ON QUANTIFIER FLOATING IN LUSHAI AND BURMESE

WITH SOME REMARKS ON THAI[1]

F.K. Lehman
(Chit Hlaing)
University of Illinois at Urbana-Champaign

0.   This was chosen as a contribution to the Benedict Festschrift because it combines a number of his professional interests: linguistics in a Southeast Asian context, Sino-Tibetan, mainly, but also Thai, and the interaction between language, culture and psychology, thereby drawing upon the three disciplines of linguistics, anthropology and psychology.   The paper illustrates the inter-section of grammar with a property of human thought.

Since this is part of a larger work on the theory of quantification in linguistics and logic containing an explanation of technical details (cf. Lehman 1979, 1979b),   the present paper says little about the formal definition of quantifiers, or about the ultimate motivations for the particular view of logico-mathematical quantification taken here.   The immediate object is to account for certain peculiarities of quantifier floating (or, in one case, why it fails to show up at all) in two Tibeto-Burman languages, Lushai (Mizo) and Burmese.   In addition Wongbiasaj's work (1980, 1980b)   on quantifier floating in Thai was drawn upon where it was needed to broaden the discussion.

1. Quantifiers have fairly clear logical and syntactic properties.   They qualify noun phrases, even though in the case of floating quantifiers, they may be syntactically non-contiguous.   A quantifier takes as its domain a class or set of entities named by a noun and picks out of that set or class one or more members, about which something is then predicated.

The well-known distinction between ordinal and cardinal can be extended to quantifiers.   In order to see how ordinality and cardinality properly apply to other quantifiers, it is best to begin with a consideration of some quantifier words that are obviously somewhat like ordinary numbers in that they refer either to successive positions or to quantity e.g. such words as many, few, some, all, and the like, which are cardinals and a, any, each, every, this, the, which are ordinals.[2]

---

[1]   This is a revision of a paper originally presented to the XIIth International Conference on Sino-Tibetan Languages and Linguistics, in Paris, in October 1979.

[2]   Only, even, etc. have been left out of this account because of the complicated way they interact with so-called presuppositions.   For instance, in

Let us first consider cardinal quantifiers. When one says <u>five books</u>, one clearly refers to any subset of the class of books just so long as such a subset has exactly five members, and <u>five</u> is said to be the size or cardinality of the subset referred to. In a similar way <u>many books</u> refers to a subset of the class of books, just in case the subset has a size or cardinality that is relatively large. It is not necessary to spell out here (but see Lehman 1979, and Cushing 1977) an explicit definition of the notion 'relatively large' in order to show that although <u>many</u> is not a specific number it is defined only over the field of ordinary cardinal numbers. Similar arguments apply to <u>few</u> (a relatively small number) and <u>some</u> (a certain, non-null number, usually understood as greater than one). These cardinal quantifiers once again pick out a particular, possibly arbitrary, subset of a class just in case the membership of the subset is 'relatively large', 'relatively small', 'not less than two', and so on, respectively.

Set theory distinguishes between ordinary sets and power sets. The latter have as members not the individual members of the former but all other subsets of the former, including the empty set (subset of zero cardinality) and the largest imaginable subset, namely, the one with the largest possible cardinality, viz., the whole basic set itself. Now, since quantifiers that are cardinal do not partition the objects that are the members of a set but rather the subsets of that set, I shall take it that cardinal quantifiers partition power sets. It is not, however, necessary to go into the technical reasons for this assumption in the present paper, and for present purposes it may be taken as merely a formal convenience.

Actually, although ordinal quantification commonly operates on ordinary sets, it can also take as its domain power sets, as in such expressions as <u>this five</u> or <u>these five</u>, <u>those few</u> and the like. I need not deal with this any farther except to use it as evidence for some sort of hierarchical relation of ordinal to cardinal quantifiers. Moreover, it is easy to see that all cardinals presuppose ordinals, though not conversely, for cardinals partition power sets. That is, they pick out some subset or subsets among the (arbitrarily) ordered subsets constituting the membership of the power set, and this is the usual ordinal operation even though they additionally refer to the size or cardinality of the subset selected. Indeed, any ordinary cardinal quantifier expression can be naturally paraphrased by prefixing it with some appropriate ordinal quantifier. Thus, for instance, <u>four horsemen</u> seems to mean the same thing as either <u>some four horsemen</u> or <u>any four horsemen</u>. It may

---

(i) Even John failed.

there seems to be a presupposition that one expects John to have a position in the ordered set of persons beyond some ith position, where all the persons up to an including the ith are either bound to fail or likely to fail; persons beyond the ith position in the list or set are expected not to fail, and indeed this is a limiting condition on the ordering of the set. (i), moreover, asserts that contrary to these expectations the boundary between those likely to fail and those bound to pass must in fact fall beyond John's position in the list (call it the jth position). Since, then, these kind of quantifiers deal with n-tuples of alternative partitions of the same set, they should be thought of as higher order quantifiers. They appear, actually, to be ordinal in character, but this does not appear to have been proved yet. Cushing 1977 presents a somewhat different view of these logical operators.

---

even be the case that plural nouns are understood as cardinally quantified. For instance, the plural noun phrase pencils selects from all imaginable subsets of the class an arbitrary subset of size greater than one.

One question remains to be addressed before I can leave the general definition and classification of quantifiers, and that is the question why I have chosen to claim that all is a cardinal quantifier but each and any are ordinals. This question arises because all such words seem, at least on first view, to entail reference to the 'entirety' of the membership of whatever set or class they qualify, and it is not a priori clear how one ought to relate the idea of the entirety of a set (exhaustion of the membership of the set, technically) to the distinction between ordinality and cardinality, in spite of the fact that there is an intuitive connection between set exhaustion and the cardinality of the set itself. Roughly, in any event, any seems to refer to 'the ith or jth member of some set, where i ≠ j, and i and j range disjointly from 1 to N.' Here N is the size or cardinality of the set, with the membership taken in some possible arbitrary order. This is, I think, the simplest case, the most readily decidable one, and we can see that any has to be ordinal because it does nothing more than pick out the arbitrary member of a set. The reference to N, the cardinality of the set, as in the semi-formal expression in quotation marks immediately above, serves merely to define the upper limit of the notion of the arbitrariness of the selection.

Each may be a somewhat less transparent problem. It frequently, at least, seems to entail set exhaustion more saliently, entailing, perhaps, the picking out, even if one by one, the entirety of the membership of the set, something not done by any. In fact (cf. Wongbiasaj 1980, 1980b), in Thai the expression nearest in meaning to English each, namely, tɛ̀ɛ la, may well be a proper cardinal quantifier expression meaning something like 'the whole set, but taken one by one only,' or somewhat more technically and precisely, 'all of the subsets of size one, singleton subsets.' Note that this rigidly entails exhaustion of the set.

All has given logicians of natural language an especially hard time, in so far as they have assumed that, having reference to set exhaustion as the definitive criterion, there appears to be no formal, logical distinction between all, on the one hand, and each or every, on the other. For they have for the most part nevertheless felt intuitively that there really is some semantic distinction. The present approach to quantification allows one to confirm that intuition, particularly its common expression to the effect that somehow all makes reference to the set as a unity. We shall say that all picks out that unique subset of a class that has the same cardinality as the set itself whereas each and every pick out individual members without directly refering to cardinality at all, even though empirically the two varieties of quantifier here converge owing to the entailments of set exhaustion.

1.1 Quantifier floating is the phenomenon that allows a quantifier to appear separated from the noun phrase in question, either attached to some other noun phrase in the sentence or attached to the predicate of the sentence as a whole. Thus, we can have:

1. a. Each of the men gave him a dollar.
    b. Each man gave him a dollar.
    c. The men each gave him a dollar.
2. a. The men gave him a dollar each.

b. The men gave him each a dollar.

These seem all to mean exactly the same thing. If we suppose that syntactic movement transformations are part of the machinery of grammar, we can suppose that some rule or rules move each from one or other of the positions it can have in (1), where it appears contiguously to the noun phrase it is understood as qualifying, to one or other of the positions it can have in (2). This supposed detachment of the quantifier from its noun phrase of origin is referred to as 'floating'. The matter is complicated by the fact that the constituent structure of (1) and (2) is unclear, and it is by no means clear whether in these three sentences each is immediately in construction with the noun phrase next to it. However, it is in any case necessary to make a categorial distinction between rules that are thought to detach the quantifier from its 'original' noun phrase and rules that move it without so detaching it. To this extent, at least, my statement of how one might classify the rule or rules that might be thought to move this quantifier from or into the different positions it takes in (1) and (2) is nearer in spirit to Dougherty's 1970, 1971 treatment than to Postal 1974, 1976.

If we reject transformational rules in general or the class of rules that includes the proposed quantifier floating rules, and assume the each is base - generated in each of the positions it is found in in (1) and (2), it is still the case that each is understood as partitioning the set of men giving the dollars rather than the set of dollars. And even on this assumption, it is convenient to refer to the fact that each can occur elsewhere than in immediate constituency with the noun it properly qualifies under the heading of 'quantifier floating'.

Quantifier floating has been usefully discussed at considerable length for both French and English by Fauconnier 1971. Indeed, it is he that uses the word 'floating' where Postal, Dougherty and others in fact use different terms for the phenomenon. Fauconnier's treatment, moreover, leads me to conclude that the rules that generate (1a, b and c), be they rules of the base or transformational movement rules, have a great deal to do with the entailment of plurality, indeed of set exhaustion, carried by each, and by French chacun. That is, there is a tendency for subject noun phrases quantified by each to take sometimes singular verb agreement, sometimes plural verb agreement. Thus:

3. a. Each of us has/have a bad cold.
   b. Each man has/*have a bad cold.
   c. We each have/*has a bad cold.

When the quantifier is floated off its original noun phrase, it appears to leave behind, so to speak, an ordinary plural subject noun phrase that necessarily evokes plural verb agreement. Indeed, having regard to (3c), it is this fact that motivated my expression of doubt as to the classification of the rule producing (1c), even though each, in such cases, is immediately adjacent to the right of the noun phrase it properly quantifies.

With regard in particular to floated quantifiers, that is, with regard to cases like that of (2) and, in view of the immediately preceding remarks, probably (1c) and (3c), there is reason to think that they may never be in immediate construction with the noun phrases they are next to, if any, and that they may rather be in immediate constituency with whole predicates, like adverbials. Notice, for example, that (2) seems to have such paraphrases as:

4. a. The men gave him a dollar one by one.
    b. The men gave him, one by one, a dollar.

Moreover, at least in 4 b, one by one can be replaced by the obvious manner
adverb severally or individually. Perhaps, then, after all, the basic
distinction is to be made between rules giving us, on the one hand, the
partitive and non-partitive versions of each quantification (1a and b) and, on
the other hand sentences of the type of (1c) and (2), where each can occur just
wherever ordinary predicate adverbs can occur.

   In Thai, it is to be especially noted, a floated quantifier can attach,
adverbially, to a predicate bare of nominal complements.

5. a. dèk thúk khon (dâiʔ) pai
    b. dèk pai thúk khon
       'All the children went/got to go'

where **thúk** means 'all' and **khon** is the classifier for human beings, here going
with **dèk** 'child'.

   What, then, does the phenomenon of quantifier floating do conceptually or
semantically? Intuitively, I suggest it has the effect of highlighting a
rather obvious function of the each-type quantifier. That is, each serves to
distribute the members of the set it properly quantifies over some other
element in the sentence (more exactly, over some other class referred to in the
sentence). This is a distributive mapping between sets. for cases like (1)
this is only trivially so, since the direct object that is the range of this
mapping is singular only. The matter is less trivial, and hence clearer, in a
sentence like:

6. The men gave them each a dollar.

On at least one reading of this sentence we understand that some men, taken one
by one, gave a dollar -- a different dollar on each occasion, perhaps, but not
necessarily -- first to one recipient, then to the next and so on. There are,
of course, two sub-cases of this that I need not bother to distinguish for
present purposes: either each giver gives, successively, to every recipient, or
else each giver gives to a different recipient, presumably with the number of
givers equal to the number of receivers.

   It is also interesting to speculate why one feels that there were probably
as many different dollars given as there were distinct givers and/or receivers.
Suppose, in fact, as hinted at earlier, whenever each appears elsewhere than as
a left-immediate constituent of the noun phrase it properly quantifies --
partitive (1a) or non-partitive (1b) -- it is an adverbial constituent in the
sentence. In that case each is attached to, and hence distributes over, the
predicate, i.e., over distinct instances of the class of events names by the
predicate as a whole. In that case there seems to be an entailment (probably
pragmatic, and so cancelable -- Gazdar 1979) the same set named by a noun
phrase within the predicate and different from the noun phrase each properly
quantifies will be understood as bearing the burden of the distributional
mapping as its immediate 'target'. All other things being equal, the target
noun phrase of the distributional mapping over whole predicates will be a
direct object, if one exists. Moreover, this can happen even when the noun

phrase <u>each</u> properly quantifies is itself in the predicate. Thus,

      7. a. I gave each of them a dollar.
         b. I gave them each a dollar.
         c. I gave them a dollar each.

Here, <u>each</u> properly quantifies the indirect object <u>them</u>, and furthermore cannot be understood as properly quantifying the subject noun phrase, since the latter is singular. Moreover, since the floating phenomenon serves only to highlight a distributional mapping by marking it overtly, and <u>each</u> actually has or produces the effect of such distributional mapping even when not floated, it is not surprising that the (pragmatic) entailment I have just been speaking about may be felt to apply even the in the unfloated case, e.g., in (7)a. In the foregoing connection we may say that the distributional mapping inductively partitions the class of events names by the predicate and, by the entailment, the set named by the target noun phrase of the float with the predicate.

    Similar considerations apply for the common second reading of (6), where <u>the men</u> is taken as a collectivity; where they are understood as giving the <u>dollars</u> or dollars as a body, and on that reading <u>them</u> is the noun phrase properly quantified by <u>each</u>. In addition, something related to the afore-mentioned pragmatic entailment from distribution over predicates as a whole to distribution over sets names by target noun phrases in those predicates may well account for a restriction on quantifier floating that applies to English though not, for instance, to Thai. In Thai, as (5)b illustrates, a quantifier can float as far (rightward) into the predicate as possible even when there is no predicate noun phrase to bear the effect of this entailment. But the same cannot be said of English, where, for such cases floating is more constrained. Thus,

      8.a. Each of us went.
        b. We each went.
        c. *We went each.

we can float to the extent of (8)b but not to the extent of (8)c. This raises a host of interesting problems that cannot be investigated here.

    2. Now consider Mizo (Lushai). In this language no <u>each</u>-type quantifier can induce singular verb agreement. In this language the agreement of a verb with the number of its subject is marked by a clitic prefix on the verb.

      9.   tlaang-vāal tin-tēe in- c̀ōo an- ēi
          boy   'each' ergative they eat
     'The boys each ate (some) food'

This sentence cannot allow the clitic prefix for third singular verb agreement (<u>a-</u> instead of <u>an-</u>). Moreover, neither this nor any other quantifier in Lushai can float. It has to take a position immediately to the right of the noun phrase it properly quantifies, and furthermore is in immediate construction with that noun phrase, as is shown in (9) by the fact that the ergative suffix for subjects of transitive verbs (<u>in-</u>) follows it. In addition this quantifier <u>tin-</u> is invariably plural, since it necessarily takes the plural suffix <u>tēe</u>. These considerations lead me to draw certain conclusions.

    In Lushai distributive quantification in the sense I have given it above is effected by an essentially cardinal quantifier. Thus, its domain is a power set of the noun it properly quantifies. Therefore, it is similar to Thai

tèɛ la, referring to successive subsets of size 1, perhaps or, rather, since it is clearly plural, to the collection of subsets of size 1. If this is correct, then Lushai and English are using radically different conceptual strategies to resolve an inherent ambiguity or equivocation in the meaning or function of distributive quantification itself. I mean that distributive quantification implicates singularity if plural, plurality if singular, as pointed out earlier in connection with (3). In Lushai this is resolved in favor of plurality by having the distributive quantifier be a cardinal quantifier.

Thai follows a somewhat different conceptual strategy. In Thai only cardinals can occur other than on the noun phrases they quantify (Wongbiasaj 1980a, 1980b). Wongbiasaj purports to show that this apparent floating of cardinal enumerative expressions (quantifier + numeral classifier) is a consequence of general rules of Noun Phrase Complement Extraposition and the like in Thai, which allow complements of noun phrases to be 'moved' rightward towards the end of the clause or sentence. In Thai, a verb-medial language (SVO), noun phrase complements are linked to their head nouns by classifiers and follow the head nouns when not extraposed. If a complement is extraposed, or moved, the classifier travels with it, so that, at least generally, there is some overt clue as to which noun phrase in the sentence the floated complement properly qualifies. And in Thai quantifier phrases in the narrow sense of enumerative expressions are included in the class of noun phrase complements. Complements, numbers in particular, that precede the classifier are quite generally cardinal, while those that follow the classifier, number words again, but also demonstratives, relative clauses and so on, are ordinal (Lehman 1979b).

It is easy to imagine taking a plurality of entities and distributing them over some different plurality of entities; or, at a limit, taking each of the first plurality and pairing it separately with the same target entity. It is therefore not surprising that in general cardinals float in some languages. However, there is in fact one Thai cardinal quantifier that cannot float, tèɛ la, the previously mentioned 'each-type cardinal. Wongbiasaj argues cogently that it cannot float because it strictly entails ordinal singularity; although it is a cardinal quantifier it entails an ordinal set-theoretic operation. Indeed, etymologically, it means something like 'setting (things) aside (up to) completion', where tèɛ, as in its more ordinary meaning as 'but', refers to setting aside, and la is the usual contraction of lɛ́ɛw, 'finish' or 'complete'. Since Thai ordinals of strictly numerical character, nearly alone among noun phrases in Thai, cannot float, neither can tèɛ la if it strictly entails a numerical ordinal operation.

On the other hand, there is one numerical cardinal that in fact can float, namely, nɨ̀ng, 'one', 'first' when it follows a classifier. Thus dèk khon nɨ̀ng means, approximately at least, 'a child' or 'some child', an essentially ordinal expression equivalent to 'a certain child' (the ith child). dèk nɨ̀ng khon means simply 'one child' in the sense of cardinal enumeration. It is reasonably clear that ordinal, post-classifier nɨ̀ng strictly entails singular cardinality.

The facts thus described suggest the hypothesis that truly distributive quantifier floating is invariably associated only with ordinal quantifiers. It amounts to taking, successively, the first, second, ..., ith, jth, ...nth members of some class or set and pairing them, perhaps in the given order perhaps not, with the members of some other set I call the 'target' set. On this hypothesis, Lushai does not possess an ordinal quantifier of the requisite distributive sort, and hence it has not quantifier floating. Thai had something like quantifier floating, but it is actually a proper part of the very different phenomenon of noun phrase complement extraposition. I claim that,

nevertheless, when cardinals are subject to the latter operation it serves, by a pragmatic implicature in the sense of Gazdar 1979, the function of distributing the members of one set over the membership of another, as does true quantifier floating. As it were then, Thai, having chosen to use only cardinals and noun phrase complement extraposition to accomplish this, has somehow specially excluded just ordinal enumerative quantifiers from the domain of noun phrase complement extraposition.

Although this hypothesis remains tentative, a cursory but fairly wide survey of reasonably well-described languages tends to support it. It seems that no language accomplishes the intended distributive mapping by subjecting cardinals to a process that is floating in the strict sense. However, it is notoriously difficult to ascertain the necessary facts even for comparatively well described languages, and particularly hard to be sure which quantifiers are cardinals and which are ordinals, because one has much of the time to rely on free English glosses. For instance, in even quite sophisticated work on Thai **thúk** and even **tɛ̀ɛ la** (when it is mentioned at all) are glossed as 'each' or its equivalent in some standard European language. Should the hypothesis be in any was confirmed by more thorough investigation, we should have a compelling instance of a constraint upon possible syntactic rules motivated by the clearest kind of formal, logical considerations, considerations suggestive at least of the possibility that grammatical phenomena may be constrained by the most general sort of cognitive processes.

3. Burmese presents us with yet another problem. In Burmese quantifier floating, again irrespective of whether we regard it as a movement rule or not, is obligatory. If it is not a movement rule -- or in a grammatical theory without transformations -- some rule of interpretation will ensure that the each-type quantifier, which appears in the syntax always on the 'target' of the distributive mapping, is associated with the noun phrase that it properly quantifies.

There are, however, two apparent qualifications to my statement that quantifier floating is obligatory in Burmese. First, the statement is meant to apply to Standard colloquial Burmese only. There are dialects, like the Tavoyan dialect, in which, at least on occasion, an each-type quantifier may appear simultaneously on the noun phrase it properly quantifies and on the target expression of the intended distributive mapping. Since my work on this dialect is far from complete I shall not say more about it here. Secondly, there are expressions loosely translatable as 'each' which are never involved in quantifier floating.

      10. nei. taing: 'each day/ every day'
            day extent

means literally 'the full measure, or extent, of days' and taing: is a head noun in genitive construction with nei. ('day'), and is derived from the verb meaning 'to measure' or 'to compare' and is not a quantifier at all. The head noun here is to be understood as designating a whole class and as neither singular nor plural (see Lehman 1979b). In spite of the traditional English glosses, such expressions do not really bear upon the subject under investigation in this paper.

In Burmese true numerical quantifiers always involve the use of a numeral classifier, whether they be ordinals or cardinals; the exception is in the abstract counting-recitation of bare numbers. On this criterion the each-type

quantifier will be seen to be a true ordinal. Examples of quite ordinary numeral expressions are

11. lu   thoun: yauk three persons
    person 3 classifier

12. thoun: yauk (myauk)   lu third person
    3   classifier participle person

Note that ordinal expressions precede, and cardinals follow, the head noun. In 12 the parenthesized (optional and literary) word myauk is of some interest. Numerical ordinals, except for adjectival ordinal words for the lower integers borrowed from the Pali language, are followed in this register or style of Burmese by myauk, which is the bare root of a verb meaning 'to raise to a certain position'. Since relative clauses, usually but not at all invariably followed, in this verb-final language, by an inflected verb-final, or tense, ending, precede the head noun, we may surmise that ordinal enumerative expressions are based upon relative clauses. Moreover, the larger class of logical ordinal expressions that include numerical ordinals, i.e., relative clauses and also demonstratives, agrees in preceding the noun head, whilst cardinal expressions follow it.

The Burmese quantifier that really means 'each' is si, derived from the verb meaning 'to take one after another, successively'. It can never appear next to, or in construction with the noun phrase it is understood as properly quantifying.

13. ?ayaung ?amyou: (?a)soun tamyou:si tamyou:si wehnainte
    pattern kind whole   1 kind each [redup] can buy
                                classif.
    'I'll buy one of each kind' (Cornyn and Roop 1968:374)

14. tayauk hnakyat si we
    1 classif. 2 Kyats each distribute
    IO   DO
    'Distribute two Kyats to each person' (Okell 1969: 407)

15. tahtat hma hcauk hkan: si hyi.te
    1 storey loc.   6 room each exist
    'There are six rooms on each floor' (Okell 1969:407)

16. tahtat si hma tahkan: hyi.te
    'Each room is on a separate floor'

17. lwe: ?eik taloun: si ne. thwa:lei-ye.
    shoulder bag 1-classif. each with go
    'They each went with a shoulder bag' (Okell 1969:407)

18. thu-dou. tayauk si tayauk si thwa:te
    they   1 classif. each [redup] go
    'They each went. They went one-by-one'

19. cundo hou lu-dei kou tayauk si myin-te
    I   that persons to 1-classif. each see
    'I saw each of them'

———————

-272-

But,

20. lu taing: thu.kou takyat pei:te
     person 'each' he-to 1-Kyat give
     'Each person gave him one Kyat'

Notice the si can appear in the foregoing sentences only where it in fact
appears. if the intended readings are to be preserved. That is why I said,
earlier, that floating is obligatory. Example 20 needs no particular comment,
but the rest of the sentences, 13 - 19 are worth further discussion.

13 makes it especially clear that si is not attached even to the
classifier expression of the noun phrase it properly quantifies. ?asoun
('whole') is an enumerative-cum-classifier expression belonging to the head
noun meaning 'pattern', and taken together they mean 'a kind of pattern'. si
is attached, however, to the reduplicated enumerative expression meaning 'one
kind'. Furthermore, the reduplication of the form here strongly suggests that
it is a manner adverbial, and since time or place adverbials, for instance, can
intervene between ?asoun and tamyou:si, I conclude that si is floated into a
predicate adverb meaning 'kind-by-kind'.

14 is straightforward. si ('each') is attached to the expression meaning
'two Kyats' (the Kyat is the unit of Burmese currency), and this attachment is
shown by the fact that the initial of si is voiced in these cases (voicing over
internal juncture within the word). Nevertheless, si is understood as
qualifying 'person'. The floating is from the direct onto the indirect object,
and this way of stating the case can be taken as informal rather than as a
claim that a transformational movement rule of floating really exists. The
floating, then, is downward in the supposed hierarchy of grammatical relations,
as one might expect, and I know of no case where quantifiers float freely up
this hierarchy. In English example (7 c), floating is from the indirect object
not onto the direct object, which would be indeed upward, but downward onto the
predicate as a whole, namely outside the domain of grammatical relational terms
altogether. The apparent counter example in 15, where the floating seems to be
upward from indirect to direct object, I dispose of below, in section 4.

Apart from the question of the direction of the floating, example (15) is
transparent. Examples (16) and (17) illustrate the principle that where a
postposition governs a noun phrase, the classifier expression belonging to that
noun phrase is to the left of, within the scope of, the postposition. This
provides clear evidence that si is indeed attached to the noun phrase it is
next to. On the same principle we can tell that in (19) si is not attached to
the noun it properly quantifies, and indeed a time or place locative adverbial
could acceptably come between kou and si in (19). I again conclude that si is
attached here to a manner-adverbial enumerative expression.

In both (18) and (19) there is no overt target noun phrase for si to be
floated onto. Example (18) might well, in fact, be questioned as a perfectly
acceptable sentence, and it is certainly not in the best style; it has an
intransitive verb, hence no direct object to receive a floating quantifier, and
the reduplication unquestionably marks the enumerative-plus-si expression as a
manner adverbial, as in (19) also (there without reduplication). Elsewhere, in
Lehman 1979b, I deal with the source of classifier expressions without heads.

In any case, in Burmese, so long as there is an available overt noun phrase downward in the supposed hierarchy of grammatical relations from subject through direct object to indirect object and then to adverbials and other non-terms, si is attached to such a noun phrase exists to receive it. In this, Burmese is very different from Thai, Lushai, English or French, because in the latter languages, to the extent that quantifier floating is defined for them it can be argued that floating is always onto a predicate adverbial. The latter situation raises no real analytical problems. After all, even unfloated each has the function of the intended distributive mapping, and therefore in a sentence such as

21. Each man left.

we understand a distributive mapping from the set of men onto something, and that something has got to be something other than an overt target noun phrase. That the implicit target is realizable as a manner adverbial is at least suggested by the fact that (21) is readily paraphrased by replacing each by the and adding one-by-one at the end of the sentence.

Notice in particular that the presumption that there were separate instances of leaving is far from automatic in the case of

22. All the men left.

as I pointed out earlier; they may have left in a body, collectively.

Burmese, by making floating obligatory, highlights or makes maximally explicit the distributive mapping function of si, not only because floating is in itself obligatory but also because it is, as much as possible, necessarily onto a particular target noun phrase, and the sort of (pragmatic) implicature that is needed to distribute a floated quantification over a target noun phrase in the predicate in such instances as examples (7) and (8) is not in general needed in Burmese.

4. It seems to me that Burmese provides good evidence for the proposition that each-type quantification involves the intended sort of distributive mapping function. That mapping points up the relations between cases or grammatical relations among arguments of a common predicate, and it is constrained by the apparent natural hierarchy among those grammatical relations (see Cole 1977: passim). It is surely not accidental that quantifiers float more readily off of subjects than off of other noun phrase arguments.

As for the generalization that quantifier floating is always downward in the relational hierarchy, exceptions such as are seen in (15) are easily disposed of. In that sentence si properly quantifies the locative phrase but is in construction with hcauk hkan: ('six rooms'), which is a term of higher order, a subject or predicate nominative of the existential verb hyi. ('to have', 'to exist'). However, in (15) the locative phrase is preposed. In a more 'neutral' order, with hcauk hkan:si coming before the locative phrase tahtat hma, the sentence would be unacceptable precisely because of the presence of si on the higher ranked term. Burmese is a topic-comment language (see Lehman 1973), and in such a language it seems that a phrase preposed left of the grammatical subject co-opts the sentential topicality ordinarily associated with the subject. Therefore it may be that this apparent counter-example of si floating upwards rather than downwards in the relational

hierarchy is accounted for, if not really explained away, by the tendency of sentential topicality to overrule subjecthood.

It is also no accident that quantifier floating is constrained within a single clause, that is, no quantifier can float into a higher or a lower clause than that of the noun phrase it properly quantifies. This restriction I doubt is explained altogether by the principle that movement to the right is upward bounded, limited, that is, to the clause within which the supposedly moved item starts out (for a discussion of counter-evidence for this principle see Subbarao 1978). Rather it seems to me that the explanation may be simply that the distributive mapping functions to relate arguments of a common predicate.

4.1. Now, in section 1.1, I claimed, with regard to some Thai examples, that the extraposition of cardinals serves only weakly, by a mere pragmatic, cancelable implicature, to induce the intended distributive mapping. I subsequently argued that this mapping function is inherent in each-type quantifiers whether they are actually floated or not. I went on to claim that in a language like English, where the quantifier seems always to float into a predicate adverbial position, the construal of the distributive mapping as being over, say, an object noun phrase within the predicate is also the result of a cancelable implicature only. There is no contradiction here. What is direct and uncancelable about the distributive mapping in the case of ordinal each is the way it necessarily partitions the predicate as a whole into several instances of the action or state named by the predicate. This is so even when, say, the quantifier is unfloatable owing to the fact that the noun phrase it properly quantifies is as far down as possible in the hierarchy of grammatical relations.

23.   There are three storeys in each house.

Here each is already in a prepositional phrase, in particular in a low-level predicate adverb, to begin with, and so we can hardly expect to get

24.   *There are three storeys in the houses each.

Yet the predicate three storeys in the house is clearly understood as applying serially or severally to the houses under discussion. Moreover, it cannot be argued that this is due to the peculiarities of 'there are' sentences, where some argument other than there is the logically understood subject, for my claim applies equally to such sentences as

25a. I saw three storeys in each house.
  b. *I saw three storeys in the houses each.

However, in a language like English, when each is floatable, it is generally understood by a pragmatic implicature only to partition an available noun phrase within a predicate-as-a-whole that is in fact directly, uncancelably partitioned or distributed over. In Thai, on the other hand, with 'floated' (actually, extraposed) cardinals, even the distributive partitioning of the predicate-as-a-whole is a matter of only pragmatic implicature.

5. Quantifier floating, viewed as a movement rule at least, is what Emonds 1976 calls structure-preserving. That is, the output of floating has the constituent structure of an ordinary noun phrase as base generated with a

following cardinal enumerative expression followed by a qualifier. An example of an unarguably base-generated maximal noun phrase of this type is

26. lu   tayauk hte: only one person
    person 1 class. only

where, moreover (see note 1) the qualifier is also a quantifier of a sort. Since si in Burmese is invariably found on a target noun phrase, even if only a headless adverbial one, and since the resulting structure is a kind that has to be generated in base structure anyhow, what is called the Extended Revised Standard Theory of generative syntax (see Culicover, Akmajian and Wasow 1977), and particularly the version of Bresnan 1978 that especially rules out movement rules that are structure preserving could not countenance a movement rule to account for the phenomenon under investigation. A rule of interpretation would then be needed to associate the 'floated' quantifier with the noun phrase it is understood as properly quantifying, and no difficulty arises from the fact that, in some sense, the distributive mapping is going in reverse, because with the distributive mapping relation being inherent in each-type quantifiers anyway, the directionality is at best a trivial consideration.

There is also no problem in extending the no-movement, interpretative treatment to quantifier floating quite generally; or even in extending the interpretative treatment of the distributive mapping function to quantifier floating in general and to the sort of pseudo-floating that we have encountered in the way Thai extraposes cardinal noun phrase complements. The only apparent difficulty arises from the fact that the quantifiers in the latter case 'float' together with their proper classifiers. This gives us such sentences as

27. dèk   sɯ̄ɯ nang-sɯ̆ɯ sɔ̆ɔng khon
    child sell book   2 classif. [+human]
    'The children both sold a book'

At first sight it appears that the 'floated' quantifier expression is attached to the object noun phrase, and such a situation could not be base generated because the classifier khon is inappropriate for books. However, as I have already suggested, the floated or extraposed expression is very likely attached to a dummy pronominal head noun in a predicate adverbial position. Since, presumably, any classifier whatever is trivially compatible with such a lexically and semantically empty head noun, there is nothing to prevent the 'floated' classifier from being base generated in that very position, and whether the resulting sentence is acceptable or not is determined by the interpretative rule that has to find an appropriate antecedent for it, in this case the noun phrase that the quantifier properly quantifies.

5.1. An interesting restriction on 'floating' or extraposition in Thai has a bearing on the foregoing proposal. A sentence such as unacceptable

29. *raw hây nang-sɯ̆ɯ (sìi lêm   sɔ̆ɔng khon)
    we give book   4 classif. 2 classif.
    ('We each/both gave four books')

is completely ungrammatical. Wongbiasaj 1980b demonstrates that this is because hây strictly requires the presence of an indirect as well as a direct object. Thus, in (29) sɔ̆ɔng khon ('two persons') will unavoidably be understood as somehow applying to a phonologically null pronoun in the position

of an indirect object of the verb 'give', even if only by the suggested implicature associated with floating the quantifier in general onto a predicate adverbial.

I have obviously taken as uncontroversial that Thai, like Burmese and many languages, has pronouns that are phonologically null and work more or less equivalently to de-stressing unfocused pronouns in English.

In any case, the implicature in question will necessarily match the 'floated' quantifier with the nearest available noun phrase with the appropriate [+human] specification, and this will always be the dummy head of the indirect object in this case, and in a language like Thai with a fixed word order: verb, direct object, indirect object. So powerful is this implicature that a sentence like (29) will invariably be understood as though it were not an instance of 'floating' or noun phrase complement extraposition; as though sɔ̌ɔng khon had been base generated on the indirect object noun phrase.

This strongly motivates accepting the no-movement account of floating, or at least of noun phrase complement extraposition in Thai. For to treat it as a movement rule would have the intolerable consequence, in this case, of a rule of logical interpretation wiping out all evidence of the application of an otherwise unimpeachable transformation. Such a proposal amounts to postulating invisible rule applications, and such claims are necessarily unverifiable, and hence unempirical claims altogether.

Alternatively, one might propose an arbitrary constraint on the otherwise free operation of the structure-preserving floating or extraposition rule: floating (or extraposition) is barred when the verb is hây or some other double-object verb. There is something unsatisfactorily circular about any such proposal, because its intended function is to block a misinterpretation arising from an implicature, or rather to avoid a situation in which one could not know, because of the implicature-based misinterpretation, that the rule had ever operated at all. Moreover, such a constraint would in any case be strictly redundant, since we should still require the rule of logical interpretation in order to motivate the constraint in the first place.

I therefore conclude that the simplest and best proposal for handling the phenomenon under examination is the no-movement-rule proposal.

6. Up to this point I have written as though quantifier floating were strictly limited, at least in English, to ordinals, in fact, to each. However, English floats such cardinals as all and both (see Postal 1974, 1976). Thus,

> 30a. All of us gave him a present.
> b. We all gave him a present.

Of course these cardinals float only incompletely; never cease to be adjacent to if not in construction with the noun phrases they properly quantify, so that the following two sentences are unacceptably bad:

> 31a. *We gave him all a present.
> b. *We gave him a present all.

It is this difference between the floatability of each, on the one hand, and all and both, on the other, that forced Postal to conclude that floating to the

end of a clause is a separate rule he called Each Shift.

My own view is that in English at least quantifiers like all and both have a special or privileged relation with ordinals like each: the latter entails the former and conversely, also. This seems to be what motivates the at least partial floatability of the cardinals all and both. The effect of full floatation would of course be to induce a distributive mapping over complements of the predicate, and this consequence would be intolerable. In fact floating these privileged cardinals out of adjacency with the noun phrases they properly quantify would be to highlight or emphasize the possibility of the distributive mapping over the predicate-as-a-whole in the case of quantifiers that simply are not distributive in their meaning in spite of their privileged relationship with the distributive quantifier. Furthermore, the consequence would be odd indeed: an incorrect uncancelable distributive mapping over the predicate appearing to be induced just by way of a pragmatic, cancelable implicature to distribution over a complement of the predicate suggested, in the first place only by the possibility of the distributive mapping over the predicate. This is quite intolerable circularity.

_____

-278-