Measure Expressions in Comparison*

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1. Introduction

Even a preliminary observation of the examples that are concerned with measurement of some sort would reveal some of the interesting properties that they have which have not been discussed in the literature. In what follows, I restrict my attention to examples that involve what I call MEASURE EXPRESSIONS. By MEASURE EXPRESSION, I refer to a member of the set of the noun phrases each of which has as its head a dimensional noun, DN, such as *length*, *speed*, or *weight*. The members are of two types: one is featured by a phrase that consists of a numeral followed by a sequence of words that denotes a unit of the measurement.[1] The phrase is called MEASURE. Note that MEASURE is what is called "measure phrase" in the literature (cf. Bolinger (1977), Quirk et al. (1985), among others).[2] The name given to this type is Type A MEASURE EXPRESSION. On the other hand, the other type, called Type B MEASURE EXPRESSION, has an ordinary kind of NP, which is represented by THING, a term which is meant to cover both abstract entities and concrete objects. Of course, a precise definition is hard to obtain in either case, but what these terms are intended to denote seem to be intuitively clear, which would suffice to the purposes of this paper.

With these notions in mind, consider the following pairs of examples:

(1) a. The vehicle weighed 272 kilograms, had a height of over 3.4 meters, and a length of 4.5 meters. (NASA, *On the Frontier*)

b. D'you realize, she even told us they [i.e. the kangaroos] were the height of a short human ... (D. M. Weber, *The Apocalypse Troll*)

(2) a. A good refractor with a 2.5-inch (64-mm) objective lens could now have a length of 20 inches (51 cm) instead of 20 feet (6.1 m), ... (W.Sheehan, *The Planet Mars: A History of Observation and Discovery*) Cf. also, (1a)

b. Its [i.e. the dinosaur's] very long tail was twice the length of its body and would have acted as a counterweight, ... (*Connected, Electronic Telegraph*, July 1998)

(3) a. Actually, the Wright machine had a speed of 38 miles per hour, while Farman's Voisin machine flew at 45 miles per hour. (W. J. Jackman and T. H. Russell, *Flying Machine: Construction and Operation*)

b. The Barnet medium ortho is about half the speed of the

well-known extra-rapid Barnet ortho-plate ... (*OED*: 1906 *Westm. Gaz.* 17 May 14/2)

(4) a. Many [human cells] have a volume of a few thousand cubic micrometers, ... (R. F. Burton, *Biology by Numbers*)

b. Jupiter is about 11 times the diameter and about 1300 times the volume of the Earth, ... (*BNC*)

(5) a. This tank had a weight of fifty tons, ... (H. M. ColeMany, *The Ardeness: Battle of the Bulge*)

b. She was now the weight of a normal baby of full term, ... (R. J. Simmons, *In Harm's Way: An Adventure in the Second Dark Age of Man*)

(6) a. This area is located approximately 1 mile east of the northwest boundary and has a width of approximately 1000 ft (305 m). (Ceophysics Study Committee, *Groundwater Contamination*)

b. ... however, virtually all desktop PCs are fitted with 3.5in drives, which is [sic] the width of the mounting bracket or "bay" inside the case. (*Connected, Electronic Telegraph*, Aug. 1999)

These examples are chosen and arranged in a way that would help to conceive that the two types of expressions differ from each other in some respects. One of them is that in the article which the DN has. The other has to do with the linking verb that comes between each of them and the subject of the sentence. These differences can be summarized as follows:

(7) a. NP have [a DN of MEASURE] (Type A)

b. NP be [the DN of THING] (Type B)

It is shown in (2) that Type A EXPRESSION involves the indefinite article *a* and immediately follows the linking verb *have*, while Type B EXPRESSION has the definite article *the* and the linking verb *be* in their places, respectively.

What follow are mainly concerned with them and related issues. In order to provide an account of those phenomena, some notions of relevance need to be made clearer. Perhaps, the most important is the relationship between MEASURE and MEASURE EXPRESSIONs. It should be borne in mind, however, that they are just mnemonic terms and would imply no theoretical significance in themselves. Yet it would also be true that they have something to do with one another, and thus their putative relationships seem to be worth considering.

2. MEASURE and MEASURE EXPRESSIONs

Type A MEASURE EXPRESSION would serve as a starter better. Recall that I

have remarked at the onset of this paper that MEASURE EXPRESSIONs are headed by a DN. In opposition to this, one might speculate that at least in case of Type A EXPRESSION, MEASURE and the EXPRESSION as a whole yield a head-phrase relation, with the sequence *a DN of* as a kind of predeterminer. Thus, an expression of this type would be given the following analysis:

(8) [a DN of MEASURE]$_{\text{MEASURE-P}}$

This analysis, analogous to the one given to the NP *a lot of books*, would seem to be all the more appealing for the semantic relationship alleged between MEASURE and the whole EXPRESSION. Still, a syntactic (and indeed as much semantic) consideration goes against that speculation. What is important is the fact that Type A EXPRESSION has *have* as the linking verb that immediately precedes. By contrast, when MEASURE emerges followed by a PP that contains a DN, it has *be* as the linking verb, as show in (9):

(9) The vehicle is 3.4 meters in height. Cf. (1a)

It seems obvious that in (9), MEASURE makes phrasal projections, although whether the PP *in DN* is included in its maximal projection or not would not be as clear. At any rate, their difference should be represented as in:

(10) a. have [a DN of MEASURE]$_{\text{DN-P}}$

b. be [... MEASURE ...]$_{\text{MEASURE-P}}$

Crucially, if Type A EXPRESSION were headed by MEASURE as well, both (10a,b) would invariantly have *be* as the linking verb, contrary to the fact. Thus it is concluded that Type A EXPRESSION does not have MEASURE as its head; rather it is headed by the DN. In other words, the alleged semantic relationship between MEASURE and Type A EXPRESSION is now turned out to have little ground. I'll show, however, that the issue has to do with the choice of *have* as the linking verb. Yet, at this stage of explication, the reason why Type A EXPRESSION is preceded by *have* still remains unclear, and I will return to this issue later.

Now, a similar argument, which makes use of the choice of linking verb, can also be made with Type B MEASURE EXPRESSION, yielding the opposite result: MEASURE has much to do with Type B EXPRESSION. For as shown in (7b), Type B EXPRESSION as well has *be* as the linking verb. Moreover, as the following examples show, Type B EXPRESSION can be embedded in Type A EXPRESSION, taking the place of MEASURE:

(11) a. ... and to secure even this figure it was necessary that the aeroplane should <u>have a speed of twice that of the maximum wind</u> in which it was desired to operate the machine. (W. J. Jackman and T. H. Russell, *Flying Machine: Construction and Operation*)

b. It [the new reinforcing bar] will not rust and is twice as strong as steel with a weight of only one-quarter that of steel. (*Washington Business Journal*, Nov. 1997)

Details aside, the example in (11a) for instance should be regarded as having the following structure:

(12) have a speed of (twice) that [the speed] of THING
Type A ——— Type B ———

Thus, it is concluded that Type B EXPRESSION is a MEASURE equivalent. To put it differently, Type B EXPRESSION has the same function as MEASURE, which in turn suggests the predicative nature of Type B EXPRESSION although categorially speaking, it is nominal.

The conclusion receives further support from the behavior of downtoners, such as *almost* or *nearly* (cf. Quirk et al. (1985:445)). I cite here examples which contain *about* and *approximately*:

(13) a. The BodyIMark was still sitting in the library; the MeIMark flew above the city at a height of about a mile. (S. E. Ketner, *The Plateau of Leng*)

b. He was indeed a man of small stature -- about the medium height for a woman -- about the height of Jane Hastings. (D. G. Phillips, *The Conflict*)

(14) a. This area is located approximately 1 mile east of the northwest boundary and has a width of approximately 1000 ft (305 m). = (6a)

b. [The human eye] cannot distinguish things of less than about one-fiftieth of a millimetre across -- approximately the width of a human hair. (M. Joyce and P. Regan, *How to See inside an Atom*)

The point to be noted is that a downtoner appears just before MEASURE within Type A EXPRESSION, while it precedes Type B EXPRESSION as a whole. The difference can be summarized as in (15), where "__" represents the place in which a downtoner appears:

(15) a. [a DN of __ MEASURE] (Type A)

b. __ [the DN of THING] (Type B)

The behavior of downtoners suggests the semantic nature of the parallelism; compared with Type B EXPRESSION, MEASURE is hardly said to be genuinely nominal, and thus, their equivalence would not be based on categorial identity.

In summary, despite their appearances, MEASURE has much to do with Type B MEASURE EXPRESSION, but not with Type A EXPRESSION. Or rather MEASURE and

Type B EXPRESSION can have the same syntactic distribution and semantic function.

3. Type B MEASURE EXPRESSION in Implicit Comparison

The equivalence of Type B MEASURE EXPRESSION to MEASURE suggests that it can be a kind of predicate, which would justify its accommodation to the linking verb *be*. Its semantic consideration is also in favor of this idea. What I would like to make explicit here is its similarity to constructions for comparison, which have a dimensional adjective, DA, corresponding to the DN of Type B EXPRESSION. For illustration, compare the following pair of examples:

(16) a. The kangaroos were the height of a short human. Cf. (1b)

b. The kangaroos were as tall/high as a short human.

In both kinds of expressions, the two set of entities (i.e. *the kangaroos* and *a short human*) are described as having the same height, and thus it follows without difficulties that they are in a paraphrase relation.

Moreover, one piece of evidence for their semantic parallelism comes from the behavior of multipliers like *twice* or (a numeral plus) *time(s)*. It is important to see that both kinds of expressions can accommodate a multiplier, as shown in:

(17) a. The elephants were three times the height of the man.

b. The elephants were three times as tall/high as the man.

In addition, note the fact that some of the examples given above indeed have a multiplier of some sort. I repeat them here for ease of reference, with details irrelevant to the present discussion omitted:

(18) a. The dinosaur's very long tail was twice the length of its body. Cf. (2b)

b. The Barnet medium ortho is about half the speed of the well-known extra-rapid Barnet ortho-plate ... Cf. (3b)

c. Jupiter is about 1300 times the volume of the Earth. Cf. (4b)

The fact that Type B MEASURE EXPRESSION can be modified directly by a multiplier would reveal the semantic nature that Type B EXPRESSION has. Multipliers presuppose comparison, as shown by their incapability of modifying adjectives directly.[3] Indeed when they do, the adjective involved should appear in constructions for comparison, in which the adjective appears in the frame of "as __ as", as in (17b), or takes the form of comparative (as in *the elephants were three times taller/higher than the man*).

In short, the parallelism between Type B EXPRESSION and the constructions for comparison discussed here suggests that they are subsumed under the same semantic category of comparison. In addition, no less relevant is the fact that

comparison necessarily involves two (sets of) entities and represents a certain relationship between them. As a result, it is no wonder that these expressions should emerge in the predicational construction and have *be* as a linking verb.

4. Possession and/or Predication?

Having shown the predicative nature of Type B MEASURE EXPRESSION, a problem remains with respect to a proper characterization of Type A EXPRESSION. Again, a key to this problem is the choice of linking verb. The fact that the liking verb in question is *have* shows that Type A EXPRESSION is a kind of possessive construction. Notice that Type B EXPRESSION should also be another one, for that matter. In this respect, the two types have one thing in common: a sentence with Type A EXPRESSION takes the form of the *have* possessive construction, and Type B EXPRESSION by itself is an instance of the *of* possessive construction. For illustration, compare the following examples:

(19) a. John has a height of 7 ft.
b. Bill is the height of John.

These examples are alike in that a possessor-possessee relationship between the concrete object *John* and the abstract entity *height* is involved.

Moreover, it may be the case that the relationship in question is not one of ordinary kind, but of inalienable possession; in light of the definition of inalienable possession (which Cattell (1984:106) claims to be "a phenomenon *P* is inalienable to *X* if *X*'s *P* cannot become *Y*'s *P*"), it should be conceived that Type A MEASURE EXPRESSION is also one of its manifestations. An argument for this conception can be made by observing the parallelism between the following examples, the latter of which is drawn from Cattell (1984:132):

(20) a. John has a height *(of 7 ft).
b. Jane had an *(attractive) appearance.

Note that the example in (20a) is as nonsensical as that of (20b), when the expressions put in parentheses are absent. Along the lines of Cattell (1984:133), the necessity of such an expression is explained as follows: in the case of (20b), there is a presupposition that the subject of the sentence has an appearance. Under that circumstance, the verb *have* does not attribute possession of the appearance to the subject of the sentence, but merely attributes the property described by the adjective to that noun. In other words, despite the uncertainty of the mechanism for attribution, semantically, the expressions in parentheses play a more significant role than the nouns that they directly modify. This form-meaning disparity is reminiscent of the discussion of the relationship alleged between MEASURE and

Type A MEASURE EXPRESSION made in section 2, where I showed that they have little to do with each other. Yet the discussion here would suggest a modification of that conclusion; it can be said at least that the alleged relationship is due to the semantic significance of MEASURE within Type A EXPRESSION.

Now, taking these discussions into consideration, a proper characterization of Type A MEASURE EXPRESSION would be like:

(21) Type A MEASURE EXPRESSION denotes a property that is inalienably possessed, with respect to the quality/quantity that the MEASURE denotes with the DN specifying its dimension.

Note the passive form, which entails the possessor but does not require its explicit realization, making sure that the possessor does not emerge within Type A EXPRESSION. This characterization gives a secondary status to the DN in comparison with the MEASURE, and allows to incorporate their relative semantic significances.

By contrast, a proper characterization of Type B MEASURE EXPRESSION calls for the involvement of the possessor within it. It should also be taken into consideration that Type B EXPRESSION, as well as MEASURE, can be embedded in Type A EXPRESSION. In this respect the three kinds of expressions are said to have one thing in common; they express in one way or another a quality/quantity that is concerned with measurement. Moreover, MEASURE and Type B EXPRESSION have the same semantic equivalence, and both should be given parallel characterizations, accordingly. Thus, they would be given the following characterizations:

(22) MEASURE denotes a quality/quantity in measurement, which may be accompanied by the PP that specifies its dimension.

(23) Type B MEASURE EXPRESSION denotes the quality/quantity that THING inalienably possesses with respect to the measurement whose dimension the DN specifies.

It should be emphasized that in this characterization of Type B EXPRESSION, unlike Type A EXPRESSION, "the quality/quantity" at issue is specified by the restrictive relative clause which requires another entity of the same quality or quantity. In the examples given above, this is expressed in the form of *the* plus *of THING*, which in turn suggests that the definite article in question should be regarded as so called cataphoric *the*. Once conceived so, it is natural to consider that Type B EXPRESSION need not take the form of *the DN of THING*, and can have other kinds of restrictive modifier, which also implies the THING of the same quality or quantity. This is indeed the case, as shown by the following examples:

(24) a. The lantern showed him a rock chamber, bare and black, about ten

feet high, and of about twice that width. (S. F. Wright, *The Island of Captain Sparrow*)

b. Some species [of ostracod] would have produced sperm 10 times as long as the adult body length. (*Connected, Electronic Telegraph*, June 1999)

5. Summary

In this paper I have shown some of the properties of what I call MEASURE EXPRESSIONs, which are headed by a DN. The expressions are divided into two types, depending on whether the PP that immediately follows the DN contains MEASURE or THING. The differences of the two types of expressions include the choice of determiner and that of linking verb. I have also argued that these differences have much to do with the possessive or predicational nature of the sentence with each type of expression: a sentence with Type A EXPRESSION is concerned with a possessor-possessee relationship between the subject of the sentence and the DN involved. The inalienable nature of the relation, however, gives rise to the semantic significance of the MEASURE. By contrast, a sentence with Type B EXPRESSION makes a construction for comparison, which is also concerned with a certain relationship between the subject of the sentence and the THING in question.

NOTES

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[1] Generally, it is not clear how the words constituting a unit are analyzed in familiar X-bar theoretic terms. For example, a question might remain as to which word should be regarded as the head in the following examples:

(i) a. 10 kilometers

b. 10 kilometers per hour

c. 100 square kilometers (=10 kilometers square)

Nevertheless, the question itself has little to do with the discussion in this paper, (and does not seem to require a detailed analysis), and thus I do not go into this issue any more.

[2] The omission of "phrase" would be justified by the fact that neither the numeral nor the unit projects up and the sequence does not make an endocentric structure. The "phrase" may have been given not because of their X-bar theoretic status, but simply because a "measure phrase" usually contains more than one word, and thus this name seems just mnemonic. Moreover, as discussed in section 1, MEASURE itself may project up, and thus "measure phrase phrase" would sound odd. Interestingly, as Bolinger (1977:7) claims, if it is the case that simple numerals can be MEASURE, especially when we speak of human age (e.g. *I already had a bike when I was six*), to give the term "phrase" would be inappropriate.

[3] Strictly speaking, this statement would require modifications, since some adjectives are compatible with a multiplier. For illustration, consider the following example:

(i) a. I would get a 400-pound pygmy chimp -- three times overweight -- who's been isolated, and wonder 'Is that cruel?' (*BBC News*, July 1999)

Note that adjectives which have the prefix *over-* by themselves also involve the notion of comparison, and thus can accommodate a multiplier.

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