

ON PARTONOMY AND TAXONOMY

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ABSTRACT

This article takes up the question of how the “partonomy – taxonomy” issue can be formulated within Langacker’s theory of cognitive grammar. The discussion concentrates on a comparison of taxonomic hierarchies with one particular model of the part-whole relationship – the so-called member-collection model. When analysed in terms of class-inclusion, complex collections like an army are analogous to type hierarchies. However, when analysed in terms of meaning, the relation characterizing collections with hierarchical organization is diametrically different from the relationship between a type and a subtype. Providing arguments for close affinity between the part-whole structure of collections and objects, as opposed to the taxonomic relation of class-inclusion, this study is in line with the results of developmental and experimental studies conducted by Markman and Seibert (1976) and Markman *et al.* (1980). At the same time, however, it goes against the folk model of the category and its members, which was argued for by Kövecses and Radden (1998).

1. Introduction

The idea of affinity between the part-whole relation and the taxonomic relation of class inclusion reappears in a number of analyses which have been postulated by linguists and psychologists of different theoretical persuasions (see, for example, Lyons 1977: 314-315; Cruse 1986: 177-179; Iris *et al.* 1988, and Tversky 1990).¹ In this article, I will confine my attention to the way in which the “partonomy – taxonomy” issue can be formulated within one particular framework – Langacker’s theory of cognitive grammar.²

¹ For a critical assessment of Iris *et al.* (1988), who claim that taxonomic relations ought to be regarded as one type of partonomic, or *part-of* relations (assuming also that the member-collection model is a more primitive version of the subset-set model of part-whole), see Górska (1998, 1999).

² For the theory of cognitive grammar see, in particular, Langacker (1987, 1990, 1991, 2000) and Taylor (2002); for an overview see also Górska (2000).

Unlike the modular versions of cognitivism advocated by formal linguistics, the theory of cognitive grammar assumes the non-autonomy of linguistic structure, i.e. it is maintained that language is not independent from cognition, but is based on it. The overall framework is founded on the idea that meaning is central not only to lexicon, but also to grammar itself. As Langacker (1987: 12) puts it, “grammar ... is inherently symbolic, hence meaningful”. By the same token, “[i]t is incoherent in this view to speak of grammar in isolation from meaning” (Langacker 1987: 35). To characterize Langacker’s semantics in most general terms: it is a conceptual theory of meaning. And, specifically, in his approach, meaning is equated with “conceptualization”, where the latter is used in the broadest sense to cover novel conceptions as well as “fixed” mental structures established as cognitive routines. By using the terms “conceptualization”, in preference to that of “concept”, Langacker wants to express the fact that semantic structures, just like all mental structure, are dynamic in nature – they reside in “recurrent patterns of neurological activity” (Langacker 1994: 25). Ultimately, then, the meaning of a linguistic expression is to be explicated in terms of cognitive processing (cognitive events that constitute the relevant conceptualization – a given mental experience). There is, of course, no doubt that an objective of this kind is, as yet, far beyond our reach. However, as Langacker (1990: 2) observes, “[t]he remoteness of this goal is not a valid argument for denying the conceptual basis of meaning”.

In order to take a distant view on the partonomy – taxonomy issue, let me first turn to developmental and experimental studies which were conducted by Markman and Seibert (1976) and Markman *et al.* (1980). The results of the former study show that children’s performance on part-whole comparison tasks is greatly facilitated when the part-whole comparison questions involve collections or objects, rather than classes. According to the authors, the fact that the part-whole structure of collections and of objects are easier for children to operate upon than a class inclusion hierarchy demonstrates, on the one hand, that the part-whole organization of collections and of objects are more stable than the inclusion organization of classes, and on the other hand, that the psychological coherence of collections and objects is greater than that of classes. Markman *et al.* (1980), in turn, provide evidence for the assumption that the collection organization is not only easier to operate upon, but also easier to establish and maintain than the class-inclusion hierarchy. In brief, referring, on the one hand, to the developmental trend in the classifications children construct, which seems “to move from objects to collections to classes” (Markman and Seibert 1976: 565), and on the other hand, to the results of experiments which they conducted with children of different age groups, the authors argue for close affinity between the part-whole structure of collections and “objects” as opposed to the inclusion organization of classes.

Looking at the partonomy – taxonomy issue from the perspective of their study of conceptual metonymy, Kövecses and Radden (1998) take a quite different stance. According to them, “our folk understanding of the relationship between a category and its members is ... that of a whole and parts” (1998: 52). They argue that most people are unaware of the difference between these two relationships: each of them is represented as a hierarchy or as inclusion (of a part in a whole, or a subset in a set); and “[i]n the same way that parts make up a whole, the members of a category as their subsets make up a category” (1998: 53). This folk view, as the authors note, is also mirrored in German: *Teilmenge*, the term for “subset”, literally means ‘part-set’. Therefore, Kövecses and Radden go on to argue that the idealized cognitive model (ICM) of the category and its members should be analyzed as an “instance of the whole-part configuration” (1998: 53).³

Evidently, the emerging picture is far from clear. Let us then see whether the perspective of cognitive grammar will allow us to clarify at least some aspects of the controversy.

2. Taxonomy and partonomy in the perspective of cognitive grammar

Let us begin with taxonomy. As Langacker (1991: 60) observes, “[s]peakers of every language sort the objects of their experience into distinctly labelled classes. The taxonomy reflected in a linguistic system invariably shows some degree of hierarchical arrangement, so that a particular object simultaneously instantiates a number of different types representing different levels of abstraction”.⁴ For example, a particular squirrel Kitty instantiates (is an instance of) the types designated by *squirrel*, *mammal*, and *animal*. In brief, a taxonomy (as in (1) below) can be regarded as a “type hierarchy”:⁵

1) *animal* > *mammal* > *squirrel* > *Kitty*

For our immediate purpose, then, the crucial question is: What is the nature of the relationship between a subtype and a type? Or, in more general terms, how is the ordering in a type hierarchy established? To answer the latter question first, the types’ meaning and extension constitute two ways of establishing the ordering: “in terms of meaning, each type specification is schematic for the one that

³ Additionally, let me note that, according to Kövecses and Radden (1998: 53), this ICM allows for reversible metonymies: (i) A CATEGORY FOR A MEMBER OF A CATEGORY (*the pill* for ‘birth control pill’) and (ii) A MEMBER OF A CATEGORY FOR A CATEGORY (*aspirin* for ‘any pain-relieving tablet’).

⁴ For the notion of instantiation see Langacker (1987, 1991).

⁵ Note that, at its lowest level, the hierarchy includes specific members of a given class (cf. *Kitty*, above). For arguments for the inclusion of specific members in the hierarchy see Langacker (1991: 61-64).

follows; as for extension, the members of each category include those of the next as the proper subset" (Langacker 1991: 61).⁶ Depending on the perspective taken, then, the relationship between a type and a subtype (e.g., between *mammal* and *squirrel*), appears to be, on the one hand, a relation of schematicity (and, by the same token it reduces to "precision of specification" (Langacker 1991: 61)), and on the other hand, a kind of inclusion relation, which obtains between a subset and a set.

It ought to be noted at this point that the relationship (of elaboration) between *mammal* and *squirrel* is parallel to the relation (of instantiation) between *squirrel* and *Kitty*, i.e. *mammal* is more schematic for *squirrel*, and *squirrel* is more schematic for *Kitty*.⁷ With respect to the type hierarchy, however, a proper name like *Kitty* is "degenerate"; defined with reference to the lowest level of the type hierarchy, at which there is no distinction between type and instance, "its semantic pole is a type conception that is also an instance conception", or, in other words, "it is a type with only one instance" (Langacker 1991: 61-62).⁸

Note now that there is a certain kind of complex collections (i.e. collections of subcollections) which, taken at their face value, bear close affinity to taxonomic hierarchies. The case in point are collections like an army, whose internal hierarchical structure finds its direct linguistic manifestation in distinct labels for the subcollections located at different levels of the hierarchy. The hierarchy in (2) can serve as an illustration here (for convenience, *soldier Brown* is added as a specific member of some specific squadron):

2) *army* > *division* > *brigade* > *battalion* > *company* > *squadron* (> *soldier Brown*)

Analysed in terms of the inclusion relation, the hierarchy in (2) is analogous to the type hierarchy (cf. (1) above):⁹ the members of each collection include those of the next as the proper subset (with *soldier Brown* representing a limiting case of a subset, though not of a collection, since the latter has two members as its limiting case). However, when viewed in terms of meaning, the part-whole relation characterizing the above collection of subcollections is diametrically different from the relationship between a type and a subtype. Observe, first, that, since the relationship between a type and a subtype is that of schematicity, the conceptions of a type and of a subtype provide grounds for alternate construals of any instance of a (sub)type located lower in the hierarchy which differ from

⁶ For the level of specificity as one dimension of construal see Langacker (1987, 1990, 1991).

⁷ For instantiation as a special case of elaboration see Langacker (1991: 61-64).

⁸ Observe that on Langacker's account of the type hierarchy, *squirrel Kitty* would also constitute a limiting case of a subset, i.e. a subset with only one element (i.e. *Kitty*).

⁹ On Langacker's account of the type hierarchy, *squirrel Kitty* would constitute a limiting case of a subset, i.e. a subset with only one element (i.e. *Kitty*).

one another in the precision of specification of the profiled instance. For example, *Kitty* can be referred to by means of any of the terms of the hierarchy in (3), as:

3) a. *Kitty is a squirrel/a mammal/an animal.*

Likewise, any squirrel can be characterized as in (3b):

b. *A squirrel is a mammal/an animal.*

Without going into details, let me observe that the crucial aspect of the predicate nominative constructions in (3a, b) resides in profiling the identity relation between an instance (of the relevant subtype) which functions as the trajector (cf. *Kitty* and *squirrel* in, respectively, (3a) and (3b)) and an instance (of the relevant type) which function as the landmark (cf., e.g., *squirrel* in (3a) and *mammal* in (3b)).¹⁰ Note now that, for example, soldier Brown, who is a member of a squadron which, in turn, belongs to a company that constitutes a part of brigade included in a division of a given army, cannot be characterized as in (4a); neither can a squadron be referred to as in (4b):

4) a. **Brown is a squadron/company/battalion/brigade/division/army.*

b. **A squadron is a company/battalion/brigade/division/army.*

Clearly, the relationship between (*soldier*) *Brown* in (4a) or *a squadron* in (4b) and an instance of a collection higher up in the hierarchy (cf., e.g., *a squadron* in (4a) and *a company* in (4b)) is not that of identity. The identity relationship cannot be established here, since the conception of a collection (e.g., of an army) is *not* a schematic equivalent of the conception of its members (be they individuals (like soldier Brown) or subcollections (like a squadron or a company)). In a word, a whole does not constitute a schematic conception of a part.

Let me observe at this point that, unlike the elements of a class (cf., e.g., the relationship between squirrel and squirrels, or between a soldier and soldiers), the members of a collection like a family (or a team) are directly or indirectly linked with each other via specific relationships; it is the existence of those specific relationships that conditions the integrity of such collections. Note, further, that complex collections of the army-type are in no way different from collections like a family, team, or – a squadron in this regard. Consider the latter collection: for an individual like Brown, to qualify as a member of a squadron, it

¹⁰ The so called "trajector/landmark alignment reflects the packaging of experience in one particular way for expressive purposes. It is basically a matter of figure/ground organization – trajector and landmark being characterized respectively as primary and secondary figure within the profiled relationship – and is thus peculiar to individual elements and constructions" (Langacker 2000: 182). And for more on the predicate nominative constructions see Langacker (1991: 64-71).

does not suffice that he be a soldier. Likewise, for a squadron to qualify as a part of an army it is not sufficient that it be a squadron. Rather, what conditions the membership in a given collection is the conceived specific relationship of a given entity (e.g., soldier Brown or a squadron) to other members of the collection in question (cf., respectively, other soldiers who belong to a given squadron and other squadrons of a company). It is only when a given entity is conceived of as participating in the relevant relationship that it can be considered a member of a given collection.

Furthermore, in the case of a collection with a hierarchical structure, the degree to which a subcollection down in the hierarchy is integrated (and hence the manner in which that subcollection's members are linked via the relevant specific relationships) conditions (albeit to a different degree) the integrity of collections higher up in the hierarchy. For instance, when the soldiers of a given squadron cease to participate in the relevant relationship in the required manner, it is not only the integrity of that squadron which is put into question, but also, at least to some extent, the integrity of a company and a battalion. Observe also that the members of a complex collection differ in terms of the role they play in the functioning of the collection as a whole: the higher up in the hierarchy a given member (a subcollection) is, the more essential its role.

It thus appears that the part-whole structure of a complex collection of the army-type has a lot in common with that of a complex artefact: in each case, the parts are either directly or indirectly dependent on one another, and they differ in the degree of their essentialness, i.e. the degree to which the functioning of other parts of a given whole is dependent on them.¹¹ In a word, complex collections like an army function as if they were a complex artefact (an instrument of some kind).

There is another aspect of such collections which renders them similar to the functional component model of part-whole (see fn. 11). Consider, for instance, the following data:

5) *This squadron is a part of our company/battalion/.../army.*

Similarly to the functional components of a complex artefact, a subcollection like a *squadron* is a conceptually dependent entity, i.e. its conceptualization requires reference to a whole of which it forms a part; by the same token, the relevant whole functions as a natural reference point (i.e. the one which is obligato-

¹¹ For the sake of comparison with artefacts, consider a simple example of a bicycle's mudguards, wheels, and pedals: the wheels and pedals of a bicycle are highly integrated with other parts (for example, the dynamo, chain, or brakes), and, consequently, they are essential to the functioning of the whole; on the other hand, the functioning of other parts of a bicycle does not crucially depend on mudguards, hence the role of mudguards in the overall configuration is only secondary. ¹¹

rily accessed at some level of cognitive processing) for the conception and characterization of the part in question. Observe also that, due to the internal structure of an army, there is the possibility of choice between the local reference points and the global one. Depending on the perspective taken to the profiled scene, a subcollection located lower in the hierarchy (and thereby one which is less essential to the collection as a whole), may be conceived by accessing a local reference point, i.e. any subcollection higher up in the hierarchy, or the global reference point – the collection as a whole (cf. (5)). Suffice it to add here that the co-existence of local and global reference points is a characteristic property of the functional component model of part-whole; for example, the notion of a car is a global reference point for the conception of a car's engine and of a piston, and the conception of a car's engine is, in turn, a local reference point for that of a piston.¹²

It is interesting to note, however, that despite the above similarities to the functional component model, in the convention of English complex collections of the army-type retain characteristic properties of collections of people, as is evident from the following example:

6) *Our army/division/brigade/.../ company is/are winning against the enemy X.*

In accordance with the English patterns for collections of people, two alternate construals of collections in (6) are possible:¹³ one, which is marked by the verb in the singular, highlights the unity of the relevant whole, while the other, which takes the plural verb, gives greater prominence to individual members-soldiers subsumed by that whole. Clearly, then, irrespective of the level it occupies in the hierarchy, each collection in (6) is conceived of as comprising people, soldiers, rather than abstract entities, subcollections.

¹² This, let me add, is another way of describing relations which obtain in the so called "reference-point chain" that is characteristic of part-whole relations (see Langacker 1997, 2000).

¹³ In the grammar of English, the majority of collections comprising humans (and also those comprising animals, e.g., *swarm of bees, pack of dogs/wolves*), unlike collections denoting physical objects, (e.g., *forest, library*) can receive two alternate construals: one of them, illustrated in (i), highlights the unity of the whole, and the other puts greater prominence to the individual members, as in (ii-iii):

(i) *My family/The team is considering its decision.*

(ii) *The team are considering their decision.*

(iii) *My family are all tall.* As argued in Górska (1999), this aspect of the English convention is motivated by the so called Silverstein Hierarchy (also known now as the hierarchy of animacy, empathy, agentivity, topicality or salience), which specifies that humans have a higher degree of inherent salience than animals which, in turn, rank higher in salience than physical objects (see Silverstein 1976); the pattern exemplified in (ii)-(iii) retains the inherent salience (hence inherent topicality) of humans and animals; physical objects, which rank lower on the hierarchy, are always excluded from its domain (cf., e.g., **The forest are all tall*). Note also that the Silverstein Hierarchy predicts that the opposite alignment of these two patterns is highly unlikely.

3. Conclusions

The foregoing discussion concentrated on a comparison of taxonomic hierarchies with one particular model of the part whole relationship – the so called member-collection model. Taken at their face value, these two conceptualizations seem to be in no way different from one another. And indeed, when analysed in terms of class-inclusion, complex collections like an army (i.e. collections of subcollections) are analogous to type hierarchies. However, when analysed in terms of meaning, the relation characterizing collections with hierarchical organization is diametrically different from the relationship between a type and a sub-type (cf. a collection is not a schematic equivalent of its members).

On a closer analysis, the part-whole structure of complex collections of the army-type (just like that of archetypal collections such as a family or a team) appears to have a lot in common with complex artefacts. In both cases, the parts comprising a given whole are (directly or indirectly) linked with each other through specific relationships; the existence of those specific relationships accounts for the integrity of a given whole on the one hand, and for its emergent properties, on the other.

In brief, this study provides evidence for close affinity between the part-whole structure of collections and objects, as opposed to the taxonomic relation of class inclusion. It is thus in line with the results of developmental and experimental studies conducted by Markman and Seibert (1976) and Markman *et al.* (1980), which were mentioned in section 1. At the same time, it goes against the folk model of the category and its members, which was argued for by Kövecses and Radden (1998, see section 1); this, one may add, should not be surprising, since, even though they are experientially motivated, our ICMs are just an idealized version of reality.

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