LETTER TO THE EDITOR

Scalar and ordinal quantities

Xavier Fuentes-Arderiu

Dear Editor,

The last edition of the International Vocabulary of Metrology (thereafter VIM3) [1] includes the concept 'ordinal quantity' and its definition.

In the VIM3, the concepts 'quantity' and 'ordinal quantity' are in generic relation. As 'quantity' is a super-ordinate concept, all its characteristics would also belong to its subordinate concept 'ordinal quantity'. However, this is not the reality: there are many characteristics that are consequence of the algebraic operations (e.g. mean and standard deviation calculations) that are not applicable to ordinal quantities. On the contrary, all these peculiarities are applicable to the rest of (non-termed) quantities (i.e. quantities the values of which need to be expressed by way of a measurement unit).

On the other hand, but stressing the above comment, in the concept diagram given in Fig. A.1 of the VIM3, the concept 'ordinal quantity' (see entry 1.26 in [1]) and the (neither termed nor numbered) concept explained by the sentence 'quantity expressed by a measurement unit' are both subordinated to the concept 'quantity'.

One logical derivation from the VIM3 is the necessity of a term to designate the non-defined concept mentioned in the previous paragraph. Among all the different terms I taken into account, I think the best term is 'scalar quantity'.

The VIM3 recognizes the existence of scalar, vector, and tensor quantities (though vector and tensor quantities are out the scope of VIM3) in a note to the definition of 'quantity' (see entry 1.1 in [1]) and explicitly uses 'scalar quantity' to define 'measurement unit' (see entry 1.9 in [1]). In addition, the term 'scalar quantity', denoting a quantity which is completely specified by magnitude only, appears in a plethora of scientific and technological books (see http://books.google.com/books at the Internet). The term 'unitary quantity' proposed elsewhere [2] is not a good choice, because the general language meaning of the adjective 'unitary' can cause confusion. So, let me propose the concept, and the corresponding term *scalar quantity* as a complement to ordinal quantity, reserving *quantity* in case a broader concept is needed.

References

1. BIPM, IEC, IFCC, ILAC, ISO, IUPAC, IUPAP, OIML (2007) International vocabulary of metrology—Basic and general concepts and associated terms (VIM) 3rd ed. ISO, Geneva [also known as ISO/IEC Guide 99:2007, and JCGM 200:2008; http://www.bipm.org/vim]
2. Dybkær R (2009) An ontology on property for physical, chemical, and biological systems. http://ontology.iupac.org/ontology.pdf

X. Fuentes-Arderiu (✉)
Laboratori Clínic, Hospital Universitari de Bellvitge,
L'Hospitalet de Llobregat, 08907 Catalonia, Spain
e-mail: xfa@bellvitgehospital.cat