionally attempted to arrange the frequency adverbs on a scale from least to most general, with roughly the following result: *never, once, seldom* (or *rarely*), *sometimes, frequently* (or *often*), *usually, always* (*ever*, as still used in affirmative sentences, in the sense of 'always'); *occasionally* would presumably fall after *seldom* and *sometimes*, or between these two. One pedagogical grammar even contains a list where frequency adverbs are marked with figures showing the relative frequency of occurrence of an action as indicated by the given adverb (Osman 1964).

The logician would not accept any ordering like the one above, because the entailment relations which hold among other types of quantifiers obtain only for some members of the class of frequency adverbs (this fact has been pointed out to me by Prof. Lauri Karttunen). Thus, for instance, *seldom* and *rarely* entail *sometimes*, contrary to the relative positions of these items on the grammarian's scale; also, the equivalence $(\forall x)\ Fx \equiv \sim(\exists x)\sim Fx$, where the universal quantifier is substituted by *always*, holds only for the *sometimes* interpretation of the existential quantifier, and for no other reading; so, for example, *it is not true that John frequently does not misbehave* is implied by, but does not imply *John always misbehaves*. *Never* is a real quantifier, characterizable in terms of the negation sign and *sometimes* or *always*. A reason

will be given later on for preferring one of these characterizations over the other, at least for the *never* of natural language.

Horn (1969) relates an interesting fact about the quantifier-like elements in natural language; namely, entailment relationships between sentences (1) and (2) below are not always the same but form a special pattern:

(1)   a. All girls are (both) clever and seductive.
       b. Many girls are (both) clever and seductive.
       c. Few girls are (both) clever and seductive.

(2)   a. All girls are clever and all girls are seductive.
       b. Many girls are clever and many girls are seductive.
       c. Few girls are clever and few girls are seductive.

The entailment relations are as follows: $(1a) \leftrightarrow (2a)$, $(1b) \rightarrow (2b)$, $(1c) \leftarrow (2c)$. According to this test, quantifying expressions in English can be classified into three groups: universal, positively oriented and negatively oriented. We find that the distribution of temporal quantifiers is similar. *Always* is universal:

(3)   a. Tom always is both tired and bored.
       b. Tom is always tired and Tom is always bored.

Usually, *often* and *sometimes* are positively oriented:

(4)   a. Tom is sometimes (often, usually) both tired and bored.
       b. Tom is sometimes (often, usually) tired and Tom is sometimes (often, usually) bored.

Seldom and *never* are negatively oriented:

(5)   a. Tom is seldom (never) both tired and bored.
       b. Tom is seldom (never) tired and Tom is seldom (never) bored.

There are sentences to suggest that, no matter how precisely the inexact concepts expressed by *often* and *usually* are defined, *usually* does not have to imply *often*, and the scale provided at the beginning of our discussion is further falsified, e.g.:

(6)   a. The sun usually rises in the east.
       b. The sun often rises in the east.

There is a reading of (6b) such that the truth of that sentence does not follow from the truth of (6a). To take a more clear-cut example, let us consider the sentences (7a) and (7b), where only one inexact concept (*often*) is involved, and where the truth of (b) might be expected to be entailed by the truth of (a):

(7)   a. The sun always rises in the east.
       b. The sun often rises in the east.

However, here again an interpretation of (b) exists whose truth does not follow from the truth of (a). Both (7a) and the negation of (7b) can be true at the same time (under one reading of the latter). The two possible readings of (7b) =(6b) are:

(8)   a. at many times t such that the sun rises at t, the sun rises in the east at t.

       b. at all times t, the sun rises in the east at t.
       Correspondingly, (7a) could be paraphrased as:

(9)   a. at all times t such that the sun rises at t, the sun rises in the east at t.
       b. at all times t, the sun rises in the east at t.

Sentence (9b), while logically impeccable, states an untruth so obvious that no ordinary user of language would ever think of interpreting (7a) in this way. However, there seem to be other reasons for (9b) to be inadmissible, in addition to its falsity. To attempt to explain the difference between the behaviour of *often* and that of *always* and *usually* with respect to the interpretation (b) let us turn to a set of even simpler sentences:

(10)   I sometimes fall asleep.
(11)   I often fall asleep.
(12)   I usually fall asleep.
(13)   I always fall asleep.

Granting the oddity of all these sentences in ordinary conversation, we must note that only the first two are ever likely to occur at the beginning of a conversation, that is, without a context. Sentences (12) and (13) would be inappropriate in such situations, and their semantic interpretation would be impossible. The same observation can be made about the following pairs of sentences, where the sentences (b) are markedly less odd than (a), if used at the beginning of a conversation:

(14)   a. I always (usually) meet Mary Smith.
       b. I often meet Mary Smith.
(15)   a. Mary always (usually) smokes.
       b. Mary often smokes.
(16)   a. Tom usually (always) works.
       b. Tom often works.

A comparison of (14) on the one hand and (15) and (16) on the other shows that it is not the duration of the action mentioned by the sentence that is involved.

Unlike the pairs of sentences (14) - (16), the following two sentences are equally good as conversation starters:

(17)   a. I always fall asleep unexpectedly.
       b. I often fall asleep unexpectedly.

Like (7a), however, (17a) has only one interpretation, whereas (17b) has two; the latter can mean either *at many times t such that I fall asleep at t, I fall asleep unexpectedly at t* or *at many times t I fall asleep unexpectedly at t*. In logical terms we may say that the quantifiers *at all times* t (*always* in ordinary language) and *at most times* t (*usually*) cannot be used in a temporally unbounded universe of discourse, whereas *at many times*, *at some times* and *at no time* are not so constrained. This provides a reason for deriving *never* in ordinary language

from *sometimes* rather than from *always* (since the latter must obey certain contextual constraints which do not limit the occurrence of either *sometimes* or *never*). The temporal bounding just referred to can be effected either within the sentence in which the temporal quantifier appears or in the context (that is why (12) and (13) could occur as answers to, e.g., *What do you do at two o'clock, on the whole?*, but not at the beginning of a conversation).

The constraint just formulated accounts for the lack of entailment between certain *always/usually* sentences and *often* sentences. However, there appear to be a number of counterexamples, e.g. the following sentence, which can start a conversation:

(18) The sun usually (always) rises.

Still, (18) cannot receive the interpretation *at all (most) times* t, *the sun rises at* t (we do not witness a permanent sunrise); instead, it has the meaning *at all (most) times* t *such that the sun is expected to rise at* t, *the sun rises at* t. A similar analysis holds for *I always believe Tom (whenever he tells me something)*. The constraint should, therefore, be complemented with a clause to the effect that the bounding of the universe of discourse can be accomplished by a temporal term which is not necessarily overtly expressed but which is automatically inferred from the situation by both the speaker and the listener.

Even in this expanded form, the constraint cannot account for the acceptability of sentences like the following:

(19) Tom is always (usually) busy.

(20) Modred usually (always) feels lousy.

(21) John always knows what he wants.

(22) This sentence is always true.

All the verbs in these sentences are stative and this, at first sight, suggests itself as a convenient explanation; unfortunately, sentences like

(23) Mary is always tall.

(24) John always knows Julia Brown.

which also contain stative verbs, are unacceptable. It might be added, for that matter, that they would remain unacceptable even if the frequency adverbs appearing in them were *often* or *sometimes*. The difference between (19) - (22) and (23) - (24) is that while the states named in the former set of sentences are subject to change, it is impossible, in ordinary circumstances, to think of a situation in which Mary, who is tall, is not tall (taking the term *tall* to be defined in a non-relative way). (21) differs from (24) in containing a description which can be filled by various individuals (things that John wants), and it is possible to imagine a situation in which John suddenly no longer knows what he wants; on the other hand, once having got to know Julia Brown, John cannot help knowing her ever after. The states expressed in (19) - (22) and (23) - (24) can be called alienable and inalienable, respectively. With expressions of inalienable state, any adverbs of frequency are inappropriate: *always* is redundant and all the other frequency adverbials express meanings incompatible with the inalienability of the state.

The problem of why *always* and *usually* can appear with predicates expressing states (sentences 19 - 22) still stands. The answer that will be proposed is not purely linguistic; yet it seems to account for the curious behaviour of some frequency adverbials quite adequately. Let us turn once again to the sentence (6a) (repeated for convenience):

(6) a. The sun usually rises in the east.

For this sentence to be used appropriately, a time at which the action of verb occurs (or is likely to occur) must be somehow known in advance (so that the temporal context of *usually* is defined). Now, it is reasonable to assume that the quality of 'being in some state' is characteristic of any object (by 'object' we mean here anything that is being spoken about, be it a person, thing or state of affairs); 'being in some state' is thus inalienably connected with any object, it is an object's inalienable state. In other words, an object must be in some state at all times. It stands to reason that performing an action, unlike being in some state, is not an inalienable state of an object. It follows from these assumptions that the temporal universe of discourse for *always* and *usually* (as well as for the other frequency adverbs) is in a way a priori bounded when states are concerned, but it is not bounded in the case of predicates expressing actions. In other words, *Bill always feels lousy* ought to be paraphrased as in fact 'at all times t such that Bill is in some state at t, Bill feels lousy at t'. Of course, the clause specifying the time t in the above paraphrase is redundant, since from the definition of 'Bill' (or of any other object) it follows that he must be in some state at all times t. On the other hand, actions cannot be automatically predicted of any object, and therefore a time t must be specified on every occasion when *always* or *usually* are to occur with a verb of action.

The above assumptions account for the mysterious behaviour of *always* and *usually* with respect to verbs expressing states and those expressing actions, but they do not explain why *always* and *usually* differ from all other frequency adverbs in requiring a temporally bounded universe of discourse. We could explain the difference by recourse to the human way of viewing time. If action, as opposed to state, is not an inherent feature of an object, clearly there must be moments when actions begin and end. If it is said that an object performs an action many times (*often*), what is implied is a series of beginning and ending moments. Time, then, is regarded as a series of discrete moments, actions either taking or not taking place in them. Time is an infinite series of such moments. Turning again to the logical values of frequency adverbs, we can see that the meanings of *sometimes* and *often* ("at some times t" and "at many times t", respectively) can be established without any reference to the infinite number of moments constituting time. This is not so in the case of *always* ("at all times t") and *usually* ("at most times t"), since both contain

reference to the "total" amount of moments (*most* means "more than half", obviously a value impossible to compute if the "total" is infinite). If we sought an analogy between the temporal quantifier system and other sets of quantifiers, we should compare *always* to *each* rather than to *every* or *all*, as its use requires that the moments referred to should be in some way countable.

An aspect of the nature of "object" and the way we look upon time suggest, taken jointly, an adequate explanation of the behaviour of adverbs of frequency towards verbs of action and verbs of state.

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