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# Conceptual relations in the semantic domain of Swedish dimensional adjectives

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**Abstract:** In the conventional study of lexical semantics, adjectives are not considered likely to have a hierarchical relation, such as a meronymic (part-whole) relation, to each other. The most possible lexical relations among adjectives are antonymy and synonymy. In this study, however, I assume that meronymic relations between internal members of dimensional adjectives (e. g. *big*, *long*, *deep*) are conceptually possible from an ontological point of view. By using a semantic task, i. e. anaphora resolution, I draw the following conclusion: dimensional adjectives themselves have no meronymic relation to each other. However, restricting our discussion to the usage of Swedish dimensional adjectives in modifying concrete entities, the conceptual relations between the general term, e. g. *BIG*,<sup>1</sup> and specific terms, e. g. *LONG*, *DEEP*, are mentally organized in a part-whole relation and thus in a meronymic structure. When applied to the whole expression which is a concept of a big entity, such as *BIG CUP*, there are meronymic relations between concepts of the big entity and its parts, e. g. *BIG CUP* – *DEEP CUP*.

## Introduction

Most existing semantic theories discuss the multiple sense relations between lexical items (e. g. Cruse 1986, Murphy 2003). It is widely discussed that a single lexical item establishes more than one semantic relation between itself and other lexical items. Types of sense relations are categorized in several ways, for instance as horizontal sense relations, including antonymy (e. g. *long* : *short*) and synonymy (e. g. *strong* : *powerful*), and as vertical sense relations like hyponymy (e. g. *poodle* – *dog* – *animal*) and meronymy (e. g. *car* – *engine*). However, when we study our understanding and actual usage of language based on human experiences, the interrelations of lexical items look more varied. In our minds, we link

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<sup>1</sup> I use capital letters to indicate concepts throughout this essay. Lexical items are written in italics.

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two or several lexical items in diverse ways that existing dictionaries hardly cover. Mihatsch (2007:359–360) contends that lexical hierarchies of nouns in taxonomies (e. g. *thing – object – garment – skirt – miniskirt*) do not correspond to our everyday reasoning as it is stored in the mental lexicon, although the hierarchical relations are very important constructions in knowledge organization. Mihatsch points out the morphological correspondence between the label of some nouns and more specific nouns (e. g. *skirt – miniskirt*), but the superordinate is not normally part of the label of the hyponyms (e. g. *garment – skirt*). This shows that linguistic form does not always mirror the hierarchical organization of concepts. Moreover, it is observed that psychological tests such as the word-association test demonstrate that hyponymy is not a dominant relation between words in our mental lexicons, where antonymy, co-hyponymy and other associations prevail. Shimotori (2013) examines the concept underlying dimensional adjectives in Japanese and Swedish by conducting word-association tests. The results show that an interesting association pattern is provided by Swedish participants, but not by Japanese participants: the cases where dimensional adjectives are associated with other dimensional adjectives except for their antonym, for instance *stor – lång* ‘big – long’. I put this type of association in a separate category since it is a distinctive association pattern in that it indicates that members of the class of dimensional adjectives that are not antonyms of one another have close conceptual relationships.

The present study discusses the vertical hierarchical relation in terms of the part-whole relation from an ontological perspective. Ontology is the branch of metaphysics that studies the nature of existence or being as such, and ontological studies in linguistics deal with the existence of concepts. Therefore, the focus in the present study is on how we position a concept in relation to another concept. It is very important to stress that my intention is to study the relation between concepts, which should be distinguished from the relation between senses. I use the term “conceptual relation” to refer to a relation between concepts underlying words. Compared to this, “sense relation” indicates a relation between words. The distinction between the two relations follows the statement by Nickles et al. (2007:40).

In talk about sense relations the distinction between conceptual relations and relations between the corresponding linguistic signs is often blurred or not drawn at all. Whereas the relation between CAR and CHASSIS is a conceptual one – a meronomic relation – the corresponding relation between any linguistic codings of those concepts, e. g. between the English nouns *car* and *chassis*, is a semantic relation – a meronymic one. Another example would be the hyponymy relation between the English nouns *car* and *vehicle*, which holds because of the conceptual subordination of CAR under VEHICLE.

In accordance with this distinction, the term ‘meronomy’ is used to refer to the conceptual relation, whereas ‘meronymy’ is used for the sense relation. Examples

are taken from the semantic domain of dimension, which is often realized in the form of adjectives, e. g. *big*, *small*, *high*, *low* etc. In the following sections, I mainly examine dimensional adjectives when they are used for expressing the spatial extension of concrete entities, i. e. describing entities in three-dimensional space, for instance, *big cup*. Usages for abstract entities in a figurative sense such as *big effort* or *long summer* are thus disregarded here. The aim is to apply an ontological perspective to dimensional concepts and demonstrate that there is a meronymic relation between concepts underlying dimensional adjectives combined with concrete nouns. I would like to shed new light on how the concepts underlying dimensional adjectives relate to each other.

## Theoretical background

From a lexical semantic point of view, it seems inappropriate to discuss the concepts of dimensional adjectives in terms of meronymy. There are some reasons why dimensional adjectives are not proper subjects for meronymic analysis. I start with the definition of the hierarchical relations of lexical items, namely taxonomy and meronymy.

For the study of taxonomy, the foci in previous analyses in the field of lexical semantics have been noun-oriented: Nouns are the most studied word class with regard to sense relations. Taxonomy is the study of classification. Generically, this study is used in biology for the purpose of classifying animate beings. Yet in the broad sense, the term ‘taxonomy’ is used for classifying all entities, even concepts, on the basis of similarities and differences of features. In linguistics, the sense relation that forms the basis for lexical hierarchies is called a taxonomy, which itself is a sub-species of hyponymy (Cruse 1986:137). A useful diagnostic frame for a taxonomy is:

An X is a kind/type of Y

If X and Y have a taxonomic relation we say that X is a ‘taxonym’ of Y, e. g. *apple* is a taxonym of *fruit* in contexts like *An apple is a kind of fruit*. However, not all sentences with this frame indicate a taxonomic relation since the expression *kind of* can be used in a broad sense as well: Cruse points out that there are three senses of ‘kind of’ which are irrelevant to taxonomy. The first irrelevant sense of *kind of* is when it is used to refer to something unfamiliar, or something that is difficult to label in the speaker’s mind. The speaker gives an approximate description, e. g. *he was wearing a kind of flattened, three-sided turban – I don’t know exactly what it was* (Cruse 1986:138). The second irrelevant sense “indicates doubt as to the appropriateness of

the predication” (Cruse 1986:138). Cruse gives an example: *I suppose a parish priest is a kind of social worker*. The third sense which is irrelevant to taxonomy is used in expressions such as *What kind of person is she?* The expected answer to this question can be, for instance, *friendly, reliable and serious* etc. The relation between *person* (or *she* in this context) and the personal attribute *friendly* is not taxonomic. Cruse illustrates a very informative example to distinguish them (Cruse 1986:138):

- A: What kinds of animals did you see at the zoo?  
 B: (i)? Big ones, little ones ...  
 (ii) Lions, tigers, monkeys, zebras ...

Above, we see the difference between two types of sense relation. The answers in (i) are obviously not taxonyms of *animal*. They are example of the third case of irrelevant sense relation we saw before. There is a modifier-modified relation between *big one, little one* and *animal*. On the other hand, the answers in (ii) are taxonyms in the sense that *lion, tiger, monkey* and *zebra* are kinds of *animal* in a taxonomic hierarchy.

For the study of meronymy, the sense relation is a type of hierarchy which is based on part-whole relationships. The term ‘meronym’ points to a part of a whole. Thus we say that ‘X is a meronym of Y’ if instances of the concept underlying X are a part of instances of the concept underlying Y. An instance of the concept underlying *engine* is a part of an instance of the concept underlying *car*, therefore *engine* is a meronym of *car*. Concepts of meronymy reflect our understanding of relative physical placement of two or more objects, i. e. parts and wholes. Thus most of the meronymic relations are constituted by nouns, while adjectives are not a relevant word class here.

The reason for this is that adjectival expressions cannot provide concrete instances which realize the part-whole relation. Prototypically, nouns refer to substantial objects which have concrete forms in reality, whereas adjectives refer to the characteristic marks or the attributes of objects. Thus, adjectives function as semantic modifiers. This means that the senses of adjectives are founded on the nouns that they are associated with. Cruse (1986:52) suggests the term ‘contextual modulation’, which says: “A single sense can be modified in an unlimited number of ways by different contexts, each context emphasising certain semantic traits, and obscuring or suppressing others [...] This effect of a context on an included lexical unit will be termed modulation”. He states that contextual modulation is greater for verbs and adjectives, because their meanings depend on the nouns that they are associated with. It is likely that adjectives are difficult to define without giving nouns that they combine with. For instance, an adjective *hot* has semantically different interpretations in *hot kettle* and *hot summer*. *Hot* in *hot kettle* denotes a high temperature on the surface of the kettle whereas

*hot* in *hot summer* primarily denotes the speaker's thermal perception, because *summer* itself denotes a season, a certain time period that we cannot physically be in contact with. Miller (1998:48) state that

The semantic organization of descriptive adjectives is entirely different from that of nouns. Nothing like the hyponymic relation that generates nominal hierarchies is available for adjectives: it is not clear what it would mean to say that one adjective 'is a kind of' some other adjective.

The semantic properties of adjectives cannot be illustrated with a taxonomic hierarchy such as *animal – dog – poodle*, which is basically made up of natural kind terms.

Here, there is an important point to discuss. In particular, I would like to bring up the expression '*is a kind/part of*' from the frames of taxonomy and meronymy. The issue is how we understand the words *kind* and *part*, which are very elusive of definition. Undoubtedly, *kind* and *part* are two general words whose meaning can be expressed by the use of other words. Winston et al. (1987) discuss the vagueness of the word '*part*' with regard to meronymic relations. They point out that '*part*' is only the most general of a large number of English terms which can be used to express various kinds of meronymic relations (1987:430). To be more precise, they illustrate the circumstance that the word '*part*' can be synonymous with '*components*', '*member*', '*portion*', '*feature*' and '*places*' etc. Based on this generality, the two frames, '*is a kind/part of*', for taxonomy and meronymy have a flexible sense when applied to lexical items. In other words, the frames are not decisive criteria in defining the taxonomic and meronymic relations. Again, I examine the statement by Miller (1998:48). She says that "it is not clear what it would mean to say that one adjective 'is a kind of' some other adjective". It is clear that the expression '*is a kind of*' has an unclear interpretation here. Besides, this gives us a clue that the interpretations of the frames '*X is a kind/part of Y*' are not identical when used for nouns vs. for adjectives. When the frames are used with nouns, the interpretations provide more concrete relations between the variables *X* and *Y*, e. g. *dog – animal*, *handle – cup* and *a slice – a pie*. On the other hand, when used with adjectives, more metaphysical relations between two concepts are expressed. In fact, verbs have been used in order to exemplify taxonomy and meronymy in frames such as *X-ing is a way of Y-ing* (e. g. *strangling is a way of killing* is an example of taxonomy) and *X-ing is part of Y-ing* (e. g. *paying is part of shopping* is an example of meronymy), but such approaches are much more limited than in the case of nouns.

Therefore, seen from an ontological point of view, where we focus on our system of conceptualization, the issues look different – it appears to be possible to discuss taxonomic and meronomic sense relation among adjectives, although they are different from those that nouns establish in their nominal hierarchies. From the purely ontological point of view we can successfully use the meronomic relations

in the conceptual realm of dimensions. I will therefore approach the dimensional adjectives through the lens of ontology and demonstrate this view in section 6.

In the field of linguistics, the notion of ontology is defined by many researchers, e. g. “Every language ontology is a conceptualization or categorization of what normal everyday human language can talk about” (Zaefferer 2002:33–34); “instances of mental universals join other less common concepts to constitute a complex structure in our minds, a network of cross-connected conceptualizations of the phenomena that make up our world. [...] we call such a system of conceptualizations an *ontology*” (Schalley/Zaefferer 2007:3). Nickles et al. discuss how the philosophical concept of ontology is put to use in linguistics. They compare the two different goals of ontological studies in philosophy and linguistics, respectively:

Whereas the philosopher is interested in answering question (1), the job of the linguist is to find convincing answers to question (2):

- (1) What kinds of things are there?
- (2) What kinds of things do people talk about as if there are? (Nickles et al. 2007:36)

For the realm of dimensional adjectives, our questions thus amounts to: What dimensional attributions do people talk about as if there are?. In the next section, I start the discussion by talking about the semantic background of dimensional expressions.

## Dimensional expressions

Concepts of dimension are mostly encoded in adjectives. In the concrete sense, dimensional adjectives describe spatial extensions of objects or spatial extensions between objects which exist in three-dimensional space. Dixon (1982:16) posits seven semantic types which make up the word class Adjectives in English, namely DIMENSION (e. g. *big, large, little, small*), PHYSICAL PROPERTY (e. g. *hard, soft, heavy, light*), COLOUR (e. g. *black, white*), HUMAN PROPENSITY (e. g. *jealous, happy, kind*), AGE (e. g. *new, young, old*), VALUE (e. g. *good, bad, proper, perfect*) and SPEED (e. g. *fast, quick, slow*). According to Dixon all types of adjectives, except COLOUR adjectives, have antonymous relations to members in the same domain. As mentioned above, sense relations within the class of adjectives are conventionally discussed mostly in terms of antonymy and synonymy. For instance, adjectives in the domain of DIMENSION have antonymous pairs<sup>1</sup> (e. g. *long – short, high – low*) and synonymous pairs (e. g. *high – above*).

Many typological studies show that semantic properties are encoded into linguistic forms in varying ways across languages. For instance, the studies on COLOUR

terms clearly show that there are language specific patterns for lexicalization (e. g., Berlin/Kay 1969). Adjectives which code physical properties are, for instance, temperature adjectives, e. g. *hot*, *cold*. Koptjevskaja-Tamm/Raklihina (2006) study similarities and differences of temperature adjectives in Russian and Swedish by exploring the semantic type of nouns that are normally modified by temperature adjectives. Such typological studies of categorization patterns reveal where we delimit two different concepts and how a language encodes concepts. Consequently, lexical units do not always have a one-to-one correspondence across languages. In the case of dimensional adjectives, various patterns of lexicalization occur depending on the differences in how a language categorizes the aspects of three-dimensional extension. In our real three-dimensional world, we see an endless number of forms and sizes that characterize our man-made artefacts and natural objects. Nonetheless, the numbers of dimensional adjectives in a language that describe the forms and sizes is not infinite. This means that in the process of lexicalization we sort out certain outstanding forms and sizes which can be shared by many objects.

For instance, the gradable concept of THICKNESS is encoded in the lexical units *thick* and *thin* in English. The terms are used for describing both plate-like objects, e. g. *a thick book*, and cylindrical objects, e. g. *a thick pole*. However, there are two pairs of terms which denote THICKNESS in Japanese, namely *futoi* – *hosoi* and *atsui* – *usui*. The pair *futoi* – *hosoi* is used for describing cylindrical objects, e. g. *futoi/hosoi empitsu* ‘thick/thin pencil’, whereas *atsui* – *usui* are used for plate-like objects, e. g. *atsui/usui hon* ‘thick/thin book’. Typologically, in Sango (admittedly a creole) *kótá* has the senses ‘big, wide, thick’ while in English, Swahili and Chinook, for instance, there is a separate word for each of the three senses; similarly Sango *kéké* has the senses ‘small, narrow, thin’ (Dixon 1982:57).

Concerning the lexicalization of dimensional expressions, the implicational scales are suggested by Wienold/Rohmer (1997). They point out that there is a hierarchical relation between subcategories within DIMENSION. The following two interlocking scales are suggested:

(A) SIZE < LENGTH < DISTANCE < DEPTH < HEIGHT

(B) SIZE < THICKNESS < WIDTH

The scales imply an order of lexicalization priority of dimensional expressions. The symbol “<” is read as “imply”. For instance, if a language codes the concept of DISTANCE in the lexicon, then the leftward concepts of SIZE and LENGTH are coded as well. So the encoding of DISTANCE in the lexicon implies the encoding of SIZE and LENGTH in the language’s lexicon. By the same token, if a language codes the concept of WIDTH, then the language codes THICKNESS and SIZE in the lexicon. Both scales (A) and (B) contain the concept of SIZE as the most general

concept in the scale. However, the concepts which occur after SIZE in each branch have no implications with regard to each other.

Based on the above implicational scale and the typological study of dimensional expressions, Wienold/Rohmer (1997) maintain that there are the following regularities in the lexicalization of dimensional expressions:

- (a) Lexicalization of dimensional expressions occurs in a relatively fixed order, which can be stated in terms of implications.
- (b) Dimensional expressions early on the implicational scale have more general meanings (have wider applications), if the language lacks expressions late(r) on the scale.
- (c) Dimensional expressions formed from other dimensional expressions by derivation and composition (and maybe also by syntactic construction) are more likely to occur the later their place on the implicational scale. Morpho-syntactic complexity, generally, increases against the direction of implications.

Based on the implications and regularities in the lexicalization, Wienold/Rohmer argue that semantic complexity increases from the general terms to more specific terms in accordance with complexity in form through derivation, composition or syntactic construction, as illustrated in the following examples from Ponape (Rehg/Sohl 1979, after Wienold/Rohmer 1997):

*lap* ‘big’ – *ahlap* ‘thick’ – *tehlap* ‘wide’ (with *teh* ‘leaf, sheet, page’)  
*tikitik* ‘small’ – *ahtikitik* ‘thin’ – *tehtik* ‘narrow’

The semantic complexity which increases with the fixed order of the implicational scale also suggests that there is an unequal structure between the general terms and the specific terms. Subcategories in DIMENSION have a hierarchical structure which consists of two levels, encoded by the general terms and more specific terms. The general terms represent a subcategory of SIZE, such as *big*, *large*, *small* and *little*. The specific terms are encodings of other DIMENSION subcategories such as LENGTH (e. g. *long*, *short*), HEIGHT (e. g. *high*, *low*), DISTANCE (e. g. *near*, *far*), DEPTH (e. g. *deep*, *shallow*), THICKNESS (e. g. *thick*, *thin*) and WIDTH (e. g. *wide*, *narrow*). The general terms are typically used to express overall size of spatial extensions and they are applied extensively to a variety of objects. The specific terms, on the other hand, express a specific extension of an object – they are typically used to describe a “default” dimension of an object. In our knowledge, many objects in the world have an inherent dimension which is one of the essential and presupposed attributes of those objects, e. g. *long river* (*river* is prototypically understood as a long object) and *high mountain* (a mountain is a highly elevated area of the earth’s surface. An object which does not fulfil that attribute is understood as another lexical item, i. e. *hill*). One concrete object can be described by both the general

term and the specific term. For instance, the adjectives *big* and *high* can be used to describe the same object, for instance, an object referred to as a building. However, the readings of *big building* and *high building* are not conceptually equivalent. The expression *big building* refers to the overall image of the building and *big* functions as an inclusive adjective with regards to the other specific adjectives, whereas *high building* focuses on one aspect of the building's bigness, namely height.

## Swedish dimensional adjectives

The conceptual relation between the general term and the specific term of dimensional adjectives is of interest for the following reasons. Firstly, the general – specific relation of dimensional adjectives in a concept has been less in focus in previous research. Generally, the domain of SIZE would indicate a more general dimension than the other dimensional adjectives do. The adjectives *big* and *small* describe the overall size of an entity, rather than its specific extension. However, the ways in which the general terms and the specific terms are conceptually related have not been discussed in previous research. Secondly, my data from two word-association tests using dimensional adjectives as stimuli words (Shimotori 2013) shows that the general terms are frequently associated with the specific terms of all responses in Swedish (see Table 1).

**Table 1:** Total number of responses in all word-association tests and the general term-specific term association (converted to percentage).

|                                   | Test 1     | Test 2       |
|-----------------------------------|------------|--------------|
| Total number of responses         | 1247       | 1090         |
| General-specific associations (%) | 46 (4.0 %) | 206 (19.0 %) |

The reason for the participants in Test 1 giving more responses than those in Test 2 is presumably the difference in response time. In Test 1, the participants were given no time restriction to list responses to each stimulus, whereas in Test 2 the participants had approximately 15 minutes in which to answer, which presumably make them feel pressured. Despite the decrease in response, we see above that the number of general-specific term associations is about five times greater in Test 2 (206) than in Test 1 (46). Besides, the proportion of general – specific associations is notably larger in Test 2 (19.0 %) than in Test 1 (4.0 %). It could be inferred from these results that Swedish participants spontaneously conceive the general-specific associations in their minds. Because of this high

frequency of general-specific association, this association pattern would be worth discussing. To give concrete examples, Table 2 shows the general-specific associations elicited from Test 1 and Test 2. The numbers of occurrences are given in parentheses.

**Table 2:** Associations of conceptual relations between general dimensional adjectives and specific dimensional adjectives.

|                           | Test 1  | Test 2   |
|---------------------------|---|--|
| <b>stimulus item</b>      | <b>response</b>   | <b>response</b>  |
| <i>stor</i> 'big'         | <i>vid</i> 'broad, wide' (3)<br><i>tjock</i> 'thick' (3)<br><i>hög</i> 'high' (2) | <i>tjock</i> 'thick' (5)<br><i>hög</i> 'high' (4)<br><i>lång</i> 'long' (4)<br><i>trång</i> 'narrow' (1) |
| <i>liten</i> 'small'      | <i>tunn</i> 'thin' (2)<br><i>smal</i> 'narrow' (1)                                | <i>kort</i> 'short' (4)<br><i>smal</i> 'narrow' (3)<br><i>tunn</i> 'thin' (1)                            |
| <i>hög</i> 'high'         | <i>stor</i> 'big' (4)   | <i>stor</i> 'big' (3)  |
| <i>låg</i> 'low'          | <i>liten</i> 'small' (1)  | <i>liten</i> 'small' (5)   |
| <i>lång</i> 'long'        | <i>stor</i> 'big' (4)   | <i>stor</i> 'big' (3)<br><i>liten</i> 'small' (1)  |
| <i>kort</i> 'short'       | <i>liten</i> 'small' (9)  | <i>liten</i> 'small' (17)  |
| <i>djup</i> 'deep'        |   | <i>stor</i> 'big' (2)  |
| <i>tjock</i> 'thick'      | <i>stor</i> 'big' (3)   | <i>stor</i> 'big' (9)  |
| <i>tunn</i> 'thin'        | <i>liten</i> 'small' (3)  | <i>liten</i> 'small' (5)   |
| <i>smal</i> 'narrow/thin' | <i>liten</i> 'small' (1)  | <i>liten</i> 'small' (7)<br><i>stor</i> 'big' (1)  |
| <i>bred</i> 'broad/wide'  | <i>stor</i> 'big' (2)   | <i>stor</i> 'big' (8)  |
| <i>vid</i> 'broad'        | <i>stor</i> 'big' (4)   | <i>stor</i> 'big' (15)   |
| <i>trång</i> 'narrow'     | <i>liten</i> 'small' (4)  | <i>liten</i> 'small' (5)   |

Interestingly, the general term of positive value, that is *big*, is associated with the specific terms of positive value, e. g. *high*, *thick* and *long*, whereas the general term of negative value *small* is associated with the terms of negative value, e. g. *short*, *thin*. In subsequent sections, I cover this general-specific association, which is a kind of conceptual relation, in depth.

## Basic assumptions from an ontological perspective

Within ontology it is discussed how we conceptually organize two or more lexical items in our mind. Schalley/Zaefferer (2007:4) suggest two groups of ontological

relations, namely taxonomic and meronomic relations. According to them, concepts are linked by way of one of the following four relations, of which the first two relations (numbered as 1 and 2) are taxonomic relations and the last three relations (numbered as 3 and 4) are meronomic relations:

1. Two weak orderings<sup>2</sup> (transitive, reflexive, antisymmetric relations):
  - a) Conceptual subordination: Concept A is *c-subordinated* to concept B iff (if and only if) every instance of A is also an instance of B, and
  - b) Conceptual superordination, its converse.
2. Three symmetric relations:
  - a) Conceptual equivalence: Concept A is *c-equivalent* to concept B iff every instance of A is also an instance of B and vice versa. (C-equivalence is just the intersection of c-subordination and c-superordination; c-equivalent concepts are co-extensional.)
  - b) Conceptual compatibility: Concept A is *c-compatible* with concept B iff it is conceivable that some entity instantiates both A and B, and
  - c) Conceptual incompatibility, its complement.
3. Two families of strict orderings (transitive, irreflexive, asymmetric relations):
  - a) Meronomic  $x^3$ -subordination: Concept A is *m-x-subordinated* to concept B iff every complete instance of B properly x-includes an instance of A.
  - b) Meronomic x-superordination, its converse.
4. Three families of symmetric relations:
  - a) Meronomic x-cosubordination to C: Concept A and B are *m-x-cosubordinated* to concept C iff every complete instance of C properly x-includes both an instance of A and an instance of B.
  - b) Meronomic x-compatibility under C: Concepts A and B are *m-x-compatible under* concept C iff it is conceivable that a complete instance of C properly x-includes both an instance of A and an instance of B.
  - c) Meronomic x-incompatibility under C, its converse.

I hypothesize that the general terms and the specific terms of dimensional adjective are linked through a meronomic relation (3 and 4 above). Concepts expressed by dimensional adjectives have no concrete referents. Yet, when combined with a noun, a dimensional adjective highlights the dimension in focus. The interpretation of a dimensional adjective is thus more cogent in a

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<sup>2</sup> 'weak' refers to the mathematical notion of a 'weak ordering', which implies that the relation is reflexive, i. e. something is in relation to itself.

<sup>3</sup> x is a variable for the kind of-part of relation.

context-dependent condition, namely in a context with a modified noun. As mentioned before, there may be a meronymic relation between two nouns, e. g. *car – engine*.

Based on the noun meronymy, I assume that it is possible to discuss the meronomic relation between two concepts of dimensional adjectives in concurrence with the meronomic relation of the modified nouns. In my view, the generality of a dimensional adjective when combined with a concrete noun, e. g. *big tree*, gives the whole expression *big tree* (whole) which is conceptually m-x-superordinated to the whole expression *long branch* (part) which is a combination of a specific term and a part noun. I discuss the issue with acceptance on the point that it is not the dimensional adjectives themselves that stand in a meronymic relation. However, I hypothesize that the whole expression in the form of NP (e. g. *big tree* and *long branch*) could have a compound concept and that the meronomic relation could be found between these compound concepts.

The conceptual structure made up of two or more simple concepts is called a complex concept or conceptual combination and it has been well analysed in former studies (Smith/Osherson 1984, Smith et al. 1988, Murphy 1988, 2004). Murphy (1988) points out that it is not at all easy to define what “a complex concept” is since the definition of a component concept, or a more primitive concept is still vague. Do we consider a single lexical item as a component? Even a simple concept can be represented as a list of features and each feature is also considered as a concept. How far should we break a concept into smaller pieces? For the convenience of analysis, Murphy defines a simple concept as follows (1988:530): 1. a concept is “simple” if it can be represented as a single lexical item; 2. a concept that requires more than one lexeme is “complex”, 3. unless its linguistic expression is lexicalized (i. e. idiomatic). Throughout the present study I will follow these definitions.

There is still a question on these definitions. For instance, a question of how we consider the relation between meaning and word/lexeme across language. In English, *hot water* is a complex concept since it requires two lexemes, whereas in Japanese a single lexeme *yu* denotes hot water. The Japanese word *mizu* ‘water’ refers to cold water in most cases. So the concept HOT WATER does not require two lexemes in Japanese. Should it be considered as a simple concept or a complex one? I will go no further than this in the present study, but it is by no means easy to explain the structure of complex concepts.

Again, I confine my discussion to only those complex concepts of predicating adjective-noun phrase (e. g. *big tree* that can be rephrased as *The tree is big*). What should be pointed out here is that such a complex concept as BIG

TREE is not just the intersection of big things and tree. According to the extensional analysis, the extension of a word X is the set of all Xs, for instance *dog* refers to the set of all possible dogs. When two words are combined (e. g. XY), the underlying concept of XY could be understood as the intersection of the set of Xs and the set of Ys. Take an example: *red dog* could pick up the set of things that are both red and dogs (Murphy 2004:444). However, this analysis works well for absolute adjectives whose meanings can be determined independently of the noun, but not for relative adjectives like dimensional adjectives. Thus *big tree* does not refer to merely the intersection of big things and tree, but it is big relative to other trees. Accordingly, the concept of BIG TREE requires general background knowledge of the world, which accords with the notion of language ontology by Zaefferer (2002:33): “Every language ontology is a conceptualization or categorization of what normal everyday human language can talk about”. It could be assumed that people use some sort of psychological mental descriptions that evoke instances of the word to understand language. Therefore analysis of the meronomic relation between two NPs consisting of dimensional adjective and noun (e. g. BIG CUP – DEEP CUP) rely largely on people’s everyday knowledge.

This meronomic relation between words is described in terms of frame semantics (Fillmore 1982) as well. We link some concepts in a frame of our structured understanding of various aspects and events in the world. So if someone talks about *a movie* then we agree that lexical items such as *actors*, *editor* and *theatre* are relevant for that topic in that a frame of *movie* includes some basic roles such as actor, editor etc. Along the same lines, a concrete instance of *house* (whole) induces instances of *roof*, *wall* and *window* (parts) in that they are basic components of a house. In this case, people conceptually apply the meronomic relation to HOUSE and ROOF, WALL and WINDOW. In addition, the concept specialization model (Murphy 1988, 1990, 2004) tells us some characteristics of conceptual combination in NP like BIG HOUSE. When a head noun selects the correct slot, namely the modifying concept, then people can infer other properties of this concept. For example, SUMMER SHIRTS makes people think of wearing them in the summer, short-sleeved, light coloured, loosely woven, more informal, and so on. This detailed information about SUMMER SHIRTS is inferred from our general background knowledge and reasoning. Accordingly, based on the concept specialization model, it is considered appropriate for that NP of dimensional adjective + noun like BIG HOUSE to conjure images of HIGH ROOF because of the meronymic relation between the whole (house) and its part (roof), and HIGH ROOF is inferred in proportion to BIG HOUSE (since a big house has commonly a high roof).

## An ontological approach to NP of dimensional adjective and noun

In order to prove my assumption above, a linguistic phenomenon is used for the semantic test, namely anaphora resolution. The conceptual relation between NPs of dimensional adjective and noun is examined through the referential relationship between antecedent and anaphor in text and discourse. Schwarz-Friesel (2007:3) states that: “anaphora are used to continue a pre-established reference in text, that they point back to a specific antecedent, usually an NP already introduced, and thereby sustain the current focus”. This notion means that antecedent and anaphor in a text are linked based on coreference in context, which can be grammatically described in terms of, for example, syntactic congruence (e. g. pronoun) and semantically described in terms of semantic compatibility, as follows in (1):

(1) A *girl* (Referent 1) went to a park. Then *she* (Referent 2) saw beautiful flowers.

A prototypical example of anaphora includes an antecedent (Referent 1) and an anaphor (Referent 2) which refer to the identical object/event. When two (or more) lexical items have a relation that semantically overlaps between the two, there is semantic compatibility. Cruse (1986:92) discusses the compatibility between words, and uses a term contingent compatibility for the genuine relationship of sense: “it is that a pair of compatibles must have a common superordinate. Compatibles, therefore, have some semantic traits in common, but differ in respect of traits that do not clash”. For instance, *dog* and *pet* have the superordinate *animal*, and *It's a dog* and *It's not a dog* are logically independent of *It's a pet* and *It's not a pet*. Therefore, example (2) is acceptable in text and discourse:

(2) We have a *dog* (Referent 1) at home. Our *pet* (Referent 2) is so lovely.

What is important here is that the lexical relationship between the superordinate *animal* and these two words *dog* and *pet* is not based only on biological taxonomy, but also on encyclopaedic knowledge since people know that every dog can potentially be a pet. Thus the referential relationship between antecedent and anaphor in a context can be understood based on our factual knowledge of entities in the world. The referential link between anaphor and antecedent is applied to the meronomic relation from an ontological viewpoint. Nickles et al. (2007:38) state:

In a sentence like *When you try to catch a lizard, the reptile may drop the tail and escape* both definite noun phrases are anaphorically related to the indefinite *a lizard*, but the relationship is mediated by ontological relations of different kinds [...]: Since LIZARD is

c-subordinated to REPTILE (every lizard is a reptile), *the reptile* may have its antecedent in *a lizard*, and since LIZARD is m-i-superordinated [meronomically – i-inclusion<sup>4</sup> – superordinated, M. S.] to TAIL (every complete lizard has a tail as an integral part), *the tail* may be interpreted as including a possessor slot which again has its antecedent in *a lizard*. Given the ontolinguistic framework, the former case could be called conceptual subanaphor and the latter meronymic superanaphor.

In textlinguistics, this example of anaphora above is known as indirect anaphora that is a definite NP which has no explicit antecedent in the text structure, exemplified as follows (Schwarz-Friesel 2007:5):

(3) The car was found in the ditch. The *tyres* (indirect anaphor) were punched.<sup>5</sup>

According to Schwarz-Friesel (2007:8) there is no explicit antecedent to which the define NP, *the tyres*, refers back. Instead, there is some kind of trigger or anchor that has a close semantic link or conceptual relation to the define NP. This anchor is made up of the mental text-world model which represents “a referential constellation of states-of-affairs in working and in episodic memory which is (in most cases) more complex and elaborated than the semantic text basis” (Schwarz-Friesel 2007:5). Accordingly, in the example by Nickles et al., *the tail* is an indirect anaphor (called meronymic superanaphor above), and it has no explicit antecedent in the text. The sentence *When you try to catch a lizard, the reptile may drop the tail and escape* is coherent based on the fact that people have the common sense to understand that a lizard (whole) has a tail (part).

Again, factual information stored in our knowledge is used to draw inferences and to interpret the relationship between two NPs in a text. Conceptual processing to interpret indirect anaphora works well for nouns derived from dimensional adjectives as well. Most concrete entities have an overall size and size of their parts which are described in regard to each part’s dimension. Different attributes of dimensional extension such as length, height and depth are then understood as essential components of the whole entity in the three-dimensional world. What differs from *the tyres* in (3) above is that a tyre is an independent entity, whereas *length* cannot be established without

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<sup>4</sup> ‘i-inclusion’ stands for the relation that holds between two entities *a* and *b* if and only if *b* properly includes *a* and *a* is integrated with *b*, i. e., *a* is an integral part of *b* and hence not easily detachable from it (Schallegger and Zaefferer 2007: 6).

<sup>5</sup> This example sentence is cited from Schwarz-Friesel (2007:5). Supposedly she means “punctured” here.

having a whole entity. In this sense, specific aspects of dimension have strong belongingness to the part-whole construction. In the Swedish examples<sup>6</sup> below, the indirect anaphors are the define nouns that are derived from the dimensional adjective.

(4) De är både ägare och besättning på fartyget 'Gullmar'. Hon (fartyg är alltid 'hon') ligger vid Östra Kajen på Skeppsholmen i Stockholm och är ett fd lastfartyg, byggt 1913. Längden är nästan 28 meter och bredden 6 meter. (DNA16 INL8 YDA 870201)

'They are both the owners and crew of the ship 'Gullmar'. She (ships are always called 'she') is anchored at the Östra quayside at Skeppsholmen in Stockholm and is a former cargo-ship built in 1913. The length is almost 28 metres and the width 6 metres.'

(5) Ett däck har bredd och höjd; bredden är bredden på slitbanan, höjden är avståndet från fälgkanten och ut till slitbanan. (DNA17 TOR4 NEE 870509)

'A tyre has width and height: the width indicates the width of the tread, and the height indicates the distance between the edge of the rim and the tread.'

The length, the height and the width of an entity like the ship in (4) are expressed relative to its overall size. In other words, when these specific dimensions of the object are referred to, then people would infer that this expression is used to describe one of the dimensional extensions of the whole object. Based on this inference, the nouns derived from specific dimensional adjectives function as indirect anaphora and refer back to the topic object in a text.

Thus, the conceptual relation between two NPs consisting of dimensional adjective and noun is largely dependent on the construction of a topic object. To take an example, from a common sense point of view we can say that the basic components which make up TREE are TRUNK, BRANCH, LEAF, ROOT and so on. An instance of TREE consists of several components or parts, i. e. there is a meronymic relation between *tree* and the corresponding expressions for the tree parts. How about the concept of BIG TREE then? In our mind, and based on the text-world model, we naturally imagine that a *big tree* has proportionately *thick boughs*, *a thick trunk*, *long branches* or *deep roots*. It is very important to stress here that it is not the dimensional adjectives themselves that are linked in a meronomic relation; it is, between the NPs, such as *big tree* and *long branch*. Concepts of dimensional adjectives like BIG and LONG have no substantial instances; however, the concept of BIG TREE has a certain measure of size, e. g. length of branches or thickness of trunk. This implies that any instance of BIG TREE, i. e. any big tree, comprises LONG BRANCH, THICK BOUGH, and DEEP ROOTS, as parts.

<sup>6</sup> Examples are retrieved from the online corpus *Språkbanken* ([www.spraakbanken.gu.se](http://www.spraakbanken.gu.se)).

Thus in our understanding, a noun phrase such as *big and high + noun* describes the extension of the whole (i. e. *big*) and part (i. e. *high*) of the identical object. Examples (6)–(9) below show that a general term **BIG** in the adjective phrase describes the overall size of the modified object and a specific term in the adjective phrase describes one specific aspect of dimension, of the same object.

(6) Hennes växthus är ganska stort och högt och dessutom byggt i trä. (GP26:0602)

‘Her greenhouse is very big and high (i. e. overall size and height of the greenhouse) and built of wood.’

(7) För 40 kronor fick vi en stor och djup plastkopp med kryddstark wok. (GP18:0504)

‘For 40 crowns we got a big deep plastic cup (i. e. overall size and depth of the cup) of hot wok.’

(8) Alltså inlånades en stor och bred cykelkärra, vilken omsorgsfullt packades till råge med tomglas. (SVD9:0605)

‘Therefore he borrowed a big wide bicycle cart (i. e. overall size and width of the wagon) onto which he carefully packed enormous quantities of empty bottles.’

(9) Väl rustade kommer vi fram till en stor, bred grusväg. (GP10:0813)

‘Well prepared, we come to a big, wide gravel road (i. e. overall size and width of the gravel road).’

Two NPs in the text structure above, for example **BIG GREENHOUSE** (whole = overall size of the greenhouse) and **HIGH GREENHOUSE** (part = height of the greenhouse) are conceptually linked in the hearer’s/reader’s mind on the basis of their world knowledge. Moreover, adjective phrases of the dimensional adjectives above function as modifiers for the same modified noun (head noun). Accordingly, in this context, two dimensional adjectives themselves are semantic compatibles that have the same superordinate, namely **SIZE OF AN ENTITY**. The two dimensional attributes **BIG** and **HIGH** belong to basically the same semantic factor (attribute of the greenhouse) and they can be counted upon to be additive, and not clash, since one describes the overall size and the other its part.

## Concluding remarks

In this short essay I discuss the meronomic relation between internal members of dimensional adjectives from an ontological point of view, by taking Swedish NPs as examples. In lexical semantics, it is not likely that adjectives have meronymic relations to each other. This stands in the way of my goal in this study. However, I assume that adjectives are conceptually allowed to have meronomic relations on condition that dimensional adjectives are conceptually combined with nouns.

Based on previous studies and conducting a semantic task, anaphora resolution, I draw two conclusions:

1. Dimensional adjectives themselves have no meronomic relation to each other; however,
2. when applied to the whole expression which is a concept of a big entity, such as BIG GREENHOUSE, there are meronomic relations between concepts of the big entity and its parts, e. g. BIG GREENHOUSE – HIGH GREENHOUSE, and
3. the general term and the specific term of dimensional adjectives within the form of NP would be semantically compatibles when they refer to the size of same object in context.

The meronomic relation is one of the multiple links of concepts underlying dimensional adjectives. Dimensional adjectives are structurally interrelated in our minds depending on which aspect of dimension is highlighted. When dimensional attributes of the same entity are focused on, we are able to establish relations that the conventional lexical relations do not cover. Further studies are required in order to study how people conceptualize our perception and experience, and how the concepts are realised in language use.

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