10.2 The hierarchical relationship

10.2.1 General

The hierarchical relationship should be established between a pair of concepts when the scope of one of them falls completely within the scope of the other. It should be based on degrees or levels of superordination and subordination, where the superordinate concept represents a class or whole, and subordinate concepts refer to its members or parts.

The following tags should be used, reciprocally:

BT (i.e. broader term), written as a prefix to the superordinate term;

NT (i.e. narrower term), written as a prefix to the subordinate term.

EXAMPLE 1

animals
NT mammals

mammals
BT animals

The hierarchical relationship may be one of three types, corresponding to three logically different situations as follows:

a) the generic relationship;

b) the hierarchical whole-part relationship;

c) the instance relationship.

Each of these leads to hierarchies that are amenable to a logical test through reference to the types of concept involved, for example those listed in 5.1.2. Every subordinate concept should belong to the same inherent category as its superordinate concept, i.e. both the broader and narrower term should represent a thing, or an action, or a property, etc. (See additional discussion of facet analysis in Clause 11.)

EXAMPLE 2

a) "metals" (a class of materials) and "casting" (an action) represent different types of concept and, therefore, cannot be related hierarchically;

b) "metals" and "gold" both represent materials and could, therefore, be hierarchically related.

It is possible to distinguish explicitly among the three types of hierarchical relationship using the conventions described in 10.2.2, 10.2.3 and 10.2.4. The extra work and complexity required in doing so should be balanced against the benefits for the application anticipated.

The main function of hierarchical relationships is to help both indexers and searchers choose the appropriate level of specificity. A search can be broadened or narrowed by moving up or down, respectively, in the hierarchy. A common technique for improving search recall is called "search explosion", in which the search is extended to include all of the narrower terms of the preferred term first selected [see also 16.3.3 e), 16.3.3 f) and 16.3.4 c)]. Careful adherence to the guidelines in 10.2.2 to 10.2.5 ensures that exploded searches retrieve only items that fall within the scope of the superordinate concept.

NOTE Search explosion, unlike search expansion, does not extend to associatively related terms (see 10.3).

10.2.2 The generic relationship

10.2.2.1 The generic relationship is the link between a class or category and its members or species. In addition to the test for validity described in 10.2.1, this relationship is also amenable to a logical "all-and-some test", as shown in Figure 2.

Figure 2 — Relationship that satisfies the "all-and-some test"

Figure 2 indicates that some members of the class "birds" are known as "parrots", and all "parrots", by definition and irrespective of context, are regarded as "birds". This test usually ensures that a term such as "parrots" is not subordinated to a class such as "pets", as not all parrots are pets. Figure 3 shows the relationship between the latter pair of terms.

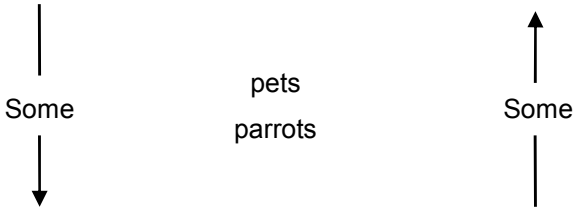

Figure 3 — Relationship that does not satisfy the "all-and-some test"

In Figure 3, some members of the class "pets" are "parrots", and only some parrots are regarded as pets. These terms should, therefore, not be given a BT/NT linkage.

NOTE When indexing a work on "parrots as pets", preferred terms representing both of these concepts should be assigned.

10.2.2.2 This argument might not apply in the context of a specialist thesaurus devoted to domestic animals, in which the only parrots in the frame of reference are pets. In such a case, "parrots" could be subordinated to "pets" in the same hierarchy. Such approximations should be applied with caution, however, especially in networked environments in which the records from one system may be mixed with those of another. When interoperability is required, the relationships established should be universally acceptable.

10.2.2.3 The tags BT/NT are normally adequate to identify the generic relationship, but optionally, the following tags may be used:

BTG: Broader term (generic)

NTG: Narrower term (generic)

EXAMPLE

rats
BTG rodents

rodents
NTG rats

10.2.3 The hierarchical whole-part relationship

10.2.3.1 The hierarchical whole-part relationship covers a limited range of situations in which a part of an entity or system belongs uniquely to a particular possessing whole. This applies to four main classes of terms.

a) Systems and organs of the body.

EXAMPLE 1

```
cardiovascular system
   blood vessels
      arteries
      veins
```

b) Geographical locations.

EXAMPLE 2

```
Canada
   Ontario
      Ottawa
      Toronto
```

c) Disciplines or fields of discourse.

EXAMPLE 3

```
science
   biology
      botany
      zoology
```

d) Hierarchical social structures.

EXAMPLE 4

```
armies
   corps
      divisions (army)
         battalions
            regiments
```

Most other cases of the whole-part relationship are not eligible for a hierarchical linkage because the part could belong to more than one whole. For example, a BT/NT relationship should not be established between "bicycles" and "wheels" because a wheel could be part of a motor car, a wheelbarrow or one of many other artefacts. An exploded search for bicycles would retrieve much unwanted material if it were extended to all types of wheel. It is sometimes the case, however, that the parts of an artefact are unique to that artefact, at least in the field of application of the thesaurus. It might be appropriate to establish a BT/NT link between "fireplaces" and "hearths", or between "bows" and "bowstrings", for example. This would usually cause no confusion and would help with exploded searches under the broader term. However, this practice is not recommended in the case of complex machines and their components, for which a more appropriate solution is to create a broader term such as "engine components", with the various components listed as narrower terms (see 7.5.2).

10.2.3.2 The tags BT/NT are normally adequate to identify the partitive relationship, but the following tags may also be used:

BTP = broader term (partitive)

NTP = narrower term (partitive)

EXAMPLE

central nervous system **BTP** nervous system nervous system **NTP** central nervous system

10.2.4 The instance relationship

10.2.4.1 The instance relationship links a general concept, such as a class of things or events, and an individual instance of that class, which is often represented by a proper name (see also 6.6.9).

EXAMPLE

mountain regions	{ class
Alps Himalayas	{ instances

In this example, "Alps" and "Himalayas" are assigned to subordinate positions in a hierarchy. However, they are neither kinds nor parts of "mountain regions", but represent individual instances.

10.2.4.2 The tags BT/NT are normally adequate to identify the instance relationship, but the following tags may also be used:

BTI = broader term (instantial)

NTI = narrower term (instantial)

EXAMPLES

Paris **BTI** capital cities capital cities **NTI** Paris

10.2.5 Polyhierarchical relationships

Some concepts can belong, on logical grounds, to more than one group or class at the same time. In such cases, a direct hierarchical link should be established to all of the appropriate broader concepts and the structure of the thesaurus is said to be polyhierarchical. This contrasts with a monohierarchical structure, which, for a particular concept, would allow only one of the valid BT links to be established.