Terminologies, Lexical Hierarchies and other Configurations

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List of abbreviations

Word classes, syntactic elements, grammatical forms and properties, etymological notes:

Adj	adjective
Attr	attribute
comp.	compositional/compound(ed)
Conj	conjunction
deriv.	derivational/derived
deverb.	deverbal
fem.	feminine
masc.	masculine
Obj	object
pl. / plur.	plural
Prep	preposition
Pron	pronoun
N	noun
Nhead	noun as the head of a noun phrase
Num	numeral
sing.	singular
V	verb
VPart	verbal participle
*	an incorrect or impossible form

Languages and national standards:

AmE	American English
BrE	British English
Cz	Czech
dom.	domestic
En	English
Fr	French
Ger	German
Ital	Italian
Lat	Latin
Rom	Romance languages

Other:

cf.	compare
div.	division
f. / fam.	family
sp.	species
ibid.	ibidem / (see) in the same place
N/A	not applicable
qtd	quoted
RV	author of this book (Radek Vogel)
UK	the United Kingdom
US	the United States

Preface

The world is hierarchical. Hierarchies with ranks or levels can be established in virtually all aspects of human life and in a person's conception of the world. Human society is inherently hierarchical, as are family, state, law, religion, education, army, police, business, language, etc. Entities of living and inorganic nature can be classified into sets or classes and these sets into larger sets, etc. on the basis of shared properties. Hierarchies of parts and their component parts can be established in the human body, in the house, in the city or in a village, on the Earth and in the whole universe. Time, distance, mass, energy, etc. are quantifiable, and therefore directional and hierarchical systems.

Basically, all concepts in these hierarchies have their relevant linguistic expression and these lexical items form analogous lexical hierarchies. Many users of a language, not to speak of linguists, are curious about the organisation of these conceptual domains, relations between their parts and the way in which language users can refer to them through language. Understanding how concepts are organised into systems will also help to speak about them more efficiently and appropriately.

The internal structure of some domains is sometimes obvious and our mind is able to identify it briefly due to previous experience or knowledge. Analogy with other concepts or systems is then effectively applied. Naturally, a great deal of information is presented as organised structures, as it is supposed to facilitate efficient understanding if the structure and size of a concept is indicated beforehand. Atomism, implicitness and non-transparence hamper full understanding.

Unfortunately, not all concepts and conceptual systems are presented transparently. The reason may not necessarily be incompleteness of reflection of a domain in textbooks or encyclopedias or incompetence of speakers or writers. The system may simply not be easy, irrefutable or convincing enough to present. Its complexity and the need to take into consideration the various, plentiful, often mutually incompatible or contradictory and vague criteria of classification, and the diverse, multi-faceted entities that should be organised according to the criteria are obvious obstacles.

English financial and accounting terminology was chosen as one of the two main areas due to my involvement in teaching it to professional business people (accountants and auditors) as part of rather terminologically focused courses. These people are sufficiently (and rather unconsciously) familiar with the corresponding terminological system in their mother tongue, Czech. I often felt the need to explain why there are considerable differences between the Czech and the English terminologies of the related semantic fields, how English terms were or can be formed and whether there are some universal rules which can help to understand and produce adequate and correct English expressions.

People from practical spheres realise that not everything in a language needs to be memorised, and that a large part is played by creative, generative language competence. Assuming that language has some rules and its lexis, particularly in some areas, has obvious internal organisation, it can be expected that understanding how lexical units are generated and how organised lexical systems are composed may contribute greatly to effective language learning.

To establish the rules governing financial and accounting terminologies, I searched for similar rules in quite systematically and consistently organised terminological hierarchies of botany and, to a lesser extent, zoology. I took into account the peculiarities of different areas of human activity and knowledge, the differences between languages and between naturally developed (and only subsequently formalised) and artificially generated nomenclatures, as well as the semantic relations which may exist between items in lexical systems. Rules applied in highly formalised biological nomenclatures helped to identify and analyse those applied in more abstract and looser lexical hierarchies of finance and accounting.

Chapter 1 of this book outlines the language of science as a specific variety characterised by some features, namely typical lexicon, syntax, formality, explicitness, etc. It describes the main types of formation of terms.

Chapter 2 introduces the basic types of lexical hierarchies, focusing on those which are utilised to organise scientific terminology, i.e. taxonomies and meronomies. I was greatly influenced by the excellent and detailed classification of lexical hierarchies, chains, series and roles of their components in D.A. Cruse's *Lexical Semantics* (1986), which I also follow terminologically.

The relations between items in hierarchies are discussed in Chapter 3, especially hyponymy, oppositeness, polysemy and synonymy, the last mentioned being surprisingly frequent in scientific terminologies. I draw on the inspiring discussion of properties of sense relations, entailment, inclusion and predication calculus in F.R. Palmer's *Semantics* (1976). Th.R. Hofmann's *Realms of Meaning* (1993) influenced this work by its theory of semantic encapsulation and markedness employed in antonymy and hyponymy.

The following Chapters 4 and 5 incorporate research into properties of well-established taxonomic systems of biology and economics which was originally included in my dissertation thesis *Lexical Hierarchies in the Scientific Terminology* (2006). Chapter 4 deals mostly with the taxonomical nomenclature of botany. It aims to explain the principles on which taxonomy is based, as well as to highlight drawbacks and irregularities which occur there. Although the underlying hierarchies of concepts are identical, considerable formal and semantic differences may be found between the terms in English, Latin and Czech. Substantial space is devoted to terminological synonyms.

Chapter 5 provides an account of a less formalised nomenclature used in finance and accounting. Lexical hierarchies looked at in this chapter are various financial statements, with analogous mutual relations between their items as those found in biological classificatory systems. Synonymy and polysemy are similarly frequent as in biology, but the sources and types of term-formation differ significantly. I carried out an analysis of

the structure of terms at different levels and compared several accounting hierarchies to obtain a more general picture of terminological systems used outside natural sciences.

Chapters 6 and 7 synthesise and draw conclusions from the comparison of lexical hierarchies from the previous two analytical chapters. The selected disciplines and their nomenclatures were considered as contrastive representatives of natural and social sciences. Specifically, differences are sought between the way terms are formed in meronomic and taxonomic hierarchies, at high and low levels of such hierarchies, in hierarchies which have grown naturally and in those which were formed artificially in accordance with prescribed strict rules.

However, the main aim of the study has been to reveal general rules, more descriptive and explanatory than predictive, which would be relevant to most lexical hierarchies and which would apply selectively to a certain type of hierarchy, regardless of its semantic domain. It is clear that exact rules cannot be formulated, but the contrast between different disciplines and types of hierarchy may highlight at least the characteristic tendencies.

The intended readers of the book are linguists, theoretical and applied, whether teachers, translators or students, who are eager to discover more about the given area of language, whether English or Czech. I admit that biologists and economists may find many of the hierarchies and comments on them debatable, since my resources are selective, I am not working in either of the professions, and the classifications in these fields are often pluralistic and constantly evolving. The taxonomies and nomenclatures analysed here also reflect the situation in the early years of the 21st century when I collected and compiled them for my dissertation (Vogel 2006), which is incorporated mainly in Chapters 1 and 4–7.

Nevertheless, I dare to claim that the chosen materials can be considered sufficiently representative for the purposes of linguistic examination and that their content is still valid, so that even a professional and non-linguistic public may find the description and analysis useful and inspiring.

1| Language of science

1 | 1 Science, terminologies and hierarchical lexical sets

Language is a system and as such it is built on several levels. It needs a system of physical signs which convey meaning. These signs are primarily transmitted phonologically, by speech, graphologically, by systems of writing, or by signing. Phonemes or graphemes form the basic material level of language. Linguistic signs, linking the meaning to the conventional spoken or written form, make up the lexical system of a language, i.e. its vocabulary or lexicon. Apart from the organised nature of a lexicon, which will be the main focus of this book, lexical elements are also organised internally, so we can distinguish morphemes and their linear arrangement as they are combined within words. This internal structure of naming units consisting of meaningful components is studied in morphology. At a higher level, words and multi-word lexical units are arranged into linear strings called phrases, clauses and sentences (rules governing this organisation are conventionally known as syntax). Still, above the level of grammar (comprising morphology and syntax), language consists of texts or utterances following certain rules and conventions depending on the place, time and purpose of use, as well on the person of a language user.

This book deals with the principal building material of languages, their lexicon, and attempts to uncover the principles determining its formation, semantic relations between lexical items and the way in which the lexicon of a language is organised. These are rather general linguistic problems; however, thorough description and analysis of word-formation processes and rules, as well as of semantic properties of lexical elements are necessary to introduce appropriately the main topic: terminological hierarchies, i.e. organised systems of lexical items which have a special value and application in individual areas of human knowledge and activities.

Sets of lexical elements related to one another in a specific, systemic way, manifesting a logical internal semantic structure, i.e. **lexical configurations** in the general sense, are clearly of great practical importance since they provide the necessary frame of reference for our understanding of the world. Taxonomic structures help people to conceptualise the world. Frake[1] (1962: 81, quoted in Wierzbicka 1996: 352) says that "the use of taxonomic systems … is a fundamental principle of human thinking". Wierzbicka adds: "Words provide

1 C.O. Frake, The Ethnographic Study of Cognitive Systems. In T. Gladwin and W. Sturtevant (eds.), *Anthropology and Human Behaviour*, (Washington: Anthropological Society of Washington, 1962), 72–85.

evidence for the existence of concepts. Lexical sets, sharing a similar semantic structure, provide evidence for the existence of cohesive conceptual wholes (or fields)" (1996: 349).

In narrower terms, terminological hierarchies are an indispensable means of reference in the study of many fields of science. They (and logically the underlying hierarchies of concepts) are a tool used to systematically grasp and convey the multi-faceted material entities and nonmaterial relationships and properties of our world. A distinction must be drawn between **scientific** and **folk** (popular, colloquial) **terminologies** (*cf*. expert vs. folk/natural categories in Taylor 2003: 75), as well as between conceptualisation in different languages. Even in biology, since the "living kinds" are traditionally considered as the most suitable for hierarchical classification, namely taxonomy, the scientific and folk systems and their elements differ considerably. Wierzbicka states that: "the fact that different languages draw such boundaries [between linguistic and cultural knowledge; added by RV] in different ways demonstrates that these boundaries can indeed be drawn. …this shows that semantic boundaries between different living kind concepts do exist, and that they are different from those drawn by biologists" (1996: 349).

Lexical configurations, often hierarchical, are inherently present in all terminology. Looking back at the first paragraph of this chapter, it is possible to identify several hierarchies. First, there is **meronomy**, the relationship between the whole and its parts, describing the components of spoken or written language.

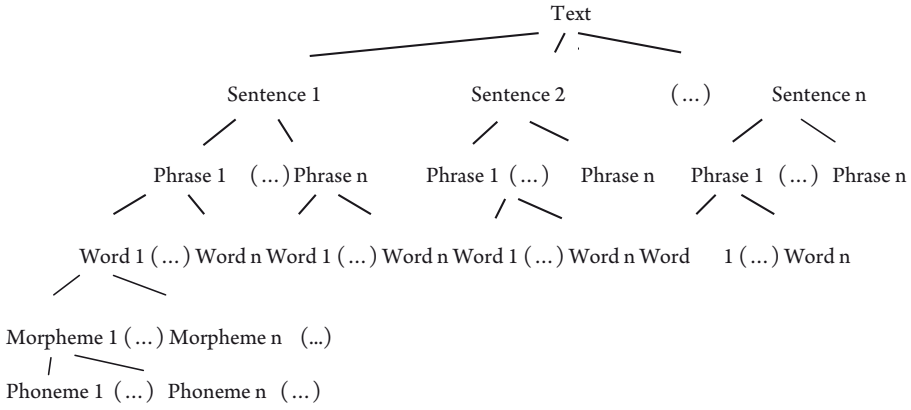


Figure 1.1. Meronomy—components of spoken and written language.

Secondly, there are **chains** based on the meronomy, which reflect the hierarchy but which do not branch. One of these is the chain of linguistic units or elements:

phoneme/grapheme < morpheme < word < phrase < clause < sentence < discourse

Stressing different criteria, such concepts as *syllable*, *tone unit*, *lexeme*, *naming unit*, *paragraph*, *text*, etc. could be used in the chain instead of the chosen components. Another chain can be derived from the hierarchy of the linguistic elements and consists of linguistic disciplines studying language at individual levels (not every component is studied within a specialised linguistic discipline):

phonology/graphology < morphology < lexicology < syntax < text/discourse analysis

It is interesting to see that an integral part of language, meaning, is missing from both hierarchies. It is not included in the first one, as meaning is an abstract, intangible component, whereas the above chain contains phonic and graphic items. Study of meaning, semantics, is missing from the other chain for the same reason—the criterion of arrangement was evidently the size of the linguistic units, and the disciplines followed this order, too. Semantics can be applied to study the meaning of linguistic units from the size of morphemes up to the highest levels (although it is mostly related to the study of words/lexemes), but it does not fit in any position in the chain due to its qualitatively different nature.

A special type of a lexical configuration (we will see later that it is called a **proportional series**) can be formed by merging the two chains, thus having pairs of elements and their corresponding linguistic analytical disciplines.

phoneme : phonology
grapheme : graphology
morpheme : morphology
word/lexeme : lexicology
phrase/clause/sentence : syntax

Figure 1.2. Proportional series—pairs of items based on an analogy.

Lastly, even true branching **taxonomic** (and partly meronomic) **hierarchies** can be established here, namely the hierarchy of linguistic disciplines that study individual language components, which is derived from the hierarchical chains above.

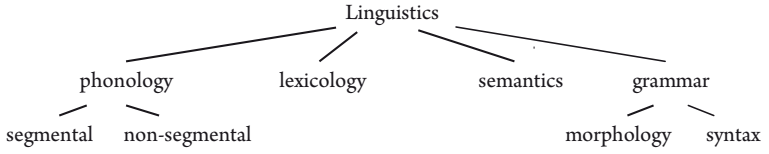


Figure 1.3. Mero-taxonomy—hierarchy of linguistic disciplines.

The above diagrams illustrate two facts: firstly, that any reality which can be divided into levels varying in the degree of generalisation or specification can be described by some hierarchical configurations of terms, and secondly, that the reality can be hierarchically organised in severeal different ways. In other words, individual types of conceptual and lexical hierarchies are mutually related and can be derived from one another.

1 | 2 The aims, methods and research questions of this study

The main attention in this book will be paid to the meaning of lexical items and to sense relations holding such items together in terminological hierarchies. However, the way such lexical items are formed must be focused on as well. The importance of understanding the formal side of terms, namely their **structure, origin and principles applicable in the formation of new terms** is essential in the process of learning a foreign language, as well as in the use of both the mother and the later acquired tongues. In order to identify the principles which underlie the formation of terminologies, contrastive analyses centred on several criteria must be carried out: comparison must be made (1) between **terms at the same level and between terms at different levels** in a hierarchy, (2) between the make-up of **equivalent terms in two or more languages**, and (3) between terminologies of **natural sciences and social sciences** (or perhaps humanities).

Since there is a great diversity of disciplines with fundamentally different subjects of study, conceptual systems and corresponding systems of terms referring to the concepts, the **preferred types** of term-formation in terminologies of individual disciplines must be identified. Also, it is necessary to consider the **composition of lexical fields**

(focusing especially on stylistic synonyms, near-synonyms and hypo- and hypernyms), as well as the historical, situational and pragmatic aspects of the use of terminological units.

In the doctoral dissertation *Lexical Hierarchies in the Scientific Terminology* (2006), which has been incorporated to a large extent into this book, two broad terminological areas were surveyed. The language of business and economics, namely the **naturally-grown lexicon (and terminology) of finance and accounting**, became the main source material and subject of the research. It is also representative of terminologies of social sciences. To provide a contrastive counterpart representing the **terminological hierarchies of natural science, botanical terminology** (and biological terminology giving it a broader framework) was chosen. Botanical terminology of species and categories higher up in the taxonomic hierarchy is a mixture of traditional naming units and parallel systematic artificial nomenclature, which is an aspect missing from more fragmented economic terminology. For that reason classificatory taxonomies (or mero-taxonomies) of accounts in the Chart of Accounts and in principal financial statements were chosen and analysed as an analogy to taxonomies in botany or biology in general.

The assumption behind the **inter-lingual comparison** is that scientific terminological hierarchies in different (European) languages are very similar or identical as far as their structure is concerned. They reflect the objective reality, which, if correctly observed and analysed, must be identical (at least in principle). Some degree of the subjective approach of creators of classificatory systems is almost certainly evident in the emphasis laid on some aspects of the examined area. Regional peculiarities are also reflected, and all this results in slight differences in the structure of terminological hierarchies. On the other hand, long-term international contacts inside scientific and professional communities enable comparison, sharing of experience and transfer of knowledge, and inevitably lead to unification of science and its tools. The continued deepening of knowledge driven by research and practical needs also eliminates errors and idiosyncratic deviations.

The terminological system of an established science is therefore a perfect field for the study of characteristic sources, instruments, techniques and processes applied by a given language, which are easily contrastable with those utilised by another language. The linguistic arsenal of a language, observed while being used in the same context and for the same purpose as that of another language, reveals precious information about the language's properties. Hierarchies of concepts should be identical, and attention can thus be paid to the structure and motivation of lexical items in corresponding lexical hierarchies of terms.

In this respect, the long-cultivated and internationally harmonised biological nomenclature (through equivalent Latin terminology) gives an insight into language-specific ways of the naming and formation of terms. The selected area of economic language, the terminology of finance, accounting, and, specifically, financial accounting, seems to be a convenient source of material, too, since the nomenclature here is highly fixed and efforts have been made to standardise both the accounting systems and terminologies internationally.

Despite the fact that financial and accounting terms in one language mostly have unequivocal notional equivalents in other languages, their lexical equivalents are often much more difficult or uncertain to establish than in a systematic biological nomenclature. Understanding and generalising the principles underlying notional and lexical hierarchies, as well as the rules of naming and terminology characteristic of individual languages, sciences and relations between concepts, should help to overcome effectively the shortcomings of any hierarchised but inconsistent system of lexis.

1 | 3 Occupational varieties and the style of science

Although the focus of the following chapters will be on static terminological hierarchies, a few observations must be made on their broader, dynamic framework, i.e. on the varieties of language in which the relevant terminologies are used. Both biological and financial or accounting terminologies are part of the lexical stock of the language of science, together with other scientific terminologies. Unlike the purely scientific discourse in which biological terminology is mostly applied, the language of accounting, along with similar professional varieties of language, belongs also to the practical **style of administration**, referred to e.g. as style of official documents (cf. Galperin 1977: 325). However, it shares much with the **scientific prose style** or the **language of science** (ibid.: 319). The similarity does not lie in its purpose, which certainly is not hypothesising, creating new concepts and discovering rules and laws governing some field of human interest (this would be true for the language of economic sciences, including that of accounting theory). The shared aspect is the **use of terms**, as they are necessitated by the need to refer clearly and unequivocally to all so far used, as well as newly developed, concepts.

Outside nomenclature, the majority of scientific texts that consist of complete sentences use logically built syntactic patterns which follow the unmarked order—from some postulates or obvious facts to new information, without a shade of emotion or subjectivity, often using impersonal constructions. Although the role of some special verbs and linking words, namely conjunctions and adverbials, is characteristic, the language of science itself is fairly unmarked, albeit formal. What makes it distinctive is largely the **lexical level, terminology**. Similarly, Crystal (1995: 372) states that, "First impressions of the language of science are that its distinctiveness lies in its lexicon. The sheer quantity of technical terms makes this unavoidable: scientific nomenclature comprises most of the English vocabulary…"

Terms make up the central part of scientific terminology. Galperin (1977) suggests a rather idealistic conception of scientific nomenclature, claiming that a term:

> will make more direct reference to something than a descriptive explanation, a non-term. Hence the rapid creation of new terms in any developing science. Further, the general vocabulary employed in scientific prose bears its direct referential meaning, that is, words used in scientific prose will always tend to be used in their primary logical meaning. Hardly a single word will be found here which, in contrast to the belles-lettres style, is used in more than one meaning. Nor will there be any words with contextual meaning. Even the possibility of ambiguity

> is avoided. Furthermore, terms are coined so as to be self-explanatory to the greatest possible degree. But in spite of this a new term in scientific prose is generally followed (or preceded) by an explanation. (319–320)

Unfortunately, terms are often neither maximally self-explanatory, nor polysemous, nor is ambiguity always successfully avoided. Galperin also said that, "terms know no isolation; they always come in clusters, either in a text on the subject to which they belong, or in special dictionaries which, unlike general dictionaries, make a careful selection of terms" (ibid.: 69). The occurrence of terms in relevant contexts and their co-occurrence with related terms is analogous to occurrences of characteristic vocabulary in various styles and genres of language. However, a specific property must be identified when considering related terms: their mutual standing, semantic relations between them. Terms—because they designate concepts of a researched, described and structured area—form a lexical configuration which reflects the underlying structure of concepts and they enter corresponding semantic relations.

According to Galperin (ibid.: 69), "terms are characterised by a tendency to be **monosemantic** and therefore easily call forth the required concept". This is probably true within the framework of a narrow scientific discipline. However, scientific terminologies often use **polysemous expressions** with different meanings in vocabularies of different disciplines of science. The confusion goes even further because polysemous terms exist in many developed nomenclatures, thus denying the above-stressed basic property of a scientific term. This is apparently caused by subdivision within a field—terms are then monosemantic within a specific context, in fact a subfield of the given professional slang.

It would be certainly useful to have a one-to-one correspondence between terms and their denotates, but there is sometimes a multitude of expressions denoting the same (or nearly the same) concept. Sets of near-synonyms and other members of a semantic field also often lead to confusion. Such cases have evolved as a result of several factors (and often of their interplay). The most obvious are:

- different **temporal strata** in the language, each coining and using its own terms,
- different parallel **geographical varieties** of the same language,
- different expressions used at different **stylistic levels**,
- different **purposes** for which expressions are used,
- existence of several **authoritative and influential sources** coining their own terminologies.

The language of business (which includes the language of finance and accounting) is a subtype of the administrative style. **Administrative** (and legal) **style**(s) of English use a certain set of linguistic means at the levels of discourse, syntax, word groups and vocabulary, serving to enable and facilitate transmission of information in the most accurate way and avoid ambiguity. The means to achieve this aim are especially **postmodification in nominal groups** (particularly in legal English, cf. Crystal & Davy 1969: 206), zero or **low determination**, rare use of intensifiers, use of marked or unusual word order, typical use of a **limited range of verbs** (ibid.: 207), as well as of **abstract nouns and verbs** and modal verbs.

Several different genres can be distinguished within this style, depending on their medium (spoken or written), domain or field of discourse (i.e. the subject matter and type of speech event), tenor (i.e. the relationship between the participants in a discourse, although neutrality or formality prevail) and function of the text or utterance (cf. Halliday 1978: 142–145). Thus, commercial correspondence comprises a variety of texts such as offers, enquiries, orders, invoices, claims and complaints, forms, etc. (Knittlová 1990: 24). Semi-official genres include e.g. application forms, requests, questionnaires, etc. The graphically arranged genre of **forms** (particularly financial statements) have proved to be the most convenient illustrative examples of lexical hierarchies in the language of finance and accounting. Hierarchical organisation of lexis is also the principle used in textbooks and dictionaries.

At the lexical level, the necessity of respecting terms must be stressed because explicitness, clarity and stability of expression are essential for coherence of administrative discourse. Apart from this, administrative texts are typically also rather traditional, bookish (or formal), syntactically and lexically stereotypical, unambiguous, and they avoid expressiveness (Knittlová 2010: 140, 148), all of which contributes to formality. In their prevailingly written mode, they stress visual markers.

As it has been said, the style of administration shares numerous features with another style relevant to the chosen lexical hierarchies, the **scientific (or technical) style**. Its aim is to communicate a message which is lexically dense, with high information value, complex structure and standardised form. Mistrík (qtd in Knittlová 1990: 26) distinguishes two types of technical (the Czech equivalent is *odborný*) style:

- **administrative** (i.e. the above-described features of the administrative style should qualify well for inclusion in the broader scientific or technical style), and
- **didactic** (the established Czech term is *naučný* or *naukový*), which is further divided into the **scientific** (in Czech *vědecký*) and **popular** (in Czech *populární*) varieties (Knittlová 2010: 148, referring to Mistrík).

If the scientific style is considered in a broader sense again, its two branches may be classified as follows:

- **objective or matter-of-fact** (in Czech *věcný*) style, characteristic of its conciseness, and
- **popular didactic** (in Czech *populárně naučný*) style, syntactically and lexically close to prose, essay-writing, publicism, etc. (Knittlová 1990).

The closeness of the **popular didactic (scientific) style** to the conversational and publicistic styles can be observed in its attempts to be attractive, to characterise things and their properties. Descriptive techniques are frequent tool, texts show bigger segmentation and sentences are rather short. In order to make the content accessible to non-experts, students, enthusiasts, etc., terminology is not very specialised and terms are usually explained or paraphrased (Knittlová 2010: 150). Popular scientific texts thus display lower occurrence of branch-specific terms as well as of general scientific expressions, which are replaced by general terms of the given discipline, as was observed by Kohutová (2007: 52–53) in the style of science and technology on a corpus of electrical engineering texts.

As mentioned above, the **written** (and also **monological**) **form** predominates. Its main function is to express ideas **accurately**, **excisely** and **completely**. There is no feedback in written expression, no reliance on support provided by prosodic features (stress, intonation, loudness, etc.) or paralinguistic means, such as gestures. Therefore, the product of the act of communication must be complete in terms of both content and form.

Texts must be linguistically and stylistically obvious, clear and transparent so that the process of communication is made smoother and the message is unambigious. To achieve this, it is necessary to organise strictly the expressions (i.e. well-organised syntax), to structure appropriately the text (its division will depend on the content), and to maintain a logical and clear sequence in sentences (to show relations between ideas). Linguistic tools used to meet the requirements of clear, transparent and well-organised expression are mainly connectors, referential and deictic expressions, and subordinating (hypotactic) conjunctions (their function is also to achieve hierarchical organisation, to show relations between clauses).

On the other hand, tools which are avoided because they would not contribute to greater clarity, accuracy, transparency and similar desirable properties of the scientific style, are other than a normal declarative or unmarked word order, alternation of verbal categories serving for topicalisation, substitution of pronouns for other pronouns, and unusual or expressive constructions (Knittlová 2010: 149).

The scientific style, similarly to the administrative/official style, shares the type of **syntax** which corresponds to the above-mentioned criteria. Sentences in administrative and scientific texts are then relatively independent, quite stereotypical, schematic, and more condensed (i.e. they include non-finite clauses and constructions). Apart from condensed syntax, sentences are characterised by logical internal structure and high objectiveness (i.e. they use impersonal constructions and passive voice). Galperin (1977) also notes a distinction between the **styles of humanities** and **exact/natural sciences** in the use of impersonal expression; passive constructions and the general subject *we* are typically used in texts produced in the latter type of science.[2]

Lexis of the language of science is **stereotypical**, but the stereotype suits the functions of the style—it consequently allows easier, more accurate and unambiguous understanding. Naturally, lexis is based on **terms**. Typical word classes are **nouns** and **adjectives**. Expression tends to be **condensed**; the most frequent semantic condensers are noun groups. Terms must be **unambiguous** (but not necessarily monosemous). Subjective and emotive expressions are avoided. The more "scientific" the style is (on a scale from being accessible to the general, non-professional public to being focused on experts in the given field only), the narrower (we might say 'more specialised') in their denotation the terms are (especially in natural and exact sciences). Any individual

2 Another distinction may be observed in hierarchies of concepts and corresponding terminological hierarchies. In Chapters 5 and 6 the characteristic features of lexical hierarchies in social sciences will be contrasted with those found in natural sciences.

scientific discipline makes use of a rather **limited vocabulary**. Lexemes are subject to high repetitiveness—which is considered the highest here, compared with other styles (Knittlová 1990: 27).

The main aim of scientific texts is to define things accurately and organise ideas logically and clearly. The principal technique is **explanation**, consisting of the functions of explanation, clarification, provision of arguments and examples, following a strictly logical approach. Texts are formally and contentually concentrated and compact.

1 | 4 Terms and their formation

Terms are defined as naming units, either single words or multi-word expressions, which are used in specific contexts to convey special meanings.

A well-formed term should possess certain properties. It should be:

- unequivocal in a certain field of activity or domain (allowing no polysemy or homonymy in the field),
- neutral (i.e. without expressive meaning and other connotations),
- descriptive (i.e. providing an accurate idea of the denoted reality),
- stable (and generally accepted),
- systematic (i.e. fitting in a relevant conceptual and lexical system),
- international (not necessarily; but there is a growing tendency towards internationalisation) (Terminology).

A translator trying to translate an English text usually faces various problems stemming from the fact that English is a different type of language, compared with Czech and even with cognate German, although all of them belong to the same family of Indo-European languages. Unlike Czech, English has a rather fixed word order, it has a rich system of verbal tenses and aspects, using combinations of (several) grammatical and lexical words to express predication, and its word stock has substantially different properties, too. English lexis differs from that of Czech in the proportion of individual types of word-formation, as well as in the semantics of naming units.

Generally, English naming units tend to be semantically vaguer than Czech ones, which is enabled by a higher degree of polysemy, especially of short, domestic expressions. This is accompanied by a considerably higher frequency of creation of new naming units, terms, by combining already existing ones, which are as a rule quite common, non-specialised, and therefore relatively vague. Czech, on the other hand, prefers derivation, i.e. morphological adaptation, although compounding (or combination of words) to achieve semantic modification is also widely used. A very important source of terminology in Czech is borrowing (with some phonological amd morphological adaptation), often from English, particularly in new and rapidly developing disciplines.

Terminology of science shares its naming processes with the general vocabulary; it only differs in proportions. New realities in science can either be named with the use of traditional or neo-classical **derivatives**, based usually on Greek and Latin elements, i.e.

roots, as well as derivational morphemes, affixes (e.g. *electro/encephal/o/graph/ic*, *carni/vor/ous*); or, increasingly often, new terms may be formed with the use of **common, everyday words**. They, often in some **combinations**, acquire a special, terminological meaning, very frequently based on a **semantic shift** and **metaphor**. Such figurative terms (e.g. *black widow = černá vdova* (a spider), *Big Bang = velký třesk*, *black hole = černá díra*, *bull market = trh s rostoucími cenami akcií*, *headhunter = headhunter / lovec mozků / konzultant pro výběr pracovníků*) are often borrowed by other languages without change as **quotational naming units** for use in a specialised area, or they are translated more or less literally and become so-called **loan translations** or **calques**. Shift of meaning, derivation, composition, and borrowing are thus the major tools of enrichment of word-stock. Other tools, such as conversion (change of word class), abbreviation, neologising, etc. are of lesser importance, but what provides relevant information on how lexis of a given language is structured, is the proportion to which the tools are applied and the conditions governing the application.

In order to approach various methods of term-formation systematically, Poštolková, Roudný & Tejnor (1983) suggest a classification, according to which terms can be formed:

- **morphologically** (i.e. by derivation, composition or abbreviation);
- **semantically** (i.e. by specialisation and narrowing of the meaning of words from general language or by metaphoric and metonymic shift of meaning);
- **syntactically** (i.e. by formation of terminological compounds);
- by **borrowing** from other languages (34).

Knittlová (1990) refers to a study published in the journal *American Speech* in 1980, dealing with the formation of new scientific terms, specifically in the field of physics and geophysics. Approximately a third of the terms, coined mostly in the 20th century, were created by a semantic change, another more than a third by combining already existing English lexical units, and a fifth to a quarter by borrowing from other languages, mainly contemporary ones. Only fewer than 5% of lexical items in the examined corpus were gained by conversion, abbreviation, etc. (48). Where more modification of a term is required, e.g. where there is a need to name its different types or realizations, it would be clearly uneconomical to create brand new derivatives, add new senses to the existing words of English (i.e. employ the means of semantic shift and polysemy) and make loans from foreign languages which have already coined terminology in the given area. (This method, however, is quite unlikely in English, given the predominance of Anglo-Saxon science and research and the contemporary status of English as a prime language of science). Therefore, requirements of terminology in such situations mean that English (as well as most other languages) has to use **combinations** of several words (where the semantic value of a combination of meanings is not equal to a simple sum of such individual meanings). Such combinations are usually **noun groups** (i.e. open compounds or multi-word lexical units), where the head noun is modified by one or more attributes: adjectival, nominal, or prepositional phrases.

English as an analytical language is specific in this respect since it can easily make noun groups composed of juxtaposed nouns, with the modifying ones functioning as attributes. **Czech or German mostly use adjectives where English uses adjunct nouns**.

French, the language with a more analytical character than Slavic languages and German, prefers to use prepositional constructions placing a modifying noun (acting as an attribute) after the head noun. Apart from inter-language variation, differences can also be observed between terminologies of individual fields of science or activity. E.g. the vocabulary of economy differs substantially from the vocabularies of science and technology, characterised by predominance of neologisms (expressions newly formed to fulfil the naming fiction) or multi-word compounds.

The language of economy clearly prefers to adapt the existing expressions, often used in a general context, and to transfer them to the specific context to be applied with a new, narrower meaning. The relation between the two senses (original and transferred) motivates this shift; it is the metaphor that helps to create new lexical units without the need for a new form. Crystal paraphrases Hughes (1998)[3] by saying: "Rather than invent new terms, we seem for the most part to have adapted familiar ones to talk about the economy, perhaps reflecting the increasingly central role which monetary matters play in our lives. There is, certainly, an immediate meaningfulness and accessibility about such terms as *inflation*, *demand*, and *consumption*, deriving from their established general uses, which would be missing if these notions had been expressed neologistically" (1995: 137).

Terminology can be defined as an organised and hierarchical set of naming units which express specific meanings in specialised contexts, i.e. **terms**. Terminology is also an applied linguistic discipline that studies terms, their development, systematic organisation and use. (Terminology) The rules and methods of terminology as a discipline were first authoritatively formulated by an Austrian engineer and terminologist Eugen Wüster[4], who stressed the need for standardisation and elimination of ambiguity (Cabré 2003: 165). Wüster also reflected the needs of (technical) practice and was a proponent of a systematic and classified manner of presentation of specialised vocabulary. His practical approach was accompanied by emphasis on the concept-oriented approach in order to identify and describe relationships between vocabulary items (Nedobity 1983).

More recently, the theoretical approaches to terminology were comprehensively elaborated by a Catalan linguist M. T. Cabré[5]. She developed Wüster's General Theory of Terminology into the Communicative Theory of Terminology since she sees terminological units as multidimensional, i.e. as units of knowledge, language and communication at the same time (Protopopescu 2013). Thus, the description of a terminological unit can emphasise the concept, the term (linguistic form) or the situation, but all of them are essential and used in combination (Cabré 2003: 182–190). Cabré labels terminological units as "units of special meaning" and claims that normal lexical units become terms due to their special semantic and pragmatic dimensions, while they are identical with normal lexical units phonologically, morphologically and syntactically (Cabré 2003: 190).

3 G. Hughes, *Words in Time: a Social History of the English Vocabulary* (Oxford: Blackwell, 1988).
4 In his doctoral dissertation *International Standardization of Technical Languages* (1930).
5 M.T. Cabré (1999), *La terminología: representación y communicación*.

Research into sets of terms, i.e. **terminologies** and **nomenclatures**[6], provides statistical data about the frequency of the individual types of constructions, word-classes, and sources from domestic word-stock or from foreign languages. Other subjects of research may be the differences between terminologies and nomenclatures, between standard terminology, professionalisms and related slang. Terms can be analysed in norms, dictionaries and texts on the given topics. This book examines the structural properties of scientific lexical hierarchies (more accurately, nomenclatures) in English and compares them with their Czech equivalents. The focus is on structure and sources of terms in relation to the strata in hierarchies and their type. Before the analysis begins, it is interesting to look at research carried out into Czech terminology since it indicates the basic properties which seem to be analogous to those established in English terminological systems.

A statistical survey of 11,414 terms from the terminological archives of the Czechoslovak Academy of Sciences quoted by Poštolková, Roudný and Tejnor in the study *O české terminologii* (1983: 35) was based on a portfolio compiled from 34 technical terminological norms and nomenclatures. The portfolio included mostly practical technical terms, less so scientific terminology. In the set of one-word terms (22.5% of the total), 92.38% were **nouns** (objects, properties, actions, etc.), 7.19% were verbs, 0.35% adjectives, and 0.08% adverbs. Of the nouns, 42.84% were derivations or compounds of domestic origin, 35.31% were borrowings from foreign languages and neoclassical formations, 6.37% were metaphorical and metonymic terms, and 4.02% were terms based on general vocabulary.

The survey of terminologies of technical disciplines (1983: 49–51) also showed that multi-word terms dominated, totalling 77.5%. The multi-word terms comprised mainly two-word terms (48.34%), considerably fewer three-word terms (17.53%), only 7.10% four-word terms and 2.95% of terms consisting of five words. This reflects the nomenclatures listing the whole repertoire of relevant terms. Such terms are listed in their full form, and modifiers are used systematically to indicate mutual relations. Logically, texts relevant to the given technical areas showed different proportions, as ellipsis of modifiers, abbreviation, use of one-word equivalents, and substitution of terms by referential pronouns, adjectives, etc. are possible and frequent. Consequently, such texts (on a sample of 2,000 television and machine-tool-cutting terms) showed 48.1% and 52.6% one-word terms, respectively, 41.4% and 36.5% two-word terms, 9.3% and 8.9% three-word terms, respectively, etc.

The most frequent type of two-word term was a combination of **a congruent adjectival attribute followed by a head noun** (40.19%), followed by a combination of a noun with an incongruent substantival attribute in postposition and in genitive (6.8%). The type ranking third, a combination of a noun and another noun in appositive, accounted only for 0.39%. Nevertheless, particularly individual nomenclatures are strikingly different from this total picture as it is based on a combination of various technical terminologies.

6 It is important to distinguish between **terminology** and **nomenclature**. Nomenclature is a system of names of taxons which are central to a particular discipline; they are usually nominal and their form reflects hierarchisation and specialisation—e.g. the chemical nomenclature = names of chemical substances, botanical nomenclature = names of plants, etc. Terminology is a set of special lexical units used in relation to a science, activity, etc.; i.e. a much less homogenous set than nomenclature.

E.g. the Czech botanical nomenclature (names of plants) is based much more on the Czech word-stock, the absolute majority of terms (the lowest-ranking and most numerous taxons, i.e. species) are two-word expressions (due to the binomial principle of naming in biology), and these two-word terms are largely combinations of a noun followed by a congruent adjectival attribute (i.e. in an exactly reverse order to that found in technical terminologies). Hauser (1980: 158) specifies that the ´N+Adj´ term type is typical of only some nomenclatures, namely of chemical, botanical and zoological terminologies.

Moreover, the ´head noun + modifying noun´ type (making up only 0.39% of two-word terms in the above-quoted statistics) is probably relatively more frequent in botanical (and zoological) terminology (e.g. *střevíčník pantoflíček, svízel přítula, plejtvák myšok*).[7] A problem arises here when either of the two components of such a term is used also separately to name a different entity (e.g. *pes vlk*, *lilek brambor*, *třešeň višeň*) or when the two components are commonly used as synonyms outside the area of scientific terminology (*borovice sosna*). To avoid this ambiguity, the formerly-mentioned ´noun + adjective´ type with morphologically differentiated components seems to be more convenient.

As far as the origin of naming units e.g. in technical sciences is concerned, Poštolková, Roudný and Tejnor (1983: 58) surveyed a set of 2,560 one-word terms from technical nomenclatures; 35.1% of them were synchronically perceived as foreign words. Out of these words, 59.51% were words borrowed from classical languages or formed from Latin or Greek morphemes, 17.25% were borrowed from French, 7.63% from English, and 6.75% from German. However, many Latin- or Greek-based words were adopted from present-day European languages. Knittlová (1990: 46) quotes Andrews who claimed in his book *A History of Scientific English*[8] that as much as 95% of terms in English are of Latin or other foreign origin. Considering that the total vocabulary of English nowadays is estimated to contain approximately 70% of words of foreign origin (compared with just 10% of borrowings in the word-stock of the early Middle English period)[9], this figure is quite probable, particularly due to the preference given to neoclassical derivations in the lexis of science.

7 *Cf.* Hauser (1980: 158) who says that this type (viz. "shodný substantivní přívlastek a jméno—*sýkora koňadra*") is not frequent in Czech apart from botanical terminology but, interestingly, the first item is the determinatum or head (*člen určovaný*) and the second is the determinant or modifier (*člen určující* or *přívlastek*).

8 E. Andrews, *A History of Scientific English* (New York: 1947).

9 Foreign-word influxes actually doubled the English word-stock several times. After the wave of approximately 2,000 Scandinavian loans left as a heritage of the Viking invasions, the influx of mostly French words after the Norman influx doubled the lexicon of English to more than 100,000 words, and the lexicon was doubled again by the end of the Renaissance due to the vocabulary derived from classical languages. The last big wave has been taking place since the mid-20th century. *Cf.* Crystal (1995: 126).

1 | 5 Semantic and syntactic condensation

Modified word-groups are an effective means used to condense expression in English. They are particularly important in scientific terminology. Such **semantic condensates** (cf. Knittlová 1990: 40–41), usually noun groups, are often difficult to analyse so that the relations between individual elements are traced and correct understanding is achieved. Translators from English (as well as to English) often face this problem. The semantic relation between the individual juxtaposed nouns acting as pre-modifiers is not explicitely declared, and once correct noun phrases from which condensed noun groups originated are reconstructed, we find a large scale of diverse underlying relations.

The hypothetically original noun phrases are periphrastic and particularly prepositions and non-finite verbal forms are used to express the relation between individual semantico-lexical components of a compound. Thus,

paper currency is currency **made of** paper,
target currency is currency which **is** targeted,
currency swap is the swap **of** currencies,
money demand is the demand **for** money,
sales or *market area* is the area where sales or market **are done**,
sales manager is the manager **responsible for** sales, etc.

Czech, despite its system of congruent premodifying adjectives, cannot fully avoid vagueness and inexpliciteness either, but its noun phrases are generally more explicit than English ones. For example, the inexplicitness of a combination ´adjective + noun´ can be manifested on the Czech phrases *dětský lékař*, *dětský úsměv* and *dětský voják*. They represent different types of semantic relation between the constituents (a doctor **for**/**serving** children, a smile **of** a child, a soldier who **is** a child), although the formal structure of these noun phrases (or strong collocations) is identical.

Semantic condensation is thus connected with certain vagueness, ambiguity, and uncertainty of meaning. Its main asset is a virtually infinite possibility of expansion of the language's onomatological function by combining existing lexemes. Economy of such expressions (because prepositions, articles, verbs, adverbs, etc. are omitted), together with the large pre-modifying capacity, which enables expansion of the capability of naming new phenomena, are the main reasons why condensed noun groups are so frequent in English scientific and technical terminologies.

Extremely long multi-word terms, consisting of more than three components, exist in both English and Czech. However, the more explicit Czech terms are achieved thanks to a less condensed syntax of the term, i.e. as a result of expressing relations between its components by case inflections (incongruent substantival attributes), prepositional constructions and mostly deverbal adjectives (to replace verbal predication, which is logically excluded from noun groups). Contrary to this, English terms are less explicit, but more concise, generally shorter, and less varied syntactically and lexically than Czech ones.

The degrees of explicitness of a paraphrase and implicitness of a condensate must be considered, particularly if a term is translated from one language to another. Redundancy necessarily connected with paraphrases should be avoided especially in target languages such as English which are characterised by a high degree of implicitness and condensation.

It was rightly observed by Knittlová (1990: 45) that the scientific variety of Czech does not favour as much as English spontaneous coinages of a metaphorical type which are presented to a professional public on an official occasion, typically a conference, and subsequently used in literature and considered fixed in this way. Although Czech seems to be more traditional and conservative in the formation of terms, the above-described type of English semantic condensates is quite frequently borrowed by Czech (e.g. *task force, talk show, chat room, skybox*; the loans are sometimes calqued: *golden parachute—zlatý padák, brainwash—vymývat mozky, Road Map—cestovní mapa* (the peace plan for the Middle East)). If an original English semantic condensate is highly opaque, Czech may choose to paraphrase it, which tends to be lengthy and (therefore) sound clumsy, e.g. *bear market—trh s klesajícími cenami cenných papírů*; *asset-stripping—likvidace jednotlivých částí majetku po odkoupení podniku*. Literal translations, such as **medvědí trh* and **odkrajování aktiv*[10], do not usually have much hope of becoming widely used.

A high risk of wrong translation of terms is contained in **internationalisms** which may work as **false friends**—the obvious familiarity with their individual components easily leads the translator, if the functional equivalent is not available, to translating the components of a condensed term separately, hoping that the combination of meanings of these part-translations will equal the meaning of the whole original term. That would definitely work with many international terms (*spermatophytes / seed plants—semenné rostliny, crisis management—krizové řízení / krizový management, profit margin—zisková marže*); it would also work with calques (*red numbers—červená čísla*), but some internationalisms may be misleading (*public limited company* is not **veřejná společnost s ručením omezeným*, but correctly *(veřejná) akciová společnost*; *finanční úřad* cannot be translated into English as **financial office/authority*, but rather as *tax authority*, or specifically as the *Inland Revenue*, officially *Her Majesty's Revenue and Customs*, in Britain and the *Internal Revenue Service* in the US).

This phenomenon certainly does not only concern false friends among internationalisms, but it is characteristic of terminologies as such: if a term has a functional equivalent in another language, that equivalent must be used, no matter that it consists of different components and that it has a different structure from the term in the first language. It is essential, though, to distinguish between real terms (*useful life—životnost*) and free combinations of several lexemes (*useful life—užitečný život*).

10 All Czech equivalents quoted from M. Straková, J. Bürger & M. Hrdý, *Anglicko-český slovník hospodářský* (Plzeň: Nakladatelství Fraus, 2000), 59, 80.

2 | Lexical units and relations between them

2 | 1 Semantic fields and lexemes

The nature of lexical hierarchies cannot be adequately approached without introducing the concept of **semantic fields**. Palmer (1976: 67) traces the origin of the idea of lexical semantics back to de Saussure. His idea of value is based on the fact that an entity (such as a knight on a chess board) represents something not thanks to some properties that it possesses, "but because of what it can do in relation to the other pieces on the board" (ibid.). Meaning is thus defined in relation to the meaning of similar concepts in the same language and equivalents in other languages, but it is claimed that there are always differences. Synonyms then fill the content range, but their meanings do not overlap in the field.

Semantic fields are formed by items between which there are paradigmatic relations, i.e. they are substitutable with units in the same field (Palmer 1976: 67). Here belong, apart from synonyms, also antonyms and hyponyms. Syntagmatic relations, another de Saussurean concept, are combinatorial relations, i.e. those of co-occurrence. Palmer mentions the contributions of Trier and Hjelmslev to the discussion concerning semantic fields, the former comparing division of a semantic field in historical dialects of the same language, and the latter comparing two different languages (Palmer 1976: 68–69). Nida's exemplification of the division of semantic fields in various languages (Nida 1964: 50, as quoted in Palmer 1976: 69) confirms Palmer's conclusion that "we have a list of words referring to items of a particular class dividing up a semantic field. In almost all cases, moreover, the words are incompatible" (Palmer 1976: 69).

As the key concept of this book is the term as a special type of naming unit, it will be useful to conceive naming units more precisely. An important distinction must be made between lexical units and lexemes. **Lexical units**, as defined by Cruse (1986: 49) "are those form-meaning complexes with (relatively) stable and discrete semantic properties which stand in meaning relations such as antonymy (…) and hyponymy (…), and which interact syntagmatically with contexts in various ways to produce, for instance, the different sorts of anomaly (…)." Lexical units thus can be defined by their involvement in semantic relations and "the meaning aspect of a lexical unit" is referred to as a **sense** (ibid.: 49). Cruse contrasts lexical units with **lexemes**, which are rather "the items listed in the lexicon, or 'ideal dictionary', of a language" (ibid.).

Senses are understood as semantic traits, whose number may not be finite. Lexemes, on the other hand, form a finite set of structural units of lexicon. In an analogy to

creativity in grammar, namely in syntax, Cruse highlights lexical creativity by saying that "a (relatively) closed set of lexical units is stored in the mental lexicon, together with rules or principles of some kind which permit the production of a possibly unlimited number of new (i.e. not specifically stored) units" (1986: 50). The confusing terminological instances quoted in Chapter 2.4 illustrate the variety of lexical units and their senses into which lexemes are frequently split.

Naturally, **context** strongly influences the semantic contribution of a word to a sentence. According to Cruse, a word can have two types of semantic participation in its sentential context. It can either be general and involve several possible specific meanings (such as *dog*—it covers any race of dog), or ambiguous "with respect to sense distinction" (1986: 51). This can be illustrated with the word *lie* with two distinct senses; e.g. when *lie* is used in "She didn´t want to lie"—with the meanings 1. [not tell the truth], 2. [be in a horizontal position]. The conclusion is that the verb *lie* (as well as e.g. the noun *bank*) each represent two different lexical units.

In syntax of any language, a finite number of items and rules can generate an infinite number of sentences. Similarly, in lexis, a finite number of lexical items can be used to express a countless number of senses (in various contexts). The finite and enumerable entities are termed **lexemes**. Cruse (1986: 76) describes "a lexeme as a family of lexical units". A lexical unit can be defined as "a word form associated with a single sense". However, lexical units differentiated by adding inflectional affixes do not form new lexical units, unlike derivational affixes attached to a stem which do. The former case yields so-called lexical forms. Cruse adds that "a lexical unit is then the union of a lexical form and a single sense" (1986: 77). The same lexeme involves several lexical units "if there exists a rule which permits the prediction of the existence of the sense of one of them from the existence of the sense of the other" (ibid.: 77–78).

Some lexical units can be used in more neutral and general contexts. These are referred to as **primary lexical units** (Cruse 1986: 79), such as *wave* in terms of a distortion on the surface of a liquid or *bed* as a piece of furniture used for sleeping. Such lexical units rest on well-established senses. **Secondary lexical units** are then contextually restricted, less established (e.g. *wave* as [a stage in a process or activity] or *bed* used for [a flat area with some function in geology, gardening, engineering etc.]). Cruse also concedes that "there remain the unestablished units, generally indeterminate in number, and varying in the degree of contextual pressure required to activate them" (1986: 79).

A test proving that lexical units can be assigned to the same lexeme is the principle of recurrent relationhips, both grammatical and semantic (Cruse 1986: 79–80). They should fit slots analogously with similar items, i.e. be used in the same grammatical patterns and be substituted by words from the same semantic category (I play the *piano/guitar/violin*, etc.).

This leads us to a definition of lexemes which have a number of (related) senses as **polysemous**. As a lexical unit combines a single sense with a certain lexical form, a polysemous lexeme thus involves multiple lexical units. Opposed to this are **homonymous** lexemes, in which "a lexical form (…) realises lexical units belonging to more than one lexeme" (ibid.: 80).

2 | 2 Sense relations seen through predicate calculus

Palmer describes sense relations as relations of a logical (or rather semi-logical) kind and suggests formalising them with the use of predicate calculus (1976: 83). Hyponymic relations, which form the basis of lexical hierarchies, require explanation of several concepts.

First, let us have a look at **entailment**. According to A. Cruse's simple definition, "P entails Q is true if in all worlds in which P is true, Q is also true" (2011: 46). If a predication says something about something (e.g. *A tiger is a carnivore*, the symbolic transcription can be C(t), where C is a predicate (*is a carnivore*; the copular verb only expresses identity) and *tiger* is an argument. With semantically richer verbs, typically content verbs, the predicate is the verb itself and there can be two or even more arguments, such as in the sentence *Tigers eat antelopes*. Here the symbolic transcription E(t,a) stands for the predicate *eats* and two arguments (*tigers*, *antelopes*), whose order matters.

This calculus can be extended beyond the limits of single predications. Logical relations holding between predicates are crucial for hierarchies. As we can say that "if a tiger is a carnivore, it (then) eats antelopes", we can for example say that "if a tiger is a big cat (B), it is a carnivore (C)" (or a mammal (D), or a vertebrate (F), or a cordate (G), etc.). This logical relation is referred to as entailment and its symbolic form is $B(t) \rightarrow C(t)$, and also $C(t) \rightarrow E(t,a)$. Two-place and many-place predicates express relations between two and more arguments and can thus be employed in more complicated logical relations than one-place predicates. Palmer (1976: 84) notes: "With two-place predicates the relations may be characterised in several ways, notably in terms of being SYMMETRIC, TRANSITIVE and REFLEXIVE."

Symmetric relations hold true for arguments regardless of their order. If Peter is Fred's colleague, then it works also in the opposite direction: Fred is Peter's colleague. The transcription is thus $C(f,p) \rightarrow C(p,f)$. Obviously, the symmetric relation characterises the sense relation of **synonymy**, i.e. the sameness (or at least high similarity) of meaning. Using the linking verb *be* or the identity-expressing non-directional verb *mean*, the statement *Debt is/means a liability* is entailed in and equals a statement featuring a reverse order of the arguments: *Liability is/means a debt*.

A **transitive relation** occurs in predicates with three or more arguments. Palmer describes it generally (using the universal quantifier symbol $\forall$ that stands for "every" or "all"): $\forall x \forall y \forall z(R(x,y) \,\&\, R(y,z) \rightarrow R(x,z)$ (1976: 84). Apart from some directional spatial relations this relation is typical of **hyponymy**, a sense relation which is inherent to lexical hierarchies. If, for example, a *leapfrog* is an *amphibian*, and an *amphibian* is a *vertebrate*, then a *leapfrog* is a *vertebrate*. Symbolically, $A(l) \,\&\, V(a) \rightarrow V(l)$. It is worth noting that this relation is directional (we cannot use the predication in the reverse direction, i.e. **If a vertebrate is an amphibian, then amphibian is a leapfrog* nor **If an amphibian is a leapfrog, then a vertebrate is an amphibian* (where the order is reversed only within the two component statements). Furthermore, it can easily be used with abstract arguments (such as zoological labels *amphibian* and *vertebrate*), so much typical of higher, more general levels in taxonomies.

The third relation, **reflexiveness**, means that the predicate relates an argument to itself. Its symbolic notation is $\forall x(R(x,x))$. It seems that reflective relations will not be of great importance in the study of lexical configurations.

Palmer discusses the opposite types of relations, namely **asymmetric**, **intransitive** and **irreflexive** ones, and points out "that a relation that is not symmetric, transitive or reflexive (e.g. *like*) is not necessarily asymmetric, intransitive or irreflexive" (1976: 85).

2 | 3 Synonymy

The mostly taxonymic and meronymic relations between items of scientific lexical hierarchies are usually incompatible with the sense relations such as **synonymy** (as the meaning of two lexical items is not identical in a hierarchy) and **antonymy** (the meaning of two lexical items is not opposite either). If the relations in hierarchies are considered strictly, they also have to be distinguished from **hyponymy** (a subordinate item is not always a kind of its superordinate and vice versa, a superordinate does not always include a subordinate in its extension, namely in non-branching hierarchies of military ranks, in professional, church or academic hierarchies). However, all these relations play some role in lexical hierarchies, whether it is systemic or just marginal.

Synonymy or sameness of meaning can also be described as "symmetric hyponymy" (Palmer 1976: 86). It thus holds that, if e.g. a *false acacia* (Lat. *Robinia pseudoacacia*) is a synonym to *black locust* (i.e. another term is used to refer to the same species of plant), every false acacia is a black locust and, vice versa, all black locusts are false acacias. In terms of symbolic expression of predicate calculus and entailment, $\forall x(F(x)\rightarrow B(x))$ and at the same time $\forall x(B(x)\rightarrow F(x))$.

Synonymy is a sense relation that quite frequently occurs in English terminologies (but also in other languages), mainly due to historical reasons. As English vocabulary has absorbed over the centuries of its development numerous French, Latin, Greek, Scandinavian etc. borrowings in addition to the domestic, Anglo-Saxon words, naming for some entities has a plurality of distinct forms, coming from different sources. However, only few synonyms are completely interchangeable. They are usually marked for register (e.g. domestic words being usually shorter and more informal), which implies that their distribution will not be identical. If there are also differences in meaning, however small they are, it is not possible to talk of absolute synonymy and relations between senses in such instances rather verge on polysemy. **Polysemy is a reciprocal relation to synonymy: while synonymy is a plurality of forms (for the same meaning), polysemy is a plurality of meanings (for the same form).**

Palmer (1976: 89) rejects the usefulness of synonymy in a logically and efficiently structured lexicon: "It can, however, be maintained that there are no real synonyms, that no two words have exactly the same meaning. Indeed it would seem unlikely that two words with exactly the same meaning would both survive in a language." He suggests five ways in which possible synonyms can differ (ibid.: 89–91): (I) usage in different dialects of the same language (e.g. British *lift* vs. American *elevator*, or Bohemian Czech *limonáda* vs.

Moravian equivalent *sodovka*), (II) usage in different styles (e.g. formal *dismiss* vs. informal *kick out* or *sack*, or formal *gentleman* vs. neutral *man* vs. colloquial (and often regionally preferred) *chap*, *bloke*, *lad* or *guy*), (III) difference in emotive or evaluative meanings (e.g. Czech *učitel* vs. *kantor*, or English *gay* and *queer*, or the often quoted difference between the positively and not-so-positively associated pair of words *statesman* vs. *politician*), (IV) collocational restrictions (e.g. verb *hold* used with *breath*, *an office* etc. vs. *keep*, which can collocate with *a promise*, *a secret* etc.). The fifth difference (V) is the one discussed already in connection with similarity of synonymy and polysemy. Palmer (1976: 91) admits that "many words are close in meaning, or that their meanings overlap. There is, that is to say, a loose sense of synonymy."

Palmer discusses several methods for disentangling supposedly synonymic sets, such as testing whether one word can be substituted for another or testing their opposites (1976: 91–92). However, as some words can only be substituted by others in certain lexical environments or contexts, it "will merely indicate the collocational possibilities, and these do not seem necessarily to be always closely related to nearness of meaning" (ibid. 92).

Synonymy as a relation of identity or similarity in meaning between lexical items corresponds to the logical relation of identity between two classes: if two classes have the same members, they are identical. As Cruse (1986: 87) notes, this concept can be best applied to lexical relations if a referential viewpoint is adopted: we take into account entities included in classes with a certain denotation, i.e. all potential referents of the given concepts. This approach can be aptly used for identifying sense relations between items in taxonomies and meronomies consisting of entities which have concrete, physical referents, i.e. in classificatory hierarchies of natural sciences, as shown further in the text.

The problems with the referential approach are, however, that some words (mostly abstract ones) do not clearly denote classes of referents and that some words have a denotation, but they do not have a referent in the real world, i.e. an existing object or another entity. Therefore, a different approach is suggested, an approach analysing truth-conditional relations between sentences containing the compared lexical items. Such a relation, advantageous for a higher degree of generality when compared with the referential approach, is termed **cognitive synonymy**. Two lexical items are synonymous if they occupy an identical slot in the syntactic structure of two parallel sentences and these two sentences have the same meaning (truth conditions) (Cruse 1986: 88).

Synonymy, although it is commonly described as sameness of meaning, involves in fact a scale on which lexical items reveal more or less semantic resemblance. For two lexical items to be synonymous, a high degree of **semantic overlap** must be accompanied by **low or no semantic contrast**. In hierarchical terminologies, the semantic overlap between e.g. the items *almond* and *peach* is not as high as to allow their mutual interchangeability. Denial of one of these items as an inappropriate sign for a certain referent (*This is not a peach (tree)*) means assertion of another item from its "implicit contrast set" (Cruse 1986: 266), e.g. *This is an almond tree* or *This is an apricot tree*. Semantically overlapping, but not fully identical words, are often **co-taxonyms**. All of these lexical units (i.e. *peach*, *apricot*, *almond*) may be referred to by a common hypernym, the botanical term *Prunus* (a genus).

Synonymy requires that if one out of two words considered synonymous is denied, the other is also denied, e.g. *This is not an American elder* also denies the truthfulness of the sentence *This is not a sweet elder*, as the two naming units, *American elder* and *sweet elder*, have the same referents, i.e. they are synonymous.

Synonymy then requires that the lexical items are **identical in their central semantic features**; with possible differences only in their non-essential features. Synonyms are thus defined as "lexical items whose senses are identical in respect of 'central' semantic traits, but differ, if at all, only in respect of what we may provisionally describe as 'minor' or 'peripheral' traits" (Cruse 1986: 267). Synonyms should also allow the meaning of the other word to be **explained** (*You must give us an advance, or / that is a deposit*).

Sometimes a **contrast** may be expressed by synonyms when the best alternative expression is sought for the same referent (*The name of this tree is the maidenhair tree, or, more exactly, ginkgo*). There is some degree of contrast between the commonly used domestic word *maidenhair tree*, and its Japanese-based taxonomic equivalent *ginkgo*, also used in Latin binomial nomenclature (*Ginkgo biloba*). Although they seem to be appropriate in different situations, their denotation is exactly the same. Similar examples are the triplet *black locust*, *yellow locust* and *false acacia*, all of which denote the same, originally American deciduous tree of the peaflower family, *Robinia pseudoacacia* (*trnovník akát*), and in Czech *ořešák (královský)* and *vlašský ořech* (*walnut, Juglans regia*), *jírovec maďal* and *(koňský) kaštan* (*common horse chestnut, Aesculus hippocastanum*), *pampeliška (lékařská)* and *smetanka lékařská* (*dandelion, Taraxacum officinale*), etc. It is evident that synonyms are not completely rare in scientific nomenclatures.

Synonymy should be strictly distinguished from cases of **hyponymy/hypernymy**, where the rule of denial of one item or interchangeability of items cannot be applied fully because it only works in one direction (a hypernymous term can be used as a more general substitute for a hyponymous one, but not vice versa), e.g. *conifer* for a *fir*, or *bird* for a *chaffinch*. Every *fir* is a *conifer* (and a *tree*) at the same time, but by far not every *conifer* is a *fir*. The relation of hyponymy is not symmetric or equipollent, unlike that of synonymy.

Lyons (1981: 148–151) distinguishes between several main types of synonymy. According to him, lexemes can be said to be **completely** synonymous (in certain contexts) if and only if they have the same descriptive, expressive and social meaning (in those contexts). Lexemes are considered to be **absolutely** synonymous if and only if they have the same distribution and are completely synonymous in all their meanings and contexts in which they occur. Similarly, Hauser (1980: 87) defines absolute synonyms as identical in all aspects, i.e. in denotation, connotation and distribution.

In *Language, Meaning, and Context* (1981: 50–51), Lyons's classification is modified: two lexemes are **fully** synonymous if, and only if, all their meanings are identical; two lexemes are **totally** synonymous if, and only if, they are synonymous in all contexts, and two lexemes are **completely** synonymous if, and only if, they are identical in all relevant dimensions of meaning. According to this, **absolute synonyms** are fully, totally and completely synonymous; **partial synonyms** do not meet all these three criteria, and **near-synonyms** are more or less similar (but not identical) in meaning. Cruse (1986: 268)

asserts that two lexical units would be absolute synonyms (i.e. having identical meanings) if and only if all their contextual relations were identical. The condition cannot be fulfilled, as all possible contexts cannot be checked.

Complete synonymy seems to be quite infrequent, and absolute synonymy almost impossible in languages. Absolute synonymy may best be found in specialised terminologies which have a descriptive character, i.e. which are not affected by evoked (associated and expressive) meaning. However, every natural language avoids having two items with identical meaning, as well as with identical associations and distribution. This would be simply uneconomical, redundant. Lyons (1981: 148) observes: "What tends to happen in cases like this is that, although a pair, or set, of terms may co-exist among specialists for a short time, one of them comes to be accepted as the standard term with the meaning in question. Any rival that it had either disappears or develops a new meaning."

Such disambiguity is vital for terminologies of sciences; however, absolute synonyms still appear, for various reasons. Unlike everyday language, which is very dynamic and flexible, terminologies tend to be fixed and conservative. Due to this characteristic property, absolute synonyms are capable of surviving. The special situation in biological taxonomy where each taxon has a Latin name, next to the domestic equivalent (if it exists), leads to the existence of numerous absolute synonyms. An objection might be made that this involves Latin terms, i.e. quotational borrowings, words of a different language. As there are no Czech or English names for many taxons (bacteria, algae, tropical insects, some lower plants, prehistoric plants and animals), Latin names are fully acceptable as foreign-language loans in a language which needs to refer to the entities. Such names are internationally comprehensible (for specialists or with the use of dictionaries and scientific literature) and their denotation is clear.

Since language must be able to name all referents or groups of referents in the world, Latin lexical units have organically become part of (specialised) vocabularies and vernacular languages should also allow the existence of Latin synonymic alternatives in cases when a domestic term exists. Where both the Czech/English and Latin terms are recent formations unfamiliar to speakers, e.g. the Brazilian species *red-eyed tree frog* (Lat. *Agalychnis callydris*, Cz. *listovnice červenooká*—rather known as a species of *pralesnička*) or a species of American moss *gouty moss / Griffith´s oedipodium moss* (Lat. *Oedipodium griffithianum*) we may talk about absolute (interlanguage, of course) synonymy.[11] This is contrary to the lack of need for the Latin equivalent with e.g. *common/red/corn/field/ Flanders poppy / corn rose*, Cz. *mák vlčí*, which is certainly more known, and possibly more semantically evoked (cf. the number of synonymous English attributes in its name) than the Lat. *Papaver rhoeas*.

Many items, however, have associative meaning or **connotations**. These differentiate between synonymous lexical items. Other synonyms are differentiated by semantic

11 If the pairs of terms (Czech and Latin or English and Latin) did not occur parallel to each other in one terminological system (viz. Czech or English), it would not be possible to speak about synonymy: they would be simply (translation) equivalents.

co-occurrence restrictions, which are selectional. Despite identical meaning, lexemes differ and they cannot be used in all contexts. These restrictions are called **collocational** restrictions, and they are irrelevant to truth-conditions. Such incomplete synonymy is called **descriptive synonymy** or **cognitive** or **referential synonymy**. (Lyons 1981: 150). Lyons observes that this type of synonymy (where "lexemes may be descriptively synonymous without having the same expressive or social meaning") is regarded by many as real synonymy (ibid.).

2 | 4 Polysemy and synonymy of terms

By comparing the Czech chart of accounts, i.e. a structured list of accounts compiled by the Czech Ministry of Finance, with lists of corresponding items frequented in British accountancy or the US GAAP (*Generally Accepted Accounting Principles*), it becomes obvious that these nomenclatures, although representing functional, hierarchised and practically designed systems, flout some basic requirements any user could have of a nomenclature—there is not always a one-to-one, binary correspondence between a concept and a relevant term. Instead, there are cases of several terms with the same meaning, terms with multiple meanings, alternative expressions, and terms overlapping in their meaning. This exists in Czech to a certain degree, but much more so in English, with its several **national varieties** (I will only focus on the two main geographical varieties, the British and American national standards), **different historical layers** in vocabulary, conceptually **distinguished accounting systems** (the reasons for differences in perception and classification of reality, which are reflected in terminological inconsistencies, are beyond the scope of this work), and **alternative ways of forming new terms**. Similar terminological inconsistency will be presented also in the botanical and zoological terminologies.

Polysemy as a reflection of ambiguity of meaning must be distinguished from **vagueness**. Frawley (1992: 58) states that an expression with two or more meanings may be ambiguous or vague. An ambiguous expression has "at least two distinct semantic specifications underlying a single overt form", whereas a vague expression "is unspecified for particular meanings and takes them from context" (ibid.). Vagueness is also motivated differently from polysemy and ambiguity; A. Cruse (2011: 200) identifies two sub-dimensions of vagueness, namely ill-definedness and laxness.

In financial and accounting terminology, which may be expected to be as unambiguous and precise as possible, cases of terminological ambiguity are not uncommon. Different coinages in the British and American terminologies (i.e. **different national variants** or alternatives) may be illustrated by *own shares* (BrE) and *Treasury stock* (AmE) (*vlastní akcie*, account No. 252 in the Czech chart of accounts), *debtors* (BrE) and *accounts receivable* (AmE) (*odběratelé*, No. 311), *provisions* (BrE) and *allowances* (mostly in AmE) (*rezervy*, No. 45; at the same time, *allowance* in GAAP means *opravná položka*, equivalent to *adjustments* in BrE), etc. Such ambivalence of naming becomes highly misleading when a quite crucial and consequently often polysemous expression is used to refer to some entities differently in the two national standards.

Confusion stemming from **polysemy** combined with the difference between the national varieties is manifested by equivalents of *Výnosy* in the Profit and Loss Account, which are referred to as *revenues* in British English and *income* in American English, while the expression *income* means *příjem* in both varieties of English. To make things even more complicated, *(net) income* is the American equivalent of *profit* in British English, used in the US to refer to the concept of Czech *zisk* as well. Czech *tržby*, i.e. a distinct, not completely synonymous lexical unit, has the same equivalents in English as *výnosy*, namely the polysemous terms *revenues* (BrE) and *income* (AmE) (*Tržby z prodeje materiálu*, 642 = *Revenues from material sold* (BrE) = *Income from materials sold* (AmE). However, further expressions may be established, harming severely the required terminological disambiguity—*Other operating revenues* (BrE) (*Ostatní provozní výnosy*, 648) are referred to by *other operating receipts* in the US terminology. The word *receipts* rather corresponds to Czech *příjmy* or *tržby* when used outside of the mentioned account type.

Table 2.1. Polysemy and differences between British and American economic terminologies.

British English	American English	Czech	synonyms
revenue	income, revenue income revenue	výnos(y) důchod výnos/důchod/výběr (daně)	sale(s), receipt(s) receipts
income	income income	příjem tržby výnos důchod	revenue receipts, sale(s), revenue, income, take, return, gain, proceeds
receipts	receipts, income receipts	příjmy, tržby výnosy	revenue gain, revenue
earnings		výdělek výnosy zisk	pay, salary/wage return profit
turnover	turnover sales	obrat tržby	 receipts, revenue, income
profit	profit income	zisk zisk	gain gain
gain		zisk výtěžek výnos nabytí, získání	profit proceeds proceeds acquisition, purchase
return		výnos návratnost vrácení, vratka výkaz	yield, earnings refund statement
cost	cost	náklad(y) cena	expenses price
expense(s)		výdaj(e) náklad(y) výloha(/y), útrata	 cost outlay
expenditure		výdaj, vydání	outlay
spending		utrácení, útrata výdaje, výlohy	expense expenditure, expenses, outlay, outgoings
price	price	cena	cost
value		cena hodnota	price, cost worth
worth		hodnota	value

Synonymy and polysemy are evidently **mutually dependent lexical relations**. If a lexical unit is used in another context (and the motivation of its application is justifiable), then it may easily become an alternative expression to already existing one(s), which are motivated differently. A lexical unit of a polysemous lexeme thus becomes a synonym to another lexeme. Although the meaning of lexical units is best revealed through contextual ties, it certainly has semantic relations to other lexical units if taken per se, out of any context. Cruse claims that "a semantic relation needs to be at least systematic, in the sense that it recurs in a number of pairs or sets of related lexical units" (1986: 84).

Hauser (1980: 85) also asserts that synonymy is established when proceeding from the denotate to the naming (form). Existence of several words for the same denotate, however, does not mean that lexis is superfluent and redundant (here polysemy seems to be the opposite to synonymy in terms of language economy, as one naming unit, one form, is used for more than one denotate). Synonyms usually differ in some aspects of their meaning, which justifies their existence.

There are two main types of sense relations: **paradigmatic** (based on the possibility of substitution of one lexical item by another) and **syntagmatic** (describing the ability of lexical units to combine in longer linear strings). Cruse (1986: 86–87) recognises four types of relations between classes, called congruence relations, namely identity, inclusion, overlap and disjunction. However, such relations are problematic from the referential point of view since some words "do not in any straightforward way denote classes of potential referents" (ibid.: 87) and some lack real referents at all (*hobbit*, *angel*, *mermaid*, etc.). Therefore, another approach to the study of lexical relations is suggested, namely "to operate directly in terms of meaning, and look at semantic relations between parallel sentences in which X and Y occupy identical structural positions" (Cruse 1986: 88).

On the grounds of analysis of truth-condition relations in sentences it is possible to establish lexical relations between lexical items. The relation of identity between two classes corresponds to **synonymy**. Propositional synonymy is identified when two items are syntactically identical and when two sentences containing them have equivalent truth-conditions (Cruse 1986: 88). In other words, a sentence containing item A entails and is at the same time time entailed in a sentence with item B. The nouns *income*, *revenue*, *receipts* and *sales* in the meaning [money earned from selling goods or services], equivalent to Czech *tržba/tržby*, are thus synonyms, since the sentence "Our *income* increased before Christmas" entails and is entailed by "Our *revenue* increased before Christmas", etc.

2 | 5 Oppositeness and antonymy

Opposites combine closeness and distance from one another at the same time. The meanings of two opposite lexical units must be perceived as maximally distinct, but, simultaneously, they have nearly identical distribution and they usually differ in only one relevant sememe (a unit of meaning). Oppositeness is not a very clearly defined semantic relation. There are pairs of opposites which are considered perfect instances of oppositeness (*alive* vs. *dead*, *dark* vs. *light*), but oppositeness of many is questionable (*bull* vs.

cow) or context-dependent (*cash* vs. *cheque*) (cf. Cruse 1986: 198). Impure opposites are those whose meaning includes some more fundamental opposition (e.g. *elephant* vs. *ant* includes the relation *large* vs. *small*).

Antonyms are words which have opposite meanings. It is debatable whether some pairs of words are antonymous, particularly because oppositeness is of several types. Unlike the popular belief that antonymy is opposite to synonymy, Palmer stresses their different natures: "For languages have no real need of true synonyms, and … it is doubtful whether any true synonyms exist. But antonymy is a regular and very natural feature of language and can be defined fairly precisely" (1976: 94).

In some lexical or terminological hierarchies there is no real possibility to identify antonyms. A similarity can be found with the mistaken belief, typical of young children, that some words are antonymous because they fall within some small contrastive sets. But as *father* is not an antonym to *mother* (although in the set "adult member of a nuclear family" they are mutually incompatible and contrastive), nor is *brother* a true antonym to *sister* and *pupil/learner* to *teacher*. Similarly, **in hyponymic hierarchies, whether taxonomic or meronomic, a notion of antonymy between sister nodes or co-hyponyms virtually does not exist**. Is *wolf* an antonym to *fox* (or rather to *rabbit*, *dog*, etc.)? There are definitely antipodes which language users associate on the basis of traditional cultural schemata, such as fairy tales or comics (*wolf* vs. *rabbit*, *(tom)cat* vs. *mouse*, *dog* vs. *cat, Americans* vs. *Soviets/Russians*, Czech *naši* vs. *Němci*), but they are rather causatively related, such as a beast and its prey or two rivals. Is *vegetable* an antonym to *animal*? These two are definitely two principal kingdoms of *Eucaryota*, namely *Plantae* and *Animalia*, different from each other in many significant aspects, but they cannot be regarded as antonymous.

Nevertheless, in some other types of lexical hierarchies it seems to be easier to find instances of antonymy. Take a simple two-item helix (cycle) *day—night*. These two fundamental periods cyclically alternate and they are mutually incompatible. With a seven-item helix consisting of days of the week or a 12-item helix of the months such neatly identified antonymy is not possible. The hierarchy (a chain) of army ranks is a similar case—it is directional and asymmetric, but a *private* (or any other rank) does not have any antonym (e.g. if it were a *sergeant*, why not a *captain* or a *general*?).

The individual subtypes of oppositeness which occur in lexical structures are:

1. **complementaries**—such opposite lexical items together exhaust completely the relevant conceptual domain. They are mutually exclusive, i.e. if one is asserted, the other is necessarily denied, and vice versa. The set of possible states in a concept has no other members but the two complementaries. Examples may be *dead* vs. *alive*, or, more specifically in biological taxonomy, *cellular* vs. *non-cellular*. Complementaries cannot be denied (or asserted) both at the same time (**The organism is neither cellular nor non-cellular*).

   Complementaries function mutually exclusively within a domain whose sense is divided between them. Therefore, many pairs of words are complementaries within a particular limited domain, e.g. animal taxons with a present trait vs. those with the trait absent (such as *monkeys* with tails vs. tailless ones).

2. **gradable antonyms**, usually classified as polar, contrary, comparative, etc. Alan Cruse distinguishes **polar antonyms** (having a single scale with a zero point at one end), **equipollent antonyms** (with two scales of opposite directions and two adjacent zero points, e.g. *hot* vs. *cold*) and **overlapping antonyms** (with two scales, the negative one having its zero point in the middle of the positive, e.g. *good* vs. *bad*) (2011: 158).
3. **converses**, expressing the same concept or situation seen from an opposite point of view (cf. Hladký & Růžička 1998: 29–30).
   As the last two mentioned types of oppositeness are usually linked with adjectives and verbs, respectively, and the lexical units in hierarchical nomenclatures are nominal terms, I will not discuss ocurrences of such types of antonyms here.

Lyons also mentions a broad interpretation of oppositeness which covers all kinds of **incompatibility** of sense (1981: 154). Oppositeness and incompatibility together with hyponymy are basic structural relations in vocabularies. These substitutional (also termed paradigmatic or oppositional) relations with syntagmatic (combinatorial) sense relations between lexical units provide the semantic structure to **lexical fields**. Such lexical fields are often organised analogously in different languages, and the **paradigmatic and syntagmatic sense relations** a lexeme has with other lexemes in its lexical field are part of its sense. Moreover, such sense relations do not only hold between individual lexemes, but also between a lexeme and a more complex expression, e.g. a phrase, a clause, etc.

2 | 6 Hyponymy

2 | 6 | 1 Inclusion and entailment

Hyponymy is associated with **inclusion**. This notion expresses that some concepts (e.g. *car*, *van* and *bus*) are included is some other, more general ones (*motor vehicle* or *means of transportation*). As Palmer puts it, "inclusion is thus a matter of class membership. The 'upper' term is the SUPERORDINATE and the 'lower' term the HYPONYM" (1976: 85). There are differences between languages in terms of the structure of hierarchies. Some do not contain a superordinate lexical item and, on the other hand, some lexical items can be used at several different places (levels or ranks) in a hierarchy. This happens when they are polysemous, usually with a more general and a more specific meaning. Palmer exemplifies this by triple occurrence of the word *animal* in a zoological taxonomy: once as opposed to *vegetable*, once on a par with *bird*, *fish* and *insect* (used to mean a *mammal*, in fact) and at the lower, most specific level in opposition to *human* (1976: 86). Examples of such polysemous items are also *dog* (as a hypernym, but also specifically as a male dog), and *cow*, *goose, lion.*

Palmer traces the notion of hyponymy back to Carnap's (1956) meaning postulates[12]. If a predication related to one lexical item means that another predication can be related to it, i.e. if one predication entails another, "the meaning of lexical items can be stated in terms of such entailments" (Palmer 1976: 87). The interpretation of entailment is that one lexical item (e.g. *lieutenant* in *He is a lieutenant*) is hyponymous to another lexical item which is entailed (namely *officer*, as it holds true that *He is an officer*.). Lyons defines entailment as "a relation that holds between propositions" (1995: 125)—as can be seen above, it also holds between substitutable expressions that make them up (*lieutenant—officer*).

The relation of hyponymy involves **entailment**. Items are members of classes and being a member of a class at a lower level entails that every item of that class is also a member of respective superordinate classes. Since there can be several levels of superordinate and subordinate expressions, Palmer suggests distinguishing which hyponym is an immediate one (1976: 87). Although the statement *This is a leapfrog* entails *This is an amphibian* as well as *This is a vertebrate*, *leapfrog* is an immediate hyponym of *amphibian*, not of *vertebrate* (or of *animal*).

Hyponymy is based on the congruence relation of **inclusion**. Cruse points out that hyponymic lexical relation works well in a certain syntactic pattern, namely "A is f(X), where f(X) is an indefinite expression" (1986: 88). The definition goes that "X will be said to be a hyponym of Y (and, by the same token, Y a superordinate of X) if *A is f(X)* entails but is not entailed by *A is f(Y)*" (ibid.: 88–89). The sentence "This is a *poplar*" entails "This is a *tree*", and *poplar* (X) is a hyponym of *tree* (Y) and *tree* is a superordinate of *poplar*. The entailment in hyponymy is unilateral and is not confined to the structure with a copular verb *be*, thus other verbs can be used if they fit semantically: "We planted/felled/crashed into a *poplar*" entails "We planted/felled/crashed into a *tree*".

Entailment depends on the semantics of the verb as well as on the logical relations expressed in the predication. The direction of entailment changes or no entailment occurs. Usually, "if the hyponym and superordinate fall within the scope of a negative, or a universal quantifier (e.g. *all*, *every*, *each*), or if they form part of a conditional clause or other expression of contingency, then the direction of entailment will be reversed" (Cruse 1986: 89). For example, "It is a *cat*" entails "It is an *animal*". But "It is **not** a *cat*" does not entail "It is **not** an *animal*", but reversely, "It is **not** an *animal*" entails "It is **not** a *cat*". However, the semantics of a verb is an important factor. Dependence of entailment on the verb meaning can be illustrated by semantically negative or restrictive verbs: while "She loves *pop*" most likely entails "She loves *music*", "She hates *rock*" does not entail "She hates *music*".

As Cruse points out, sometimes "hyponym and superordinate in parallel positions yield no entailment at all" (1986: 90). He illustrates it by "It turned *scarlet*", which does not entail "It turned *red*" (ibid.: 91), nor is it possible to make a reverse entailment. On the other hand, a reverse entailment would work here with negation. It is evident that the relation between entailment and hyponymy is not completely straightforward.

12 See R. Carnap, *Meaning and Necessity* (Chicago: Chicago University Press, 1956).

2 | 6 | 2 Compatibility, incompatibility, paraphrases and imperfect relations

Cruse suggests a test on hyponymy, namely that "a hyponym is often propositionally equivalent to a paraphrase in which a superordinate is syntagmatically modified" (1986: 91). Thus, as *bitch* is equivalent to *female dog*, it holds that *bitch* is a hyponym to *dog*. Superordinates as a more general item, in fact a frame of reference, are also joined with hyponyms in such phrases as "*Czech* and *other languages*", "all *minerals* except *limestone*", "There is no sweeter *fruit* than a *persimmon*", "He is good at all *sports*, especially at *athletics*", "*Cheetah* runs the fastest of all *land animals*", etc. (cf. Cruse 1986: 91).

Another useful concept in hyponymy is **compatibility**, which is defined as "the lexical relation which corresponds to overlap between classes" (Cruse 1986: 92). Compatibles also require that there are no entailments between sentences which contain them in the same syntactic slots. The second requirement is that "a pair of compatibles must have a common superordinate" (ibid.). In other words, a pair of compatibles share some semantic features, but differ in others.

The opposite relation to compatibility is then **incompatibility**, in which two classes do not share any members (Cruse 1986: 93). Using predication calculus, if a sentence *A is f(X)* entails a sentence *A is not f(Y)*, then X and Y are incompatibles (ibid.). Most words are obviously incompatibles, but incompatibles which are co-hyponyms of the same superordinate are more interesting in terms of study of lexical hierarchies (e.g. *birds* include incompatibles such as *swallow*, *finch*, *lark*, *eagle*, *falcon*, *owl*, *goose*, *ostrich*, etc.). Incompatibles used in analogous slots in sentences with the same syntactic pattern can also be contrary, but entailment does not always work predictably (cf. hyponymy). In the pair of sentences (1) "He is happy" and (2) "He is depressed" holds that if (1) is true, (2) is false. But if (1) is false (by negation: "He isn´t happy"), then (2) may, but does not have to be true.

Cruse identifies modifications of basic paradigmatic relations which "generally render them in some way imperfect, limited or attenuated" (1986: 96). **Partial relations** are established "between lexical items whose syntactic distributions only partially coincide" (ibid.: 96). There are e.g. partial synonyms which share the same sense but one of the words occurs in syntactic patterns which are restricted to the other, such as *increase* and *rise*, or *finish* (which can be objectless, followed by a gerund, etc.) and *complete* (Cruse 1986: 96).

The next type of relations, **quasi-relations**, occur when there is a gap in the paradigm and the semantically suitable lexical item is not available within the same syntactic category (see Chap. 3.1, Figs. 3.2 and 3.3). No singular countable hypernym exists to co-hyponyms *fork*, *knife* and *spoon*, except for the mass uncountable noun *cutlery*, a quasi-superordinate to the above quasi-hyponyms (Cruse 1986: 97). Wierzbicka (1996: 372) does not even consider these relations as taxonyms: "Semantically, *spoons* are not a kind of *cutlery* or a kind of *tableware*, *cups* are not a kind of *container*, *tables* are not a kind of *furniture*, *skirts* are not a kind of *clothing*, and *dolls* and *rattles* are not a kind of *toy* …" (ibid.: 372). She argues that "linguistic tests show that in the area of artefacts there are no 'supercategories' corresponding to the biological rank of life form" (ibid.).

Pseudo-relations are found between lexical items which are not in a relation and which only imitate some of "the contextual characteristics of that relation under special circumstances" (Cruse 1986: 98). For example, quasi-synonyms just fill the same syntactic slots without being cognitively synonymous.

2 | 6 | 3 Relation between antonymy and hyponymy

Hofmann (1993: 22) discusses the issue of **markedness** in antonymic pairs, and touches upon the connection of antonymy with hyponymy. He states that normally positive things are unmarked and their negative counterparts are perceived as marked. The same is true for male reference in most names of jobs, but there are a few of them where the female reference is unmarked: "In everyday language female is the unmarked sex for secretaries, midwives, prostitutes, ballet dancers and housekeepers as well" (Hofmann 1993: 21). The female form is sometimes formed by suffixation (*manageress*), modification by adding a word (*female doctor*, *woman soldier*), but quite often no modification is necessary (in dual gender nouns such as *teacher*, *accountant*, *student*).

The unmarked form can be used in questions or as a more general term, and a newly formed gender-neutral word is often used to encompass meanings of gender specific forms (e.g. *police officer* for both *policeman* and *policewoman*). Similarly, as Hofmann notes (1993: 23), apart from questions using *how* (*How old is he?*, not **How short is he?*), answers to them "and in fact any quantification of a simple adjective (i.e. modifying it with a number), can use only the unmarked forms." A. Cruse refers to Lyons' term **semantic markedness** in which the unmarked term involves properties common to both antonymous terms and the opposition between them is thus neutralised (2011: 162).

What is already a sort of hierarchy, is using an unmarked noun referring to the quality for both antonyms. In terms of markedness, Hofmann asserts that "The same preference for unmarked forms (-Mrk) is found when we turn adjectives into nominal forms (Noml)" (1993: 23), such as *length* (Noml) for *long* (-Mrk) vs. *short* (+Mrk) or *thickness* (Noml) for *thick* (-Mrk) vs. *thin* (+Mrk). Such nouns "distinguish the various physical dimensions without implying that the object is actually long, wide or deep" (ibid.). Semantic analysis would show that marked forms have an extra semantic component which denotes the less common state (e.g. negation, female gender, lack of a property in question), unlike the unmarked ones, which are considered normal and more usual.

2 | 6 | 4 Markedness – general and specific words

According to Hofmann (1993: 24), "common words normally have simple and general meanings that allow their use in many situations, while uncommon words generally have complex and specific meanings." He refers to such highly marked words as specific. Since the lexicon contains many words for more specific concepts, either created or borrowed, we deal with the relation of **inclusion** of one concept in another or, in other words, **hyponymy**. Hofmann compares inclusion with its analogy, subsets in the mathematical set

theory (1993: 25). The relation can be expressed thus: one set (i.e. a hyponym) is a subset of another set (i.e. a hypernym). Hofmann describes interesting differences in classification of some items between languages, such as *potatoes* which are included among starchy foods in North American English (along with bread and rice), but in Japanese language (and culture) they fall into the category of vegetables (1993: 25). The implication of the classificatory diference is that the Japanese normally eat potatoes with rice (as they are not alternative starchy foods or co-hyponyms), and Americans will not. The possible reason for the difference is that the Japanese used to eat sweet potatoes long before the arrival of American white potatoes, so the slot among starchy foods had been already filled.

Hyponyms are the marked, more specialised words, in contrast with the more general words, **hypernyms**. The benefit of using hypernyms is lessening the demand on knowledge or quick retrievability of a specific lexicon, but they logically fail to express nuances of meaning, which results in a lack of denotative precision. When a hyponym is preferred to a hypernym, Hofmann speaks of "**blocking**" the use of a more general word (1993: 27), e.g. a more common use of the specific word "car" instead of the hierarchically higher "motor vehicle" or "thing" (which has no hypernym whatsoever). He explains further that "we can say that a word with an appropriate meaning … blocks (i.e. prevents the use of) other words, words of more general meaning, and … phrases of several words. … It does not mean that one does or should choose words that are as specific as possible, but only that when one selects a specific word, there is something in that extra meaning that one wants to communicate." (1993: 27)

Hyponyms can be marked for different features (e.g. sex, age, size) and the meaning of hypernyms is often restricted in its usage, i.e. it is blocked. Sometimes an item in the paradigm is missing, either a hyponym or a distinctive hyperonym (see covert categories, Chap. 3.1) .

Table 2.2. Hypernyms and gender-specific hyponyms (family members, English)—lexical irregularities (missing items—covert categories).

Hypernym (gender non-specific)	**masculine**	**feminine**	**Comments**
person / human	man	woman	
parent	father	mother	
child	boy	girl	
child? / offspring *(fml)*	son	daughter	No hypernym that would express that hyponyms will be marked both for gender and one´s parenthood to them (+Mrk).
-	uncle	aunt	Missing hypernym.
-	nephew	niece	Missing hypernym.
cousin	cousin	cousin	No lexical differentiation between hypernym and hyponyms.
- / in laws?	father-in-law	mother-in-law	No singular hypernym.

Table 2.3. Hypernyms and gender-specific hyponyms (family members, Czech)—lexical irregularities (missing items—covert categories).

Hypernym (gender non-specific)	**masculine**	**feminine**	
osoba / člověk	muž	žena	
rodič	otec	matka	
dítě	chlapec / kluk	dívka / holka	Standard (formal) and general Czech dublets.
dítě? / potomek *(fml)*	syn	dcera	No hypernym that would express that hyponyms will be marked both for gender and one´s parenthood to them (+Mrk).
-	strýc	teta	Missing hypernym.
-	synovec	sestřenice	Missing hypernym.
-	bratranec	sestřenice	Missing hypernym.
-	tchán	tchyně	Missing hypernym.

Hofmann claims that general words in series such as *sheep—lamb* and *goose—gander* are often wrongly interpreted as expressing two meanings, one for groups of animals of mixed or unknown gender and another which is contrasted with its supposed opposite with a more specific meaning (i.e. *goose* for female geese, as opposed to *gander*, and *sheep* for sheep when their youth is not relevant) (1993: 29). The specific meaning is thus blocked by a more specific word. Hofmann adds that "we can say that the message 'It is a goose' is vague: it can be used for different situations, but then almost all messages are vague to some extent". In the example of *lamb*, he denies that it would have two meanings (since he considers as restricted the word *mutton* for meat of adult sheep): "the word *lamb* is not restricted to live animals, so it serves as well for the meat; it has only a single meaning" (1993: 30). It is not necessary to adopt a stance here as both conceptions are logical: *lamb* can well be considered as a polysemous expression (1. young sheep, 2. meat of young sheep) or accept Hofmann's view that *lamb* denotes naturally the (young) animal and its meat and just *mutton* blocks it out of the meaning in a restricted area. Coincidentally, in a few commonly consumed meats English uses French borrowings (e.g. *mutton*, *pork*, *beef*, *venison*), not the same words as for animals (as in *chicken*—animal and *chicken*—meat; similarly in *goose*, *duck*, *horse*, etc. capable of being used both generally and specifically).

The theory of blocking explains aptly why descriptive multi-word phrases are not part of the lexicon even though they seem to express the same meaning. For the commonly used words have a more neatly defined meaning (they include extra semantic components), they are preferred in specific situations (cf. Hofmann 1993: 32). Using a descriptive phrase "a decidious tree with heart-shaped leaves" may mean a *lime tree*, particularly in a European context, but not exclusively. The paraphrase also fits *Judas tree* (Cz. *zmarlika Jidášova*), *catalpa* etc., and that is why the shorter, single-word, and more specialised terms are preferred. Another important benefit of their shortness is achieving

economy in language. The paraphrase has a good usage when a semantic feature explicitly mentioned in it is highlighted, such as when comparing it or contrasting it with another concept. So *deciduous* can be contrasted with *evergreen*, *tree* with *shrub* or *herb*, *heart-shaped* with *oval-shaped,* etc. In such a case descriptive precision takes preference over a more economical form, particularly if it is not a very ordinary, frequently used word of whose precise denotation every language user is aware.

This brings us back to **markedness**. Both specialised, rarely used words (this applies not only to single-word items, but also to multiword terms, e.g. *eastern white cedar* (or *northern white cedar / American arborvitae* etc., Lat. *Thuja occidentalis*) or a *white-eared ground sparrow* (Lat. *Melozone leucotis*) and multiword descriptive phrases (paraphrases), e.g. "a country ruled by a hereditary ruler" for *monarchy*, or a "*male duck / samec kachny"* for a *drake,* are marked as they include some additional components of meaning. Hofmann states: "Using a marked word when its unmarked counterpart would do as well is appropriate only if that extra element is true and important to the communication, so doing it naturally creates a type of presupposition, or assumption that the speaker seems to make" (1993: 32–33). Saying "There are fifty *male* and *female teachers* at this school" is in most situations redundant and confusing if the gender of teachers is not meant to be stressed. However, if it is used at a single-sex religious school, whether for boys or girls, the paraphrase communicates the extra piece of information that the teaching staff are *not* single-sex, unlike the pupils.

Different **presuppositions** are made by adding the attributes *male* and *female* to the dual gender nouns *teacher* and *student*. The sentence "The *student* fell in love with a *teacher*" normally uses the words *student* and *teacher* in an unmarked way (provided it is not formulated vaguely in order to confuse hearers, to hide the less expected combination of sexes). It thus implies that (1) the student is a female and the teacher a male, or (2) the student is a male and the teacher is a female. If this sentence were used for situations described in (3) and (4) below, it would be confusing (because the common words are too vague). Therefore, marked and periphrastic expressions are preferred if a presupposition is made that the situation is somewhat unusual, unexpected, out of the norm or deviant.

The modified sentence "The *student* fell in love with a *male teacher*" implies (3) that the student is a male, too. As the love relationship between persons of the same sex is a minority one and was traditionally dispreferred, it is thus socially marked, and as the general, dual gender words do not carry the information about a gender, a marked form (adding information on the sex—a *male teacher*) had to be used. Note that it is not necessary to say "The *male student* fell in love with a *male teacher*" since it would already be redundant. Analogous conclusion can be inferred from the sentence "The *student* fell in love with a *female teacher*": (4) the student is most likely a female, otherwise the specialised and thus marked phrase *female teacher* would not have been used.

It is interesting that the same situations are not denotatively clear (nor are presuppositions made about an unusual same-sex affection) when the other participant, the experiencer subject, is expressed markedly: "The *male student* fell in love with a *teacher*" and "The *female student* fell in love with a *teacher*". The interpretation can well be that the

student has a fairly usual affection for a person of the opposite sex. The difference lies in the arrangement of information which attributes different weights to the theme and rheme. If the *student* is thematic (as initial elements, typically subjects normally are), the attribute *male* or *female* is of little importance, providing just marginal descriptive information. However, if it were stressed, the information would be interpreted as important (a '*male student*, not a '*female student*), although no inference would have to be made about a same-sex affection. To achieve that, the *male/female* attribute would have to be added to the *teacher* as well ("The *male student* fell in love with a *male teacher*." etc.), with stresses just on heads of phrases, nouns, i.e. not used to mark any information.

In sentences with implications (3) and (4), on the other hand, the final element is expectably a rheme, so if the subject is not given a prominent stress on the word *student*, the marked attribute *male/female* added to *teacher* suffices to arouse the presupposition of a same-sex relationship. If the subject *student* is prominently stressed, though, another presupposition is made, namely about the status difference and social inappropriacy of such a potential relationship (it may even overshadow the presupposition aroused by *male/female* before the word *teacher*). The matter can get even more complicated by putting a stress on *teacher* at the same time (thus implying, that the gender sameness is not considered so unusual as the teacher/student status difference).

Nouns tend to be more varied in terms of their inherent markedness than most of the other word classes. Hofmann (1993: 33) says that, "While adjectives can often be described as simply marked or not, nouns and verbs often have a whole range from the very general, through various levels of hyponyms, down to the most highly marked or very specific terms." He also claims that this hierarchy of lexemes is learnt and it exerts influence on the understanding of underlying concepts and speakers´ behaviour (ibid.). Appropriate use of a word, general or specalised, blocks the words not used (its hypernyms) even though they could be used too and have the same meaning, and the specific information contained in the used word is then interpreted as relevant.

3| Lexical hierarchies

3 | 1 Classificatory hierarchies: introduction

Terms of a certain scientific discipline are interconnected semantically, as they are used within a restricted discourse, as well as to refer to entities which have mostly mutual functional links in the extralinguistic reality. The complexity of such relations is then present in a terminology, nomenclature or hierarchy containing lexical units relating to a given area. Various types of sense relations can be established between lexical items, such as synonymy, oppositeness or antonymy (relations hold also within one lexeme, between its different senses, viz. polysemy), and hyponymy in lexical configurations consisting of **branches and ranks (levels)**. Cruse calls **hierarchies** and **proportional series** "the two most complex types of lexical configuration" (1986: 112). Other types of configurations include **doublets** and **clusters**. Types of hierarchies that he distinguishes are taxonomic hierarchies, part-whole hierarchies and non-branching hierarchies (ibid.). Other important relations, such as analogy, distinction between national varieties, between general language, professional dialect and terminology (i.e. stylistic synonymy) are involved as well.

Terminology of a field of activity or a science is hierarchical, i.e. it includes elements which are related to each other in a characteristic way. A hierarchy is defined as "a set of elements related to one another in a characteristic way" (Cruse 1986: 112). Hierarchies fall into two main types, **branching** and **non-branching**. Non-branching hierarchies cannot branch at all, whereas branching hierarchies in some cases have no branches, but they should not be confused with non-branching ones (Cruse 1986: 113). Some monotypic taxons of plants are a famous example of a taxonomy (which is by definition a branching hierarchy) with no branches—e.g. *ginkgo* (Lat. *Ginkgo biloba*, En. *maidenhair tree*) is the only species of the genus *Ginkgo*, which is a single genus of the family *Ginkgoaceae*, which is again the only family in the order *Ginkgoales*[13] (Ginkgo biloba).

The principal relation which characterises any hierarchy is the relation of **dominance** (Cruse 1986: 113). It functions vertically (expressing superordination and subordination). A branching hierarchy is also based on the relation of **difference**, which, in turn, operates horizontally (differentiated are items equivalent as to their level in a hierarchy). Both these relations "must be constant throughout a well-formed hierarchy" (ibid.).

13 Interestingly, Anglo-Saxon and Czech taxonomies stick to different classifications of this taxon at higher levels: in English taxonomies it belongs to a separate division *Ginkgophyta*, but in Czech (and most European) taxonomies its eclusiveness ends in the subdivision *Ginkgophytina* or even lower, in the class *Ginkgopsida*, as all gymnosperms (including the class *Ginkgopsida*) are combined in a single division *Gymnospermae*. (cf. *Květena České republiky*)

Coming back to the relation of dominance, "it must be **asymmetric**; that is to say, it must have a **directional** character" (Cruse 1986: 113). The relation between a superordinate and a subordinate expression is not identical with the relation between the subordinate and the superordinate, but the latter is seen as a converse to the former relation. In practical terms, if *dog* is superordinate (or hypernymous) to *dachshund*, *dachshund* does not stand in the same relation to *dog*. Conversely, it is subordinated (or hyponymous) to *dog*. The other necessary property of dominance is that it is **catenary**, i.e. capable of forming (theoretically) "indefinitely long chains of elements" (ibid.).

It is possible to see that sense relations such as synonymy and antonymy are neither assymetric (because the semantic relations between their member elements are symmetric), nor catenary (because their elements are not part of chains structured on the basis of the same relation; they are rather sets, pairs, etc.). On the other hand, hierarchical structures are well-suited to the sense relations of **taxonymy** and **meronymy**, sub-classes of a broad relation of hyponymy.

Lexical hierarchies are composed of items which have a certain position that can be described clearly as either lower or higher relative to other items. Hierarchies typically reflect social **relationships**, consisting then of ranks (*(...) major general—brigadier—colonel—lieutenant colonel—major—captain (...)*), they are **quantitatively** motivated (*tonne—kilogram—gram—miligram*), or they are based on distinguishing different **levels of abstraction**. (Crystal 1995: 168).

Cruse (1986: 114) further distinguishes a **transitive** and an **intransitive type** of dominance relation. The transitive relation is defined as transferable over the boundaries of elementary relations, following the same principle (if it holds between A and B, and between B and C, it also holds between A and C). This is not the case with intransitive relations, which, despite holding between the first pairs of elements, do not hold between A and C. To circumvene the question of transitivity, it is possible to express the relation so that all members of the set are in some relationship to a single element (ibid.). The elements of such a relation can be "arranged to form a continuous chain" (ibid.). Non-branching hierarchies are exactly like this, but in branching hierarchies this results in several parallel chains, all originating in the same item at the highest level. In order to be a hierarchy, the branches must not converge.

An important property ensues from this, namely **differentiability**, which is inseparable from the relation of dominance. According to Cruse, "to be differentiable, a relation must be capable of being directed along mutually exclusive pathways in an indefinite number of successive stages" (1986: 115). He illustrates this on the relation "larger than" which corresponds only to a non-branching hierarchy (ibid.: 116), as two items defined by this relation must not appear at the same level.

Differentiability is particularly important in taxonomic and meronomic hierarchies. The nature of a taxonomic classification is that "the lexical items in a taxonomy may be thought of as corresponding to classes of things in the extra-linguistic world" (Cruse 1986: 116). Each class (whether it is termed more precisely as an order, class, subclass, family, genus, etc.) is divided into sub-classes and those are further subdivided, This

subdivision "can be repeated, at least in principle, indefinitely, without convergence (i.e. without producing classes that have members in common)" (ibid.).

Another differentiable relation is the relation between the whole entity and its parts (a **meronomic relation**). A branching lexical hierarchy is the product of division of the whole into parts and further of the parts into sub-parts (this process should be capable of repeating successively), all these parts and their parts being disjunct, i.e. not overlapping or identical. Cruse says about taxonomy and meronomy that "these two branching hierarchies, which are the only types of any general lexical significance, have relations of dominance which are not merely differentiable, but which in some sense are inherently differentiated" (ibid: 116). That means that division into just one subclass or one part cannot exist; more than one are always presupposed in a branching hierarchy.

So, every taxonomy requires differentiation into more than one sub-class, as much as every whole-part relation presupposes the existence of more than one part of the entity. There are definitely hierarchical nodes with no branches, but they have clearly defined levels. E.g. a monotypic class (more precisely, a division) of *ginkgos*, gymnosperm trees, has one order, one family, one genus and one species (*Ginkgo biloba*) in the botanical taxonomy.

Hierarchical levels (each item of a hierarchy belongs to a particular level) may be defined in two ways: the **technical** conception is based on counting the nodes removed from the origin of the hierarchy. This functions in both branching and non-branching hierarchies, but problems may arise if the position of a lexical item at a certain level (or its distance in nodes from the origin) does not correspond with the language users' awareness or feel. Their way of construing and using a hierarchical structure simply differs from the technical conception. Some nodes at certain levels in some branches of hiearchies may not be utilised and skipped, or they may remain further unbranched while others are branched into subclasses or parts.

This type of hierarchy, characterised by ignoring some identifiable higher, more abstract levels, conflicts with levels determined more rigorously. Cruse states that if there exist "definite intuitions about which elements belong at a given level, we may speak of **substantive** levels. In an ideal hierarchy, technical and substantive levels would be congruent (…)" (1986: 118). In conflicting situations, however, the substantive classificatory levels are usually more powerful.

The **taxonomic principle is specially linked with the domain of "living things",** supporting thus also the existence of domain specificity in cognition (Wierzbicka 1996: 352). Wierzbicka argues that "the universal principles of folk-biological taxonomy include a presumption of "underlying natures" or hidden essences" (ibid.: 352), contrary to Putnam (1975)[14], who considers this rather as typical of natural kind concepts (Wierzbicka 1996: 353). Atran[15] (1987a: 28, qtd in Wierzbicka 1996: 370) also asserts

14 H. Putnam, The Meaning of Meaning. In K. Gunderson (Ed.), *Minnesota Studies in the Philosophy of Science*, vii, (Minneapolis: University of Minnesota Press, 1975), 131–193.

15 S. Atran, Ordinary Constraints on the Semantics of Living Kinds: A Commonsense Alternative to Recent Treatments of Natural-Object Terms, *Mind and Language*, *2*/1, 27–63.

that "the semantics of living things is different from the semantics of artefacts" and "hierarchical rating of living kinds is apparently unique to that domain" (Atran 1987a: 41, qtd in Wierzbicka 1996: 372). Finally, Hunn[16] (1987: 147, qtd in Wierzbicka 1996: 372) claims that "… a transitive hierarchy (however shallow) is to be expected in the classification of flora and fauna".

Cruse mentions findings of anthropological linguists and ethnolinguists who studied **'natural'**[17] **taxonomies**. They claim that such taxonomies "typically have no more than five levels, and frequently have fewer" (1986: 145). Biological focus reflected in the names referring to levels is also characteristic, particularly because they originate from classifications of living things. The suggested five biology-inspired levels in 'natural' (or folk) taxonomies are the *unique beginner—life-form—generic—specific—varietal* (see Fig. 3.1.). Only the life-form level (e.g. *tree, bird*) cannot be used outside of biological taxonomies, but using the label *kind* instead enables it.

Wierzbicka (1996: 358, referring to Berlin, Breedlove and Raven 1973,[18] Berlin 1981[19]) lists criteria that categories must possess to be **"life forms"**: these are only few in number and must be "polytypic", i.e. they are considered as "comprising many different kinds of entities" (ibid.). In zoology, life forms would be *animal*, *fish*, *bird* and *snake*, and possibly also *insect* (Wierzbicka 1996: 358). Polytypicity must be recognised lexically: folk terminology must contain primary lexemes for various kinds. Therefore, e.g. *spiders*, *ants*, *snails*, *worms*, *bugs*, etc.) are not life forms as there are no "names (primary lexemes) for different kinds of spiders, ants, or snails" (ibid.: 361). The reason might be lack of practical need and consequently lack of interest in naming various kinds of these small animals in a colloquial language.

Specialist taxonomies, such as taxonomies of technical and natural sciences, do not differ from folk taxonomies only in the application of different criteria stemming from a necessarily higher degree of rigour, but also in the number of levels. Biological taxonomy illustrates this aptly (see Figures 4.8 and 4.12). The total number of levels from the beginning level downwards, if it is shifted higher than *kingdom* (*Plants*), would be about 10: *domain—kingdom—subkingdom—division subdivision—class—subclass—superorder order—family—genus—species*. On the other hand, in the terminology of finance and accounting, rarely may more than five levels be found; and the usual number is even lower. This is probably directly linked with the practical purpose and use of financial terminological hierarchies, unlike the purely scientific function of botanical, zoological and other biological taxonomic classifications.

16 E.S. Hunn, Science and Common Sense: A Reply to Atran, *American Anthropologist*, *89*/1, 146–149.
17 Natural or folk taxonomy in this sense is understood as one used actively by a general speech community, i.e. not a specialist community. **The term natural' is then applied differently from other instances in this book** (esp. Chapter 6.1) where it means a classificatory hierarchy of concrete, tangible entities, not abstract concepts ('natural' is contrasted with 'artificial' there).
18 B. Berlin, D. Breedlove & P. Raven, General Principles of Classification and Nomenclature in Folk Biology, *American Anthropologist*, *75*, 214–242.
19 B. Berlin, The Concept of Rank in Ethnobiological Classification: Some Evidence from Aguaruna Folk Botany. In R. Casson (Ed.), *Language, Culture and Cognition*, (New York: Macmillan, 1981), 92–113 .

Also, speakers are mostly aware of the term at the so-called **generic level**. This is the level with "the ordinary everyday names for things and creatures" (Cruse 1986: 146). Such names are usually unmotivated and morphologically simple. The generic level also tends to be the terminal level of taxonomies. "Items which occur at specific and varietal levels are particularly likely to be morphologically complex, and compound words are frequent" (ibid.). This book will, however, demonstrate later that items at the higher, more abstract (artificially formed and more scientific) levels tend to be morphologically complex as well.

Levels	Examples (1)	Examples (2)	Examples (3)
● unique beginner	creature	plant	thing/object
●● life-form / kind	animal	tree	machine / vehicle
●●● **generic**	**dog**	**cherry**	**car**
●●●● specific	alsatian	Japanese flowering cherry (Prunus/Cerasus serrulata)	hatchback
●●●●● varietal	N/A	Kanzan	Škoda Fabia

Figure 3.1. Levels in a natural (folk) taxonomy.

Logically, scientific taxonomies include many more levels, especially above the generic level.[20] This is why the life-form or kind level in folk taxonomies cannot be unequivocally supplied: is it *animal*, or rather *mammal* or *beast*? Is it *machine* or more specifically *vehicle*? Also, scientific taxonomic hierarchies differ, not only by their complexity, from folk taxonomies, particularly in that they have **gaps** at certain levels due to users' classificatory misconceptions. Cruse (1986: 146) exemplifies this by the popular belief shared by some speakers of English who consider small garden birds such as *blackbird*, *robin* and *starling* to be terms at the varietal level, comparable with breeds of *dogs* (1986: 146). Thus, such speakers either skip the generic level in birds (and the category *bird* is thus at the higher level of life-form, on a par with *animal* (which, in respect of zoological taxonomy, represents a difference of several levels between the class *Aves* (*birds*) and its superordinate kingdom *Animals*), or they place *bird* down to the generic level, skipping thus the level of life-form. This placement is regarded as more probable, as the generic level tends to contain natural kind terms (*dog*, *cat*, *cow*, *crocodile*, *bird*, …).

Wierzbicka (1996: 359) notes a discussion in Berlin, Breedlove and Raven (1973) who suggest *mammal* as a life form and *animal* as only a "unique beginner" (taxonomically, a life form is the first level below the unique beginner). Wierzbicka believes that *mammal* does not belong to an English folk taxonomy (it is a scientific concept). She asserts that, "Scientific concepts such as *mammal* stand for classes, not for individuals …" (1996: 359). Since *animal* does not refer to individual *spiders* or *ants* (ibid.), it is not a "unique beginner"

20 See Alan Cruse (2011: 61–62), who provides detailed characteristics of the properties of basic-level, superordinate-level and subordinate-level categories.

in folk English usage. It seems to be rather a life form, whereas *creature* is a "unique beginner" (or a covert category—see below). Wierzbicka stresses that *animal* is not just a colloquial equivalent to *mammal* (e.g. spiders, snags, ants, butterflies would not be referred to as *animals*; also people are *mammals*, but not, colloquially, *animals*) (1996: 360).

Taxonomic hierarchies sometimes contain a category which denotes a set of concepts but lacks a label (Cruse 1986: 147). Names of colours do not have an adjectival superordinate, nor do some objects have a labelled superordinate, such as some tools or musical instruments (*bagpipes*, *concertina*) (ibid.). Superordinate categories including such instruments which seem to be difficult to classify, but even other concrete instruments like *violin, guitar,* or *trumpet*, can be labelled only periphrastically, using a descriptive adjective. Categories without names (but whose existence can be proven by tests) are called **covert categories** (ibid.: 148) and they rather occur at higher, more general hierarchic levels.

When several options are tested examples of a category (typical taxonyms), some are preferred—they are the **prototypical members** of the category in question (Cruse 1986: 148). For example, a diagnostic statement "A *fennec* is a better example of a beast than *tiger*" sounds strange, but when the two animals are swapped, it sounds correct. Thus *tiger* is rather a prototypical co-taxonym subordinated to *beast* (zoologically, the order *carnivores*).

Peripheral categories are linked to non-prototypical, marginal members of classes. *Potatoes* are classified as *vegetables*, but an idea of a vegetable salad or a basket with vegetables usually does not include potatoes, at least not in the first place. Cruse mentions an interesting fact that a lexeme can often "include lexical units functioning at more than one level of taxonomic specificity" (1986: 149). Lexical units with differently specific senses are restricted in their use, so e.g. one is neutral or more unmarked (*in the zoo I like monkeys the most*), the other or others is/are more specific (*Only apes, that is gorillas, chimpanzees and orangutans, can learn some sign language, not monkeys.*) In the first sentence the speaker evidently included *apes* among his favourite ZOO animals as well, although he used the (zoologically incompatible) label *monkeys*.

Taxonomic hierarchies often employ **quasi-relations**, such as the quasi-superordinate *colour* (a noun) for adjectives denoting colours (Cruse 1986: 149). Another typical pattern is mass nouns used at higher, more general levels in taxonomies, and count nouns at the lowest levels, or even those with collective nouns with a plural concord at the higher levels (ibid.: 149–150). An example of the former may be *fruit* or *baggage* (Fig. 3.2), of the latter *brass (instruments)* (Fig. 3.3), as proposed by Cruse (1986: 150).

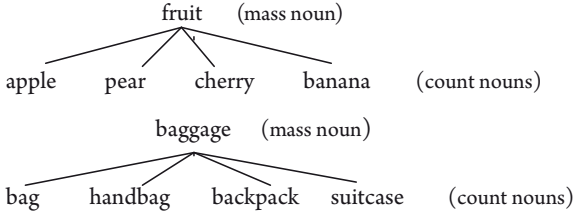


Figure 3.2. Hierarchical quasi-relations: absence of count hypernyms.

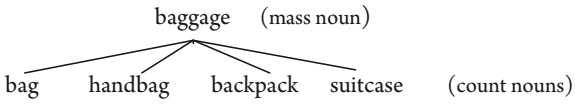


Figure 3.3. Hierarchical quasi-relations: taxonomy with a plural count hypernym.

This phenomenon is also characteristic of scientific taxonomies, particularly above the generic level, but this is not very common in English due to its analytic character. In synthetic languages the genera, subfamilies, families, orders, superorders, classes, phyla, etc. in biological taxonomies tend to have an adjectival status. However, this is rather true for botanical taxonomies. In zoological ones (Czech/Latin/English), the genera are countable nouns, e.g. *pes/Canis/dog, hyena/Crocuta/hyena, liška/Vulpes/fox* etc., the family is adjectival in Czech—*psovití/Canidae/the dog family, hyenovití/Hyaenidae*, but the higher ranks are nominal again in Czech and English (the class is *savci/Mammalia/mammals*, the order *šelmy/Carnivora/carnivores*, the phylum *strunatci/Chordata/chordates*, etc.).

Quasi-categories are thus logically more frequent at superordinate levels, where they are created often by abstraction, as descriptive labels. The normal word class of the members of taxonymy is then represented at the generic and specific levels. An analogy can be drawn with covert categories which are also typically superordinate—"established by superordination—that is to say, it is only the behaviour of a set of taxonyms which can point to the existence of a covert category" (Cruse 1986: 150).

In her paper "Apples are not a Kind of Fruit: The Semantics of Human Categorization"[21], Wierzbicka identifies the links between semantics of concepts and the corresponding grammatical forms of lexemes in quasi-relations as follows:

> To summarize the discussion of nontaxonomic supercategories, purely functional concepts such as *toy* are defined in terms of what for; collectiva-singularia tantum such as *furniture* are defined in terms of what for and where; collectiva-pluralia tantum such as *leftovers* are defined in terms of where and why; and pseudocountables such as *medicines* are defined in terms of what for and where from. In addition, all four of these types of non-taxonomic supercategory are defined in terms of the mode of use: functional concepts stand for individual indivisible things; collectiva-singularia tantum stand for groups of indivisible things; collectiva-pluralia tantum stand for groups of things, divisible or not; and pseudo-countables stand for 'stuffs' and divisible things." (1984: 325, quoted in Wierzbicka 1996: 372)

Co-taxonyms are by rule incompatibles, but this can be problematic in some verbs with more senses. The narrower sense of such a verb can be interpreted as a hyponym of the verb with a broader sense and can thus be distinguished from another hyponym which would otherwise appear as a synonym of the original superordinate verb. Cruse illustrates this with the verb $roast_1$, itself hyponymous to *cook*, which is superordinated to the narrowly defined $roast_2$ and to its co-taxonym *broil* (1986: 151). Cruse's conclusion

21 A. Wierzbicka, Apples are not a Kind of Fruit: The Semantics of Human Categorization, *American Ethnologist*, *11*/2, 313–328.

is also that the meanings of verbs and adjectives are much more dependent on the context than the meanings of nouns (ibid.: 152). He claims that "hierarchies composed of unattached verbs (…) fail to display the rigid semantic structuring shown by hierarchies composed of nouns" (ibid.), but the meaning can turn more definite by attaching them to a specific noun phrase as its subject.

Taxonomies should never be convergent structures, with one hyponym of two superordinates. If this seems to occur, it is rather caused by **intersecting taxonomies** (Cruse 1986: 152); in other words, the seeming superordinates belong to different taxonomies built upon different criteria, each of which is divergent.

3 | 2 Taxonomy

3 | 2 | 1 Properties of taxonomy

Taxonomic lexical hierarchies are based on the sense relation referred to as **taxonymy**. Taxonymy is in fact a subtype of **hyponymy** since the taxonyms of a lexical item form a sub-set of its hyponyms. Taxonymy is defined as the relation of dominance in a taxonomy (Cruse 1986: 137). **Co-taxonymy** then is the relation holding between sister nodes (Cruse 1986: 136). A taxonomy basically requires employment of two sense relations: **hyponymy** between daughter-nodes and their correspondent mother-nodes, i.e. in the vertical direction, and **incompatibility** between sister-nodes, i.e. at the horizontal level (ibid.). However, it is even possible to create taxonomies whose hyponyms are not incompatibles.

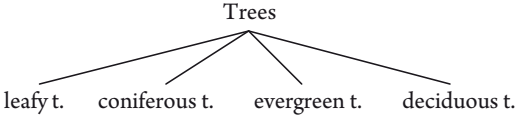


Figure 3.4. Taxonomy with incompatible hyponyms.

All the co-hyponyms above are differentiated, all of them are subordinated to the dominant, more general item, but the configuration is not well-formed. There are obviously trees which are leafy and evergreen at the same time (e.g. *olive*) or coniferous and deciduous at the same time (e.g. *larch*). The co-hyponyms thus are not incompatibles because the classification mixes up two different criteria.

Taxonomy can be seen as a converse relation to dominance as its direction is from the bottom to the top. Taxonymy can be paraphrased by "**A is a kind/type of B**" (Cruse 1986: 137). This relation holds specifically for taxonomy (*Waltz is a kind of dance. A blackthorn is a kind of tree.*), but not for hyponymy in general—many such statements are questionable (**Son is a kind of child. *Widow is a kind of woman. *Woman is a kind of person.*) In verbs, the test frame for taxonymy may be "X-ing is a way of Y-ing" (Cruse 1986: 139),

e.g. "Jogging is a way of running". Not all hyponyms qualify for taxonymy. Cruse illustrates this by *travel* and *walk* being hyponyms of *move*, but only *walk* can be regarded as a taxonym (1986: 139), as it cannot be stated that **Travelling is a way of moving*. Semantic unity between paronyms usually guarantees that taxonymy identified in verbs is also found between their nominal equivalents, whether the verbs or nouns were primary forms in derivation (*Jogger is a kind of runner*.)

3 | 2 | 2 Natural and nominal kind hyponyms

When the nature of taxonomy is to be analysed (to distinguish it as a specific subtype of hyponymy), Cruse points out "a strong correlation between taxonyms and what are called **natural kind terms**, and between non-taxonymic hyponyms and **nominal kind terms**" (Cruse 1986: 140). Nominal kind terms correspond to "analytic definitions containing a superordinate with a modifier" (ibid.: 140), e.g. *cognac* equals *wine brandy* and *bull* is a *male bovine*. A nominal kind term yields a hyponym which can be seen as "encapsulating a syntagmatic modification of its superordinate" (ibid.: 140). A nominal kind term mentions explicitly the entailing superordinate and adds a specific feature: *a female dog.* The nominal kind term paraphrases the natural kind term, a *bitch*. The term *cash*, paraphrased as *liquid money* or *money in the form of notes and coins*, clearly indicates the superordinate category (i.e. *money*), i.e. the natural kind term, which is specific and its meaning is inherent in the expression without any clue being given.

Natural kind hyponyms cannot be expressed by modification of their superordinate; there are many aspects which would have to be described. Taylor asserts that a "natural kind term like *bird* is presumed to correspond to some real phenomenon in the world, whose inner constitution determines the range of things in the category. … natural kind categories might be expected to have clear boundaries and not to display degrees of category membership" (2003: 47). Thus *waltz*, *jive*, *foxtrot*, etc. must be defined as a specific kind of dance in the end, by a thorough definition, and so must be *carnation*, *daisy*, *tulip*, or *badger*, *goldfinch*, *hare*, etc. Paraphrasing them simply as "a red flower", "striped beast" or a "long-eared animal" would not be sufficient.

Natural kind terms also, according to Cruse (1986: 141), "show certain resemblances to proper names in the way that they refer". Together with proper names, they are "rigid designators" (ibid.), i.e. "referents would not lose their entitlement to their current labels whatever changes in our perception of their nature were to come about" (ibid.). So even when the knowledge of and the perception of e.g. a *badger* changes, there is hardly any other way than to keep referring to them by the original name.

Nominal kind terms, if the concept changed, would disallow the application of both the syntagmatic modification and the term as such. So if *boys* were not definable as "non-adult male humans" (e.g. not male, not young, not humans), it would make no sense calling them *boys*. Cruse says that natural kind terms tend to name natural species and substances, whose meaning "cannot be established by dictionary definition" (1986: 141).

Natural kind terms (i.e. true taxonyms) can also be tested positively for the capability of referring to a type of entity (Cruse 1986: 141), unlike nominal kind hyponyms. So it sounds normal to say "This *pear* needs storing at a low temperature" as it obviously means "this type/kind/sort/cultivar" of *pear*. Contrary to this, saying "This *seedling* is suitable for grafting" means a specific plant, not a type/kind of it. *Seedling* is thus a nominal kind term, which can be paraphrased by syntagmatic modification as "a young plant/tree", and is not a rigid designator.

Sometimes hierarchies composed of nominal kind terms depend on underlying natural kind taxonomies. In science, taxonymies are based on hierarchies of terms which are clearly, analytically and unequivocally defined, which is a characteristic property of nominal kind terms. This raises the question about the correlation between natural kind terms and taxonyms.

To identify taxonymy, Cruse suggests sticking to "the good category principle", which means that in creating a taxonymy by dividing a superordinate concept it is essential to "create categories with the highest possible degrees of resemblance between co-members, combined with the maximum possible distinctiveness from members of other categories (especially sister categories)" (1986: 143).

However, basing the good principle on a superficial similarity would be misleading and would not yield a correct taxonomy. Some plants of different genera are more similar to each other than to other species belonging to the same genera (e.g. *apples* and *pears*, namely *nashi*; or the wide variety of forms that *oaks* display), so the good category principle will have to stem from more relevant biological properties than those immediately visible. In animals with considerable visual differences between sexes (sexual dimorphism) using relevant criteria should prevent joining males or females of different species or even different genera into the same taxonomic sub-division. Biologically, "to be maximally like a species, a sub-species or variety would at least have to be capable of reproducing itself", which proves the incorrectness of same-sex sets. It is problematic in many areas, though, so analogues to natural species are sought by "creating where possible sub-classes that require encyclopaedic characterisation, in preference to classes that can be characterised by means of a couple of clear-cut semantic traits" (Cruse 1986: 144).

The hierarchy of language families, further divided into subfamilies (or groups), subgroups, branches, etc. can be suggested as an illustrative taxonomy (before the extensive taxonomic system of biological species, genera, families, etc. is presented here). This "tree" manifests characteristic features of taxonomies, in particular:

- it contains **natural kind terms** at the lowest level (names of individual languages);
- it displays the **'type/sort/kind/variety of' relationship** between a hyponym and its hypernym;

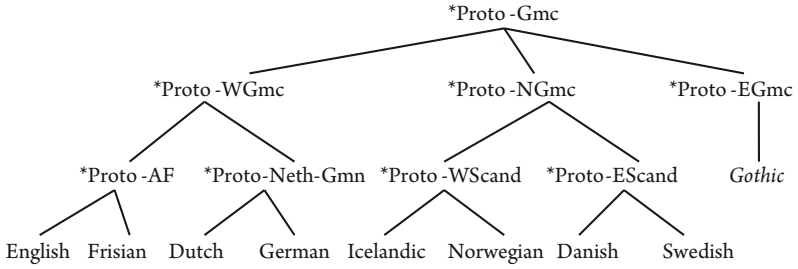
- the members at individual levels **share a certain degree of similarity**, based on genetical relatedness here (like between biological species);
- a scientific taxonomy consists of a considerably **larger number of levels** than generally-known and widely-used folk taxonomies.[22]

One more feature is also common to both the hierarchy of languages and the system of biological taxons—it is the **evolutionary foundation** of such taxonomic classifications. The **genetical** (or genealogical) classification of languages is based on the assumption that languages belonging to the same family (or subfamily, branch) have descended from the same ancestral language, a proto-language. Therefore, apart from the enumeration of related languages (manifesting a high degree of analogous structural patterns and many similar lexical items), such a taxonomy involves an evolutionary aspect, the relation ´ancestor–descendants´. Other, non-genetical, classifications are particularly based on **typology** and on the **geographical distribution** of languages.[23]

Thus, two different types of genetically-organised taxonomic hierarchies can be constructed for languages:

1. The **family-tree-diagram** where the **ancestral language** sits at the top and branches are drawn downwards and sideways to show the younger languages that have evolved from their ancestors. Such hierarchies may consist of several levels, since proto-languages which may be deemed ancestral to several descendant languages may themselves share a common ancestor with other proto-languages spoken in the same period. The obvious drawbacks of the tree diagram are the dominance given to **divergence** (but languages may also converge, i.e. come closer), disregarding detail (e.g. some mid-levels in development), and failing to distinguish clearly enough between languages and dialects.

22 M. Ruhlen´s classification of languages (M. Ruhlen, *A Guide to the World´s Languages—Volume 1: Classification* (Stanford University Press, 1987)) even consists of as many as 17 hierarchical levels.
23 It is rather the geographical proximity, however, than a proven genetical relatedness which has been used as the underlying classificatory criterion in the case of the Caucasian family. A large variety of small Caucasian languages often have very distinct lexis and unclear links.



Abbreviations and symbols:
* - reconstructed proto-languages
italics - extinct languages
Gmc - Germanic
WGmc - West Germanic NGmc - North Germanic EGmc - East Germanic
AF - Anglo-Frisian Neth-Gmn - Netherlandic-German WScand - West Scandinavian
EScand - East Scandinavian

Source: According to J. Lyons, *Language and Linguistics. An Introduction* (1981), 186.

Figure 3.5. The family-tree-diagram of the Germanic languages.

The family-tree-diagram above (after Lyons 1981: 186) fails to include some stages and variations in the development of Germanic languages, e.g. stages in the development of English (*Old English*, *Middle English*, etc.) and their temporal parallels in other branches, as well as the earliest recorded ancestral languages to modern Germanic languages (such as *Anglo-Saxon*, *Old High German*, *Old Norse*).

2. The **enumeration** (a **list** of taxons) which reflects the individual hierarchical levels (families, subfamilies, branches, groups of languages, languages) in a "report form", running from the top to the bottom of the page and graphically distinguishing the sets of members at individual levels from each other. The highest taxon is not an ancestral language here, but **a hypernym** whose meaning is included in the meaning of relevant hyponyms (e.g. the hypernym *Germanic languages* entails *English* and *Dutch*, just as either of these languages is included in the extension of the family of *Germanic languages*). Another difference of an enumeration from a tree-diagram is that the evolution from ancestors to descendants is not shown; instead, the **synchronic** classification of related languages is used (although a group composed of extinct languages is usually added into each family).

(Language family:)

1 Indo-European family

(Branch:) (it contains groups of languages and isolated languages)

European

(Groups and isolated languages:)

1 Baltic languages

(Languages:)

Lithuanian, Latvian;

dead language: Prussian

2 Slavonic languages

West (Slavonic): Czech, Slovak, Polish, Sorbian, Kashubian;

South (Slavonic): Slovenian, Serbo-Croatian (or Serbish, Croatian), Bulgarian, Macedonian;

East (Slavonic): Russian, Ukrainian, Belorussian;

dead languages: Old Church Slavonic, Polabian;

3 Germanic languages

North (Germanic) or Scandinavian: Icelandic, Norwegian (i.e. Bokmal and Nynorsk), Danish, Swedish, Faroese;

West (Germanic): English, Frisian, Dutch, Flemish, Afrikaans, German, Tüütsch, Yiddish, Luxembourgish (Lëtzebuergesch);

dead languages: Gothic (Visigothic, Ostrogothic), Vandalic, Langobardian, Burgundian;

4 Celtic languages

(...)

5 Romance (or Italic) **languages**

(...)

6 Greek (or Hellenic)

7 Albanian

8 Armenian

9 Other extinct languages

Etruscan, Dacian, Siculian, Venedian, Frygian, etc.

Asian

10 Indic languages

(...)

11 Iranian languages

(...)

12 Dardish languages

(...)

13 Hittite -Luvian or **Anatolian** *(all are dead)*

12 Tokharian *(dead)*

Source: Adapted from František Čermák, *Jazyk a jazykověda* (2001), 64–72.

Figure 3.6. The enumerative (listing) classification of Germanic languages within the Indo-European family. (Baltic and Slavonic languages are also presented in full extent; other groups just to show the extent of the Indo-European family.)

There are about **15 more families** of languages (Čermák 2001: 66–71), co-hyponymous with the Indo-European family[24], and several isolated languages, which are not classifiable as members of any family (among them are Japanese, Korean, Basque, etc.). Sometimes geographical subgroups (such as the Ibero-Romance languages within the family of Romance languages) or geographical complexes are distinguished (such as the Balkans, including Greek, Romanian, and the regional South Slavonic languages). Some families are sometimes also combined into one for their closeness, such as the Balto-Slavonic languages, and some, based on the assumption of a common proto-language, are combined into big groups, called **macroclasses, phyla or superfamilies**. Thus, the hypothetical Nostratic superfamily combines the Indo-European, Hamito-Semitic, Kartvelian (or South Caucasian), Altaic (namely the Turkic group), Uralic, and Dravidian languages. Several other phyla are assumed to exist: the Afro-Asiatic, the Sino-Caucasian or Dene-Caucasian (including Basque and Sino-Tibetan languages), the Amerind, and the Austro-Asiatic or Austric (or Miao-Yao or Tai) (Čermák 2001: 72). The existence of classifications which assume hypothetical higher taxons than the generally accepted 16 or 17 families, inserting thus another level to the hierarchy, provides more evidence of the **scientific origin and purpose** of classification of languages, where the continuing comparison of languages and reconstruction of proto-languages may result in further grouping and re-grouping.

3 | 2 | 3 Taxonomic overspecification and underspecification

In communication, a speaker or writer needs to choose the appropriate degree of specificity so that the addressee can identify the referent (Cruse 1986: 153). The necessary degree of semantic specificity depends on the situation, especially on the retrievability of unspoken information from the context. Cruse subsumes that "the situation sets a clear lower limit of specificity", but he asserts that there is no analogous upper limit to specificity, giving the speakers relative freedom to determine it.

The phenomenon of supplying more information than "the basic functionally prescribed minimum" is called **overspecification** (ibid.: 154). Limitations to overspecification exist, but they are rather psychological or pragmatic. Specificity of an expression can be increased either syntactically, by adding modifiers (*house—that small yellow brick house by the railway bridge*), or by using hyponyms, i.e. more specific lexical units (*tree—black locust*) (cf. Cruse 1986: 154).

The opposite referential approach, **underspecification**, also has its communicative roles. Naming units at the taxonomically generic level provide normal and unmarked names for most entities. Also, "provided the basic functional requirements are met, a generic term produces an unmarked utterance (…) even when, from the strict functional point of view,

24 Ruhlen (1987) suggests a taxonomic classification consisting of 17 families of languages. The Indo-European languages are included in the Indo-Hittite family.

it represents an overspecification" (Cruse 1986: 154). Thus, saying "Take that *textbook* off the table" is not regarded as overspecification even if the textbook were the only object on the table and using the general superordinate *thing* or *object* would be referentially sufficient.

Cruse formulates two consequences thereof. The first rule is "that a generic term can never be used as a marked overspecification: either it is neutral, or it is functionally an underspecification" (1986: 155) Secondly, if the generic term provides more information than is referentially necessary, it is possible to use "a marked, but functionally adequate, underspecification by using a superordinate of the generic term" (ibid.). Employing the word *thing* instead of *textbook* in the previous example would suffice referentially, but the sentence would not be neutral. Cruse feels that avoidance of the generic expression "is often to add negative emotive overtones to the utterance" (1986: 155).

In conclusion, knowing the location of lexical items "in a taxonomic hierarchy relative to the generic level" (Cruse 1986: 155), which is "an inherent property of lexical items" (ibid.), is instrumental in establishing their complete semantic content and appropriateness in particular situations.

3 | 3 Meronomy

3 | 3 | 1 Meronyms and holonyms

Meronomy is a **part-whole** type of branching lexical hierarchy. (Cruse 1986: 157). Such type of hierarchy is easy to find in the natural environment (parts of a human or animal body, of a plant, a glacier, etc.) or in technical disciplines (parts of an engine, device, tool, etc.). When such a hierarchy of naming units corresponding to the structure of a physical object or division of an abstract entity exists, it forms a system of meronymic relations. **Meronymy** is the semantic relation existing between a lexical item denoting a part and an item denoting the corresponding whole. The relation between lexical units denoting sister parts, i.e. those at the same level, is referred to as **co-meronymy**.

Meronomy requires "fully integrated and cohesive physical objects, with well-differentiated parts" (ibid.). There is a clear distinction between the concepts of 'piece' and 'part': a piece must have been "spatially included within its whole" before becoming a piece and it must be "spatially continuous" (Cruse 1986: 158) The "—piece of—" relation is "transitive, asymmetric and catenary; furthermore, it is inherently differentiated" (ibid.). However, arbitrary pieces, which can be divided into further arbitrary pieces, do not yield any lexical hierarchy.

Parts, similarly to pieces, have spatial continuity, and they are topologically stable and related with their wholes and with sister parts (Cruse 1986: 158). However, parts differ from pieces by being autonomous and having non-arbitrary boundaries (ibid.: 158–159). Autonomy means that a part, unlike a piece, does not have to be an authentic part of the corresponding whole, but it must be structurally identical to such a part. Non-arbitrary boundaries mean that parts are (at least potentially) discontinuous with and separable from their sister parts.

If a whole without a part were defective and incomplete, the word denoting a part would be a **canonical meronym** (e.g. *wheel*) and the whole a **canonical holonym** (e.g. *bicycle*) (Cruse 1986: 162). If the relationship is optional, such as between a *house* and a *loft*, *loft* is a **facultative meronym** of its holonym, *house*. Depending on the combination of canonicity and facultativity between a meronym and a holonym and vice versa, these relations can be unilateral or bilateral (ibid.: 162). The loosest combination, a bilaterally facultative relation, cannot be reasonably considered to be a basis of a lexical relation, but it can describe the hierarchical relationship between concepts in a specific situation. A garden does not need to include a fountain, and a fountain is not necessarily located in a garden, but if we draw a meronomic hierarchy for the sentence "The beautiful garden of the abbey has a rare collection of exotic plants, a small lake and a fountain", *fountain* will be a facultative meronym of its facultative holonym, *garden*.

The above-described "optionality or necessity" of the relation (Cruse 1986: 162) is one of the factors that proves or limits the chance of a lexical item being a meronym. Another test is checking the **congruence** between two lexical items. Cruse states that the only one out of four congruence relations which is not compatible with meronymy is **disjunction** (ibid: 163). **Inclusion** is one of the congruence relations that applies. According to Cruse, two situations occur: the meronym can be more general than its holonym "in that without ambiguity it stands in the same relation to at least one other holonym" (1986: 163). *Wheel* and *car* serve as a good example ; *wheel* has alternative holonyms such as *lorry*, *van*, *train*, *bicycle*, *motorcycle*, etc. Using the pair of examples *nail* and *toe*, Cruse identifies *nail* as "a super-meronym of *toe*, which entails that *toe* is a hypo-holonym of *nail*" (1986: 163). *Nail* is a canonical part of *toe* (and of *finger*), so it is "a bilaterally canonical super-meronym of *toe*" (ibid.: 163).

The second situation occurs when the holonym is "the more inclusive term in a mis-matched pair" (Cruse 1986: 163). Cruse illustrates this with a more inclusive holonym *flower*, which is a "bilaterally canonical super-holonym of *sepal*" (1986: 164), since not all flowers have sepals. A marginal case of meronymy is when a part can sometimes constitute the whole. Cruse's example of *blade,* which can make up the whole *leaf* if a stalk is absent, represents **holo-meronymy** (i.e. *blade* is a holo-meronym of *leaf*, which itself is the holonym) (1986: 165).

Meronomies (and taxonomic hierarchies in general) follow certain principles which determine the type of differentiation of the reality. If a whole is divided into separable, spatially or perceptually cohesive parts, these are referred to as **segmental parts** (Cruse 1986: 169). In such a division, items of a lexical hierarchy correspond to real-life objects which stand in a relation of segmental parts to the whole. Parts of a human body, of a plant or of a car are an example. An alternative approach is a division into **systemic parts**, which "have a greater functional unity, a greater consistency of internal constitution, but they are spatially inter-penetrating" (ibid.: 169). Divisions of this kind are not so easily perceptually accessible, but they are as valid as the former type.

Every good taxonomic hierarchy must keep a constant principle of hierarchy and avoid mixing them. Thus a *plant* must be either divided into segmental parts, such as

root, *stem*, *leaves* (further divisible into a *leaf stalk* or *petiole*, and a *blade* or *lamina*), *flower*, etc., or into systemic parts, such as the *vascular tissue* (mainly *xylem* and *phloem*), *stele* or *vascular cylinder*, *cortex*, *stem cambium*, *epidermis*, *endodermis*, *photosynthetic tissue* or *mesophyll*, and other specialised cellular systems. A. Cruse (2011: 142) stresses that there is a consistency within a part-whole chain, "but moving beyond the intuitive upper and lower limits would involve a change of type", i.e. a change from segmental to systemic parts or vice versa.

D. A. Cruse says that, unlike taxonymy, the relation of meronymy cannot be expected to yield a well-formed hierarchy (1986: 169). He adds that "unlike the extra-linguistic part-whole relation, (it) is not inherently differentiated" (ibid.). Even convergence may occur due to "the existence of super- and hypo-relations, in particular super-meronyms" (ibid.: 170). For example, *nail* is a meronym to *finger* as well as to *toe* in a hierarchy of *body* parts (ibid.), although no convergence arises in the underlying extra-linguistic hierarchy (the nails on fingers and toes are different). A way to avoid this would be by making congruent pairs of meronyms with their holonyms, but the risk is that it "would exclude many normal part names" (ibid.: 170). Other approaches are intersecting part-whole lexical hierarchies or simply accepting the fact that meronymies cannot be perfect (ibid.).

Among other properties of meronomies are insufficiently developed substantive levels (Cruse 1986: 170), with **equi-levels** based usually on structural or functional analogy. Also, while **gaps** are quite common in taxonomies, in meronomies "the most inclusive term is never covert: there are no meronomies of unnamed wholes" (ibid.: 171). A covert part which does occur in meronomies is the main functional part of some items, such as tools and instruments. The name for the major part different from the *handle* is popularly identified with the immediate holonym (*rake*, *hoe*, *spoon*, etc.), although it is not correct technically. For relatively bulky central parts the term *body* is supplied, too, by analogy with the human body (ibid.: 171).

3 | 3 | 2 Transitivity vs. intransitivity of meronymy

Although hyponymy is generally a transitive relation, its subtypes taxonymy and meronymy pose problems in this respect. It is safe to consider taxonymy as intransitive, but meronymy seems transitive at first sight (Cruse 1986: 165) Every piece is also a part of the ultimate whole. It sounds correct to say the following:
The *body* has a *head*.
The *head* has *eyes*.
The *eyes* have *eyelashes*.

However, applying transitivity to say "The *body* has *eyelashes*" sounds inappropriate. Cruse attributes the problem to the notion of **functional domain** (1986: 165). It is defined as "the more inclusive element within which the part functions" (ibid.: 166). The functional domain of *eyelashes* is the *eye* since eyelashes protect it from dust, sunshine, etc. Eyelashes do not relate functionally to the nodes higher in the hierarchy (face, head, body). This type of functional domain is called **restricted** (ibid.: 166), whereas a **generalised**

functional domain, not restricted functionally to the immediately dominating item, creates a transitive meronymy (such as between *catalytic converter* or *spoiler* and a *car*).

Cruse mentions an important aspect of functional domains, namely that functional domains of many parts are included or encapsulated within their meanings (1986: 166). E.g. *handle* relates to many different functional domains as "it forms part of a sense-spectrum" (ibid.: 166). The functional domain can be explicitly included as a part (modifier) of the phrase with the meronym. Thus, in *eyelashes* and *schoolyard* the locative modifiers *eye-* and *school-* are the immediate functional domains.

Transitivity fails with a special type of part referred to as **attachment** (Cruse 1986: 167). Attachments are attached to a larger whole (called the **stock**) (ibid.: 167). It is then possible to say "The *eyelashes* are attached to the *eyes*." Attachments must meet the criteria which are used to establish parts (namely "A is a part of B"; "B has an A"; "the parts of B are C, D, E and A". Although attachments are different from integral parts (it is not possible to say *"The *pupil* is attached to the *eye*(*ball*)"), they are "typically an integral part of the overall whole" (Cruse 1986: 167).

Integral parts and attachments differ in terms of **transitivity**: when some verbs are used with integral parts, they entail the wholes (ibid.: 167) (*I had a pain in my thigh* entails *I had a pain in my leg*), whereas when they are used with an attachment, the transitivity (i.e. application to the whole) is not necessarily the case (*My head didn't hurt, just my ear did*). Transitivity is not applied when "a part of an attachment does not count as a part of the stock" (Cruse 1986: 168). Thus, it cannot be well said **The head has gums/teeth* or **A rooftile is a part of the house*. The holonym to parts of attachment is thus the attachment, not the entire whole.

Part–whole relations allow either relationships between items on two **neighbouring levels** (a *root* is a part of a *tree*, a *tree* is a part of a *forest* or a *park*, but probably a *root* is not normally considered as a typical part of a *forest*) or between items in a **chain**, i.e. on different levels (a *nail* is a part of a finger, a *finger* is a part of a *hand*, a *hand* is a part of an *arm*, and an *arm* is a part of a *body*, but it is true at the same time that a *nail* is a part of a *hand* or an *arm* or a *body*, etc.).

Parts which are an **essential feature** (*head* as a part of (human) *body*) of an entity can be distinguished from those which are an **optional feature** of it (*beard, moustache* or *male/female reproductive organs*, as they are not all present in representatives of both variants of human, namely the genders, male and female). Another distinction can be drawn between some items being a **part** (*arm* to a *body,*) and those being an **attribute** or feature.

3 | 4 Relation between taxonomy and meronomy

Terms of both meronomic and taxonomic hierarchies denote classes of entities. However, there is a difference between the two in terms of relation between the extralinguistic reality and its reflection in lexical hierarchies. In a **taxonomy**, classes denoted by the terms "form a hierarchy which is more or less isomorphous with the corresponding lexical hierarchy"

(Cruse 1986: 178). In contrast, hierarchy of a **meronomy** is not originally based on a hierarchy composed of classes (Ibid.). As meronomic hierarchy is rather based on relations of individual parts to the whole, the **relation with the reality is closer in meronomy** than in taxonomy.

Meronomy is also not as well-structured as taxonomy; it does not provide such well-defined and clear levels as taxonomy. There is a large number of variants and related items in meronomies; however, individual items are more clearly identifiable here than in taxonomies thanks to their closer link to the physical reality. Classes of meronomy are rather made up of analogous items (e.g. *fruits*, *arms*, *windows*) of different analogous isomorphous wholes. Cruse (1986: 178) concludes that "corresponding to a taxonomic hierarchy there is a hierarchy of classes, whereas corresponding to a part-whole hierarchy there is a class of hierarchies."

Another difference is that a meronomy is less well-defined and less well-structured, so it "does not often display clear levels, and it is typically less cohesive due to the frequency of super- and hypo-relations" (Cruse 1986: 178). What is more defined in meronomies is the most inclusive term (because meronomy is more closely bound with the physical world) and it is never covert, unlike in taxonomies.

The question of whether a part is facultative or not cannot only be answered by looking at the functional properties of objects, but it is also a lexical question. If there is a label e.g. for *armchair*, then *arm* is not a facultative meronym of *chair*, but a necessary meronym of *armchair* (sub-class of *chairs*) and it is then a hypo-meronym of *chair* (Cruse 1986: 178–179). "Super-meronymy and hypo-meronymy are obviously matters of lexical semantics rather than properties of objects" (ibid.: 179).

A property shared by meronomies and taxonomies is that they "both involve a kind of sub-division, a species of inclusion between the entity undergoing division and the results of the division, and a type of exclusion between the results of the division" (Cruse 1986: 179). A **taxonomy can be perceived as a kind of a part-whole hierarchy** (a class consists of subclasses just as a whole consists of parts), so it can be transformed into a meronomy (ibid.). It is possible to say that a class referred to by its common-name label **consists of** its subclasses, expressed in an analogous way. This is a truly meronomic—or part-whole—relation, proving the closeness of taxonomy and meronymy.

Cruse underlines that in both types of hierarchy elements yielded by sub-division are characterised by "internal cohesiveness and external distinctiveness" (1986: 179). **Cohesiveness** is revealed by resemblance between members of classes in taxonomies and physical integrity of parts in meronomies. The other parameter, **distinctness**, in taxonomies is represented by "unshared attributes; in parts it means unconnectedness" (ibid.).

The presence of meronomic principles alongside taxonomic ones is exemplified by most accounting hierarchies. In the terminology of accounting, taxonomies and meronomies are frequently used **in combination**, but they seem to have different roles: taxonomy classifies entities into categories by their function, whereas meronomy enumerates those entities which must be added or subtracted to obtain the total sum (corresponding to an entity at a higher level) when the hierarchy is applied practically, as a

financial statement. The most comprehensive hierarchy, the *Chart of Accounts*, is formed as a nomenclature including all categories (called ***classes***) of accounts, divided by the criteria of use into those denoting a type of property (Class 0: *Intangible and tangible assets / Fixed assets*, Class 1: *Inventory*, Class 2: *Financial accounts*) and those which rather denote various types of transactions and relations (Class 3: *Clearing*, Class 4: *Capital accounts and long-term liabilities/payables*, Class 5: *Expenses*, Class 6: *Revenues*, Class 7: *Closing Balance Sheet accounts and off-Balance Sheet accounts*, Classes 8 and 9: *Managerial/Internal accounting*). This highest level of classificatory division suggests a taxonomic type of hierarchy, since its items are classes, differentiated from each other and not constituting a well-defined whole (the whole would be *Accounts*—hence the *Chart of Accounts*).

The middle level of hierarchy, division into ***groups of accounts***, is still mostly taxonomic, but the lowest level, into individual ***accounts***, already reveals some features of meronomy as it is often represented by an enumeration of concrete items making up a corresponding group, the whole. In real financial statements, the figures representing the value of individual parts, identical with those listed under a certain heading in the *Chart of Accounts*, are added up in the total figure, representing the whole on the given level of hierarchy. The problem (not linguistic, rather for compilers of such hierarchies for the purposes of various financial statements) is that not all such items—meronyms—have to be present in a certain real business entity, depending obviously on the specific type of business activity the entity is involved in. Such optionality enables the chart of accounts to be adapted to the company's relevant needs by selecting only the applicable accounts. An optional relationship between a part and a whole (the parts being facultative meronyms), is frequent in selective hierarchies of both social and natural sciences and activities.

3 | 5 Relations similar to the part–whole relation

Meronymy is based on the existence of wholes and their constituent elements. The core part-whole relations apply to "well-differentiated parts of clearly individuated and cohesive physical objects" (Cruse 1986: 172). Wholes such as groups, collections, classes, etc. thus form hierarchies similar to meronymic ones. Their constituent parts are less differentiated than typical parts of meronymic hierarchies and the wholes are rather **collective entities**, being not so integrated as physical objects, which are wholes in meronymic structures. A similar lack of differentiation also applies to elements of such collective structures. A meronym such as an *eye* is well-defined and limited in relation to its whole, whether it is *head* or *body*, but a member of a class, e.g. a *student* in relation to a *university*, is less definite, less singular, etc., when referred so anonymously as a member of a class.

A **piece** of a whole, although it is spatially limited as well and an aggregation of all pieces should make up the original whole, differs from a part in the level of its autonomy. A piece must be an authentic integral component of the whole, whereas a part may be substituted for another part of the same type, such as when assembling a machine and using a specific part from several of the types that we have in stock. Other differences are

that a piece, unlike a part, may have an arbitrary size and shape (the whole can be e.g. cut into large or small or irregular pieces, whereas an *eye* as a part is clearly defined as to its size, shape, location, etc.) and that part has a definite function which it performs in the whole (cf. Cruse 1986: 158–159).

In less ideal relations than in the meronomic or part-whole ones, some dimensions correspond to the properties of centrality and peripherality. For instance, in terms of **concreteness** a hierarchy can consist of parts of concrete or, on the contrary, non-concrete entities. Another dimension is "the degree of **differentiation** amongst parts" (ibid.: 172): on one end of the scale the parts are highly differentiated (e.g. parts of a *body*, a *camera* or a *tree*), but on the opposite end there is no differentiation whatsoever (e.g. units of measure—*kilogrammes*, *litres*, *metres*, etc.) (Cruse 1986: 172). Somewhere in between these extremes are members of a *military unit*, a *crew*, a *team*, books in a *library*, etc., where it depends on how much differentiation is necessary in a certain situation. E.g. soldiers of a certain rank are undifferentiated in terms of their expected standard behaviour, obedience, basic military training, etc., but different as far as their special qualifications and experience, physical abilities, personalities, etc. are concerned.

Taylor (2003: 135–136) draws on Johnson (1987)[25] and Lakoff (1987)[26] who suggested image schemas which structure areas of human experience. The part-whole relationship is based on a specific configuration of parts and is destroyed by their separation or rearrangement. Although rearrangement is not a disqualifying condition for many relationships listed at the end of this chapter, Taylor stresses concreteness: "Primarily, this schema is applied to discrete, concrete entities. Metaphorically, it can be applied to a range of abstract notions..." (2003: 136).

Structural integration is yet another dimension, and it correlates with centrality (Cruse 1986: 172). Parts of a *body* are highly integrated, as opposed to pupils in a *class*. The fourth dimension is **countability vs. uncountability** (ibid.: 172) of nouns in the hierarchy; the underlying property is individuation. Mass or count nouns can be either meronyms or holonyms, or both can be of the same type.

Concrete parts can be found among geographical areas, which can really be split into pieces, each designated by its own proper noun, and these can be further subdivided. The general labels for such places also form a concrete part-whole relation (Cruse 1986: 173). Interestingly, *capital* is a supermeronym as its holonym is not only *country*, and *centre* is a local meronym (ibid.), as virtually anything can have an identifiable centre.

Apart from places, time is also divided into parts, denoted namely by event nouns, which are often deverbal (Cruse 1986: 173–174). Event nouns are derived from verbs referring to activities and processes (people or things do activities, but processes happen to them) (ibid.: 174). Activities are split into accomplishments, actions and achievements.

25 M. Johnson, *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason* (Chicago: University of Chicago Press, 1987).

26 G. Lakoff, *Women, Fire and Dangerous Things: What Categories Reveal about the Mind* (Chicago: University of Chicago Press, 1987).

Concepts in whose time frame some sections can be identified may have parts, usually segmental. When the nouns are derived from verbs denoting process, achievement or accomplishment, their segmental parts are usually called stages or phases (ibid.). On the other hand, "actions, which have no temporal structure, can only have systemic parts" (ibid.).

Murphy (2010: 122-123) distinguishes several subtypes of meronymy, namely "**whole > segment** (*month > day*), **whole > functional component** (*car > engine*), **collection > member** (*pride > lion*), and **whole > substance** (*pipe > copper*)". Murphy observes that the meronym-holonym relation is not as necessary and central as the hyponym-hypernym one. Some parts are optional (e.g. *wing, horn, chimney*) and some names of parts can relate to different wholes (e.g. *leg, button, leaf*), being substantially different in each of them (2010: 123).

The following sub-types of **element-whole relations** similar to meronymy exist:

- the **group–member** relation**:** groups are often linked with collectives of humans or animals (Cruse 1986: 175), such as *family*, *team*, *committee*, *jury, pack*, *flock*, *herd*, etc.). As members of groups display the property of being a part of a functional whole, there are often no specific lexical units to designate the members (although exceptions exist: *senate* : *senator*, *jury* : *juror*, *gang* : *gangster*) (Ibid.). Grammatically, the singular noun for groups can have both singular and plural concord (My *family* is/are large), but they are countable and form a plural (All *families/juries/committees…*) (ibid.: 176).
- the **collection–member** relation: in contrast with groups and classes, collections are usually inanimate (e.g. *library*, *currency*, *forest*). The relation in direction from member to collection is facultative (*book* : *library*, *tree* : *forest*), and sometimes the facultativeness functions in both directions (ibid.: 176). The facultativeness stems from the fact that "the members of a collection are not normally lexically distinguished" (ibid.). Plural forms of collection nouns (*libraries*, *forests*) are normal, but their singular forms cannot have a plural concord with a verb (ibid.).
- the **class–member** relation: a class is defined as "an assemblage of humans justified more by the possession of common attributes than a common purpose" (ibid.: 176). Compared with a group, a class is less cohesive as a whole and members of a class have weaker properties as parts (e.g. *aristocracy* : *duke*, *clergy* : *priest*). Unlike group nouns, class ones are usually not used in the plural form, but plural concord (motivated by notional plurality) prevails.
- the **whole–constituent** and **whole–ingredient** relations: these two relations manifest a significant difference: **ingredients** are substances which exist at the time when preparation of something starts, but which can lose their original properties or identity during the process; **constituents** may be created during the manufacturing or production process and "enter into the final composition" of the whole (Cruse 1986: 177). The whole in such relations is usually a mass noun (whole-ingredient relation: *soup* : *carrot*; whole-constituent relation: *brandy : ethanol*).
- the **object–material** relation: it occurs if the whole is a count noun (ibid.: 177) and the material is, in turn, a non-count (mass) substance (e.g. *ring* : *gold*, *bag* : *polyethylene*).

- the **substance–particle** relation: it occurs if there is a mass-noun whole and a count-noun part (Cruse 1986: 177) (e.g. *sand* or *salt* : *grain*, *dust* : *particle*). The lexical unit used to denote the whole can usually be used to refer to the discrete, countable particles as well as to the mass-noun wholes (a *grain* of sand is simply referred to as *sand*).

3 | 6 Proportional series as non-hierarchical configurations

3 | 6 | 1 Open vs. closed, consistent vs. inconsistent series

Proportional series consist of elements which are related to each other in the same manner. The missing elements can be thus easily determined when the relation is known. For example, *king* is to *queen* as *duke* is to *duchess*, *count* to *countess*, etc. At the same time, *king* is to *duke* as *queen* is to *duchess*, etc. From this, e.g. an empty slot related to *baron* will be easily filled with *baroness*. If the simplest graphic image of such a proportional series is to be drawn, we get a quadrangular pattern where the relations hold true analogously in all directions, along both axes, vertically and horizontally. They are thus parallel and reciprocal.

Figure 3.7. Parallel and reciprocal relations between items of a proportional series.

Cruse distinguishes between the relation in taxonomic hierarchies, which is 'many-to-one' and virtually disables identification of a missing element (at least at the hyponymic level), but in proportional series the relation is necessarily 'one-to-one' (1986: 120). This relation is more precisely defined and recurrent items are predictable. As Cruse adds, "to constitute even a minimum cell of a proportional series, two recurrent one-to-one relations are necessary" (ibid.).

If the minimal cell of a proportional series can be extended along both its axes, it is an **open** proportional series. If the extension is possible only along one, not both axes at the same time, the series is **closed** (Cruse 1986: 120–121).

In terms of ambiguity of some lexical items, such as *cow* (as 1. the species, 2. the female member of the species), *dog*, *cat*, etc., they can be placed in more (usually) two places in a proportional series (Cruse 1986: 121). Ambiguity can be diagnosed to identify "the ability to occupy more than one point in a proportional series" (ibid.). One criterion is that an item has several opposites. However, Cruse suggests a more reliable check: "The evidence for ambiguity is stronger if the separate occurrence of a lexical form in a proportional series is established in different proportional sets" (1986: 122).

Another property is whether a proportional series is **consistent** or **inconsistent**. If the elements in one axis of a series observe the same type of relation between each other, the series is consistent. A missing item would then be easy to guess and supply. In an inconsistent series as in Fig. 3.8. below, the missing items cannot be "uniquely determined" (Cruse 1986: 122). The contrast *father—mother, son—daughter* etc. works on the same principle (male—female counterparts), but the relation *father* to *son* (or *mother* to *daughter*) is not the same as that between *son* and *brother* (or *daughter* and *sister*), etc.

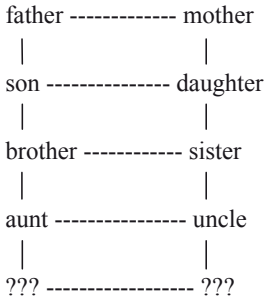


Figure 3.8. Inconsistent proportional series.

Thus, it is evident that proportional series display two different types of contrast. Following the visual pattern used to depict series, the main contrast holds between items placed horizontally. It is more frequent and recurrent. The less common contrast is between items along the vertical axis, but it has some relevance in consistent proportional series.

According to Cruse, "The relatively restricted contrasts are invariably carried by open set elements; the freely recurring contrasts may be carried by open set items (as in *mare* : *stallion*), but the members of a pair of lexical items manifesting such a contrast frequently share the same open set element (i.e. the root), the contrast being signalled by one or more closed set elements (i.e. affixes)" (1986: 123). These affixes can be illustrated by suffixes denoting female sex in some animals (*tigr-ess, lion-ess*) or in some jobs (*host-ess, manager-ess, police-woman*).

The more frequent type of contrast ("relatively recurrent contrasts", Cruse 1986: 123) is obtained between lexical items placed horizontally; and the "relatively restricted contrasts" (ibid.) are found between items listed along the vertical axis. Proportional series can be divided into strict and lax ones. **Lax** series have any item in a cell uniquely predictable from the remaining three items in two lexical pairs which make up the cell (Cruse 1986: 128). Cruse admits that in many cases the exact recurrence of contrasts or even equivalence of contrasts is not perfect (ibid.).

3 | 6 | 2 Endonyms, exonyms, analogues and lexical siblings

Semantic encapsulation forms the basis of the lexical relation called **endonymy**, which "involves the incorporation of the meaning of one lexical item in the meaning of another" (Cruse 1986: 123). **Endonym** is thus the item whose meaning is included, and an item which contains its meaning is termed the **exonym** (ibid.). Endonymy is in fact a broader type of relation than hyponymy, because the meaning of a superordinate in a taxonymy or in a meronymy (i.e. a holonym) is usually included in its hyponym. In other words, the semantic relation of hyponymy is a subtype of endonymy.

Pairs of a superordinate and a hyponym are e.g. *tree* : *oak*, *fish*: *trout* (taxonymy) and, in the specific case of meronymy, *tree* : *leaf*, *fish* : *fin*, etc. These are all at the same time pairs of an endonym and an exonym, but other such pairs are e.g. *milk* : *mammal, milk* : *cheese*, *water* : *fish*, *tree* : *wood*, *eye* : *see*, *school* : *teacher*, etc. None of these are instances of hyponymy, but the exonym always arouses association with its respective endonym: e.g. *cheese* is made of *milk*, *fish* live in *water*, *see* is what only *eyes* can do, etc. The determination of the roles is usually clear (*milk* does not necessarily associate *cheese*, as it can be consumed as such or used to make other products, so *cheese* cannot be an endonym; similarly, *water* does not necessarily contain—and thus associate—*fish*. However, sometimes it is difficult to decide which item is an endonym and which an exonym. *Mammals* are defined by feeding their babies with *milk* produced by females, so *milk* is an endonym (possession of mammary glands by females even gave name to the whole vertebrate class of *Mammalia*), but *milk* can also be considered an exonym—it is what only *mammals* typically produce, so the meaning of *mammals* is included.

Cruse admits that the determination is easier in taxonymy and meronymy: "If the terms are hyponymously related, then the superordinate is the automatic choice for endonym; being less specific in sense, it is therefore less complex semantically." (1986: 124) By analogy, this can be applied to meronymy, thus the less specific holonym qualifies as an endonym. Another hint is that "if one term of an endonymous pair is a natural kind term, and the other is a nominal kind term, then the natural kind term is automatically the endonym" (ibid.).

Endonymy which is recurrent, i.e. employed in several analogous pairs, yields proportional series. For example, *dog* : *puppy*, *cat* : *kitten*, *sheep* : *lamb* is a proportional series with the more general terms (here adult animals´ names) being endonyms. Similarly, *bee* : *hive*, *bird* : *nest*, *dog* : *kennel*, *fox* : *den*, etc. are endonym-exonym pairs, where the natural terms (animals) are the endonyms. Sets of exonyms such as *puppy*, *kitten* and *lamb*, and *hive*, *nest*, *kennel* and *den* are called **analogues** (Cruse 1986: 125). Cruse defines analogues as "exonyms related in parallel ways to different endonyms" (ibid.).

Endonyms are included in the meaning of various exonyms and when the proportional series consisting of various co-exonyms follows the same pattern, then the series gives rise to analogous exonyms, so-called **lexical siblings**. For example, if the co-exonyms of different games include the names of the objects played (or played with), the names of places where the sports are played, and the names of equipment (if used),

endonyms *football, volleyball, tennis, ice-hockey* and *golf* produce sets of lexical siblings (at relevant positions) *football, volleyball, tennis ball, puck* and *golf ball; (football) pitch, (volleyball) court, (tennis) court, (ice-hockey) rink* and *(golf) course*; and only for the last three endonyms (since football and volleyball are played by hitting balls just with the legs and arms) another set of siblings *racket, hockey stick* and *club*.

Table 3.1. Series—sports and their exonyms. Series of analogues and siblings.

← Exonyms (co-exonyms) →				
Endonyms	**Analogues (1) ↓**	**Analogues (2) ↓**	**Analogues (3) ↓**	
Names of games or sports	**Objects played with**	**Places to play at**	**Tools used**	
football	(foot)ball	(football) pitch	-	**Lex. siblings (a)**
volleyball	(volley)ball	(volleyball) court	-	**Lex. siblings (b)**
basketball	(basket)ball	(basketball) court	-	**Lex. siblings (c)**
handball	(hand)ball	(handball) court	-	**Lex. siblings (d)**
tennis	(tennis) ball	(tennis) court	(tennis) racket	**Lex. siblings (e)**
golf	(golf) ball	golf course	(golf) club	**Lex. siblings (f)**
cricket	(cricket) ball	(cricket) pitch	(cricket) bat // willow	**Lex. siblings (g)**
ice-hockey	puck	(ice-hockey) rink	(hockey) stick	**Lex. siblings (h)**
exercise	exercise ball	gym	-	Lex. siblings (i)

A set of siblings often lack a common superordinate item (Cruse 1986: 125). Proportional series can either be composed of "parallel strings of endonyms and analogous exonyms (…) or parallel strings of analogues" (ibid.: 125–126). In a graphic pattern used to illustrate the series, "the columns consist of analogues, and the rows consist of siblings, (…) the sibling relationship is associated with the recurrent contrast, and the analogue relationship with the restricted contrast" (ibid.: 126).

Cruse illustrates the congruence mismatch between analogues by *cub* being an analogue to *lion, tiger, leopard, bear, fox* (1986: 127) and some species of felines (Lat. *Felidae*), canines (Lat. *Canidae*) and bears (Lat. *Ursidae*), whereas other animal endonyms typically have one specific exonym denoting a non-adult animal (*cat* : *kitten, dog* : *puppy, goat* : *kid, raccoon: kit*). Although *lion* and *cub* or *tiger* and *cub* are **compatibles**, it is possible to call *cub* a **superexonym** of *lion, tiger, bear,* "a **super-analogue** of *calf* and *puppy*, and a **super-sibling** of *lioness, vixen*, etc." (ibid.) The occurrences of the superexonym *cub* are highlighted in Tab. 3.2 below, with no comparable Czech superexonym (only *kotě* can be used as an alternative, general word to refer to non-adult tigers, lions, cheetahs, cougars, etc.—but not bears and foxes). The table also illustrates identity be-

tween some endonyms and their male or female exonyms (in English and Czech alike: *medvěd*—masc. *medvěd*, *kočka*—fem. *kočka*, *fox*—masc. *fox*, *cow*—fem. *cow*).

Table 3.2. Series—domestic and wild animals: English/Czech endonyms and corresponding exonyms.

general word (endonym)	male adult	female adult	young general	male young	female young
bear	bear	she-bear	(bear) **cub**	-	-
medvěd	medvěd	medvědice	medvídě	-	-
cat	tomcat	cat	kitten	-	-
kočka	kocour	kočka	kotě	kocourek	kočička
chicken	cock/rooster	hen	chick	-	-
kur / slepice	kohout	slepice	kuře	kohoutek	slepička?
cow	bull	cow	calf	bullock	heifer
kráva	býk	kráva	tele	býček	jalovice
dog	dog	bitch	puppy	-	-
pes	pes	fena	štěně	-	-
duck	drake	duck	duckling	-	-
kachna	kačer	kachna	káče / kačátko	-	kačenka?
elephant	(elephant) bull	(elephant) cow	(elephant) calf / baby eleph.	-	-
slon	slon	slonice	slůně	-	-
fox	(he-)fox/dog-fox	vixen	whelp/(fox) **cub**	-	-
liška	lišák	liška	lišče	lišáček	lištička
goat	he-goat/billy-goat	she-goat/nanny-goat	kid	-	-
koza	kozel	koza	kůzle	kozlík	kozička?
goose	gander	goose	gosling	-	-
husa	houser	husa	house	-	-
horse	stallion	mare	foal	colt	filly
kůň	hřebec	klisna	hříbě	hřebeček	klisnička
lion	(male) lion	lioness	(lion) **cub**	-	-
lev	lev	lvice	lvíče	lvíček?	-
pig	boar	sow	piglet	-	-
prase	kanec	svině /prasnice	sele / podsvinče	-	-
sheep	ram	ewe	lamb	-/young ram	-
ovce	beran	ovce / bahnice	jehně	beránek	ovečka
tiger	(male) tiger	tigress	tiger **cub**	-	-
tygr	tygr	tygřice	tygře/tygřík	-	-
wolf	he-wolf	she-wolf/wolfess	**cub**	-	-
vlk	vlk	vlčice	vlče	-/vlček	-

In terms of the meaning of the derivational sufix *–ess*, Cruse tries to establish whether it means 'female' and is combined with a gender-non-specific noun (stem) as in compounding (*tiger—tigress*), or whether it rather means 'female counterpart of' and is derived from the male sibling item, formally identical with the endonym. Resorting to another set of words, nobility titles, it seems that the female analogues *princess*, *duchess*, etc. are derived by *–ess* from nouns denoting males. The general word for noble people does not exist here, unlike the small group of animal names which form female exonyms by adding *-ess* (1986: 128). However, judging intuitively whether hypothetical female words derived in order to replace etymologically unrelated nouns such as *ewe*, *mare*, and *swine* would rather be derived from their respective endonyms (i.e. *sheep-ess*, *hors-ess*, *pig-ess*) or from male exonyms (*ram-ess*, *stallion-ess*, *boar-ess*), most people would possibly favour the former type.

This judgment can be supported by testing an analogous derivational process, prefixation. Greater acceptability of prefixed forms with *she-* may be assumed where the prefix is added to the general word, i.e. the name of species (in other words, the endonym), whether they are really used in such a way (such as the existing *she-goat*, *she-wolf*, *she-bear*), or those which are not established and would merely be acceptable as paraphrases (e.g. *she-horse*, *she-dog*, etc.). These forms are more likely than those derived from male-specific nouns, which are, in contrast, generally unacceptable (**she-stallion*, **she-ram*) (Cruse 1986: 129). In a set of exonyms with missing specific male forms, this rule seems to work analogously (so *he-cow*, *he-cat* are more acceptable than **he-swine* or **he-hen*).

Czech strings can be compared with a similar result: when there is a proportional series consisting of a general word, male, female and non-adult exonyms, such as

(pes)—pes—fena—štěně
(kráva)—býk—kráva—tele
(kůň)—hřebec—klisna—hříbě
(prase)—kanec/vepř—prasnice/bachyně/svině—sele/podsvinče,

the acceptable alternative derived forms would rather be *psice* (which is used, albeit as an archaism), but not **feňák* or **fenek* (which is, coincidently, a different species, *fennec* (Lat. *Vulpes zerda*)), it would be *kravák* (this word exists, but it denotes a 'cowboy'), but not **býčice*, possibly also *konice* (formed in the same way as *oslice*, *slonice*, *hrošice*, etc.), but definitely not **hřebčice* or **klisňák*. The form *prasnice* (= *she-pig*) really exists, being one of synonyms for a female exonym to the endonym *prase* (*pig*), but neither **kančice* nor **sviňák* are permissible (*sviňák* is a derogative word meaning a dishonest man, though, and the equally derogative *prasák* does not mean a male pig either).

However, the latter two sets differ, both in English and in Czech, from the former ones, since the general word (species) is not used in a more restricted sense for one of the genders as well. This seems to effectively prevent the formation of female words by derivation from male ones, whether by suffixation (*-ess*) or by prefixation (*he-*, *she-*). In English, with fewer feminine suffixes, Cruse draws the conclusion for the by far commonest suffix

-ess that we have to "postulate two senses of *-ess*: *-ess*[1], which means 'female', and appears in *lioness*, *tigress* and *leopardess*, and *-ess*[2], which means 'female counterpart of', and appears in *princess* and *duchess*. (1986: 129)

3 | 6 | 3 Paronymy

When lexical items in proportional series belong to different syntactic categories (usually different word classes), we speak of **quasi-series** with the relations of quasi-endonymy and paronymy (Cruse 1986: 129). **Paronymy**[27] is thus defined as "the relationship between one word and another belonging to a different syntactic category and produced from the first by some process of derivation" (ibid.: 130), with a **paronym** being the word derived from the **base**, i.e. the original lexical item. Lyons (1977) refers to such relation as quasi-hyponymy.

Paronyms often encapsulate more than is the basic sense of their base. Therefore, it is reasonable to distinguish **hypo-paronyms** (Cruse 1986: 131) which, despite having the same derivational affix, express slightly different senses of their base. Take e.g. *reader*, which can denote 'a person who reads', but also 'a book with texts to read', or *striker*, which either means 'a person involved in a strike', or 'a player in a ball game whose task is to score goals'.

Next, there are **super-paronyms**, "where the meaning associated with the base in its encapsulated form is superordinate to the meaning of the free base" (ibid.: 131). A notorious example of a super-paronym is *computer* (cf. Cz. *počítač* and German *Rechner*) which does not only compute or count, at least not any longer, compared with its early prototypes. Other examples are the nouns *salary* (no longer are people rewarded with salt), and even compounds *dustbin*, since not only dust is collected in it, and *cupboard*..

As a third type of paronymy Cruse establishes a semantically obscure relation between a base and its paronym, **hetero-paronymy** (e.g. *complex—complexion*, *salt—salary*), saying that "the relation between free base and base-in paronym could be viewed as incompatibility, and included as a congruence variant" (1986: 131).

Semantically regular and predictable interpretations of a derivational change are called paronymy, but Cruse suggests that "semantically idiosyncratic derived forms" (1986: 132) be called **false paronyms**. Paronyms which are not semantically predictable from the derivational rule can be likened to idioms. Cruse concludes that "the category false paronyms includes super-paronyms, hypo-paronyms and hetero-paronyms" (ibid.).

There are some marginal cases of paronymy, viz. **zero-derived paronyms**, which contain no overt marker of a change from the base (Cruse 1986: 132), such as a derivational suffix, a different stress pattern, etc. English is rich in such cases due to easy conversion between word classes (e.g. *sleep* (verb) : *sleep* (noun), *empty* (adj.) : *empty* (verb)).

27 Paronymy (Cz. *paronymie*) is defined differently in Hauser, namely as a relation similar to homonymy, with paronyms as words not completely identical, but differing in some feature (e.g. vowel quantity). (1980: 84)

Cruse discusses the superficial similarity between zero-derivations of the type *comb* (n) : *comb* (v), *hammer* (n) : *hammer* (v), etc. (1986: 132–133) It seems that they are analogous with non-derived endonym-exonym pairs, such as *dig* : *spade*, *write*: *pen* or *shoot* : *gun* in being pairs of a verb and a related instrument or tool. However, the verb is always more important in the latter series (it is an endonym) and the noun (instrument) is an exonym. The noun needs the verb in its definition, but not necessarily the other way round (e.g. defining the verb *write* does not require mentioning the use of a *pen*). In instances where the verb is an exonym converted from a noun, the noun is primary; the verb is named after it and its definition is based on using that tool (to *hammer* (v) means using a *hammer* (n) to fix objects with the help of nails).

Table 3.3. Comparison of zero-derived paronyms (with a primary noun) with non-derived (lexically distinct) endonym-exonym pairs (with a verb being primary).

Zero-derived paronyms	**Non-derived endonym-exonym pairs**
noun is primary (endonym)	**verb** is primary (endonym)
verb (exonym) is converted from noun	noun (exonym) is not derived from verb
hammer (n) → *hammer* (v)	*write* (v) ~ *pen* (n)
(v) = to use (n) (almost exclusively, it is named after it)	(v) = to use e.g. (n) (as well as other tools, not exclusively)
(v) entails (n)	(v) does not necessarily entail (n)

Paradoxically, quasi-series are composed of verbs which are considered bases and the respective nouns are defined in terms of the verbs. This illustrates a conflict between semantic primitivity, morphological simplicity (ibid.: 133) and also historical primacy of certain words. Cruse concedes some relevance to all of these arguments and concludes: "If it is accepted that derivation has a semantic dimension, then it must also be accepted that in some cases—especially those where the stabilising influence of overt morphological form is absent—a semantic shift may change the effective direction of derivation" (ibid.).

3 | 7 Non-branching lexical hierarchies

3 | 7 | 1 Derivation of non-branching hierarchies

A non-branching hierarchy can be derived from a branching hierarchy (such as a part–whole hierarchy or a taxonomy) very easily by giving **labels to the levels**. The precondition then is to have a branching hierarchy with clearly distinguishable levels. Such hierarchies of levels exist in many areas, namely in the systematic biological taxonomy: e.g. the labels for the levels in botany, which correspond to an extensive branching taxonomy consisting of many thousands of items which fill the slots referred to by the

few level labels. The levels *kingdom—subkingdom division—subdivision—class—subclass superorder—order—family—genus—species* (the most usual hierarchy used in botanical taxonomy) form a pattern for branching taxonomies composed of real names of taxons (see examples in Chapters 4.2 and 4.3).

The levels in the previously quoted classification of languages (Fig. 3.6) form a non-branching hierarchy as well, e.g. the levels in the Chart of Accounts (*class of accounts—group of accounts—account*) and in the taxonomic classification of world languages (*macroclass/superfamily/phylum—family—branch—group*: some of these levels are also termed *subfamilies, subgroups*, etc.—*language*). This non-branching hierarchy is governed by a sense relation of **meronymy**: a *macroclass* **consists of** several *families*, the *families* may be divided into several *branches*, the *branches* consist of *groups*, and groups (if they exist) are made up of individual *languages*.

Cruse (1986: 181) distinguishes two types of non-branching hierarchies—those which are "secondary derivations" from branching hierarchies, and those which are not connected with branching hierarchies and "arise from non-differentiable relations of dominance". An important condition for a branching hierarchy to "serve as the basis for a non-branching hierarchy (is) if it has well-defined levels" (ibid.). An example suggested here is a linguistic structure which is analysed grammatically (syntactically and morphologically) at different levels. Such a hierarchy is enabled by meronymic relations between constituents at different levels: morphemes, words and phrases.

What makes this hierarchy virtually non-branching is that it is possible to "recognise structural parts with stable functions that can be labelled with common nouns" (Cruse 1986: 182), and these functions can be represented several times or not at all in the structure. Such structures are not truly meronomies, but they can be aptly described as a system consisting of structural slots and fillers which fit in them (ibid.: 183). The slot labels (such as sentence elements), however, are not parts but can themselves form a non-branching hierarchy. This is a characteristic property of all branching hierarchies: **each of them can generate a non-branching hierarchy composed of abstract entities**, corresponding to the above discussed labels or slots.

Levels in taxonomic classifications can serve as an example thereof. In biological taxonomies, as Cruse also suggests (1986: 184), such levels are clearly defined and labelled, e.g. botanical classes *kingdom*, *phylum*, *order*, *family*, *genus* and *species*. In meronomic hierarchies, whose items at all levels tend to have concrete denotates, the superordinate names for items at each level must sometimes be formed, in fact similarly to the names assigned to classes in taxonomies. Thus, in a meronomy of a *motor vehicle*, particularly of an *automobile*, such names can be *mirror* for *left side mirror*, *right side mirror* and *rear mirror* (all of which refer to real parts), or *lights* for *front lights* (left and right), *rear lights* (left and right again), *fog lights*, etc.

Since the relation of a co-meronym A to such a label B is "A is a type/kind of B" and the holonym denotes a class of objects, it is rather a case of taxonomy. The meronomic aspect is, however, present here as well, as it can be said that *a car consists of* or *has lights*, *mirrors*, etc. Note the use of a plural number here, as the names for individual concrete

objects (such as *left front light*) are included at an immediately lower, truly meronomic level. It seems then that not only can a branching hierarchy serve as a basis for a non-branching one, but also that a meronomic hierarchy can yield a taxonomy.

Cruse states that the method of deriving a non-branching hierarchical string fails to work for taxonomy (1986: 184). To make **a non-branching hierarchy from a branching one** (such as a family-tree-diagram in biology or the classification of languages) requires the taxonomy to be transformed into a meronomy. Cruse points out that "for each level of a hierarchy, a term is needed of which all items at that level are hyponyms, but of which no items at any other level are hyponyms" (1986: 184–185). We cannot say taxonomically **An oak is a kind of a beech*, or **A peach is a sort of a rose*—it is simply not true. Superordinates, which can hardly apply to its hyponyms directly, must be transformed into labels for the classes, so that the classes can be seen as single entities. Therefore, it is possible to say meronomically that the *genus Oak* (*Quercus*) belongs to and is part of the *beech family* (*Fagaceae*) and that the *genus Peach* (*Persica or Prunus (persica)*) belongs to and is part of the *rose family* (*Rosaceae*), as well as of the *rose order* (*Rosales*).

Thus, the transitiveness of a hyponymic hierarchy must be overcome by "re-interpreting classes as individuals" (ibid.: 185). This transformation of a taxonomy into a meronomy can be achieved in English namely by adding a noun designating the level, so the family of beasts which is referred to as *Canidae* in Latin or *psovití* in Czech (i.e. by a single word extended by a distinguishing derivational suffix) is made an individual entity (and more abstract) when it is called *the dog family. Families*, as well as *phyla*, *superorders*, *orders* above them, and *genera* and *species* below them make up a non-branching string of levels. Cruse concludes that "the sense relation between adjacent members of the resulting lexical string is again meronymy without differentiation: a *family* consists of *genera*, a *genus* consists of *species*, and so on" (1986: 185).

3 | 7 | 2 Non-lexicalised branching and non-branching hierarchies

Non-branching lexical hierarchies may also correspond to branching extra-linguistic hierarchies if an entity is divided into identical parts. An example is **units of measure** where no motivation exists to refer to each sub-unit of a branching node by a separate term (e.g. to give names to each *gram* of a *kilogram*, or to each *yard* of a *mile*). Some meronyms of this kind, however, obtain separate names (months of the year: *January*, *February*, *March*, …; days of the week, seasons of the year). **Ranks** in the military or police hierarchy, which itself is non-branching, also correspond to a branching extra-linguistic hierarchy. It is necessary to distinguish the **levels** of a hierarchy of ranks (*sergeant*, *captain*) which have some traits of proper nouns and do not function as superordinates to elements at that hierarchical level (a *sergeant* is not a hypernym to *Sergeant A. Pierson*), and **classes** consisting of individual members. These have common-noun properties (*a sergeant*, e.g. *Sergeant A. Pierson; three captains*, etc.). The formation of names designating military ranks is described further in Chapter 6.1.3.

As for the days of the week, Cruse notes that they can be referred to in two ways. It is either possible to employ "a movable reference point which is constantly updated as we move through time (*yesterday*, *today*, *tomorrow*)", or to refer to "fixed points like milestones (with a repeating pattern of numbers) along a road (*Sunday*, *Monday*, etc.)" (1986: 186). The point is that some extralinguistic hierarchies which are branching and meronomic have **no lexical expression**, i.e. no corresponding lexical hierarchies exist. A *day* consists of 24 *hours* but each hour does not have its own name, except the designation by a cardinal number from the 12 or 24 hour-pattern. The same applies to units of measure, such as those of distance, mass, force, power, voltage, etc. A *ton* has a thousand *kilograms*, and a *kilogram* consists of a thousand *grams*, so they consist of them, and the underlying hierarchy is thus a meronomy, but each single *kilogram*, *gram* (*metre*, *newton*, *joul*, *volt*, *milivolt*, *farrad*, etc.) lacks its own name.

However, some hierarchies (such as the days of the week, months of the year) are designated in most languages by their own common names (cf. Cruse 1986: 185–186). The reason why some lexical hierarchies corresponding to meronomic hierarchies are filled with names, and some not, is probably practicality in everyday use. A system of 3-to-5 (*yesterday—today—tomorrow*; *předevčírem—včera—dnes—zítra—pozítří*) or 12 (*January*, *February*, *March*, …) names for its nodes is easier to remember and use than a system consisting of more items. A 28-to-31-item series referring to days of the month (i.e. dates) is thus more comfortably realised by a universal system of numbers, linguistically expressed by cardinal and derived ordinal numerals. This is also the reason why e.g. the continuum of time is divided up into several parts at lower hierarchical levels, with different degrees of denotative precision and referential accuracy. So we can refer to a certain time alternatively as *10.48 am*, *before 11*, *late in the morning* or *today*, depending on how precisely the time reference should be made in a given situation.

A tentative illustration of a lexical hierarchy of reference to time (see Fig. 3.9) also shows that the nodes which are at levels above or below the limits of everyday practical usage lack lexical expression and are only designated numerically.

Cruse sees the reason why some branching hierarchies are not lexically expressed in the fact "that the elements which occupy them do not qualify for lexification" (1986: 186). He claims that "if the elements are individuals, for instance, and not classes, then they only qualify for proper name labels" (ibid.). As an example is used a non-branching hierarchy of military ranks which has names for levels and corresponds to a (branching) meronomic extralinguistic hierarchy of military personnel with different individuals at each level, each designated by his rank. However, a distinction must be drawn between reference of a rank label to an individual (where it is a countable, common noun) and to a class in a hierarchy.

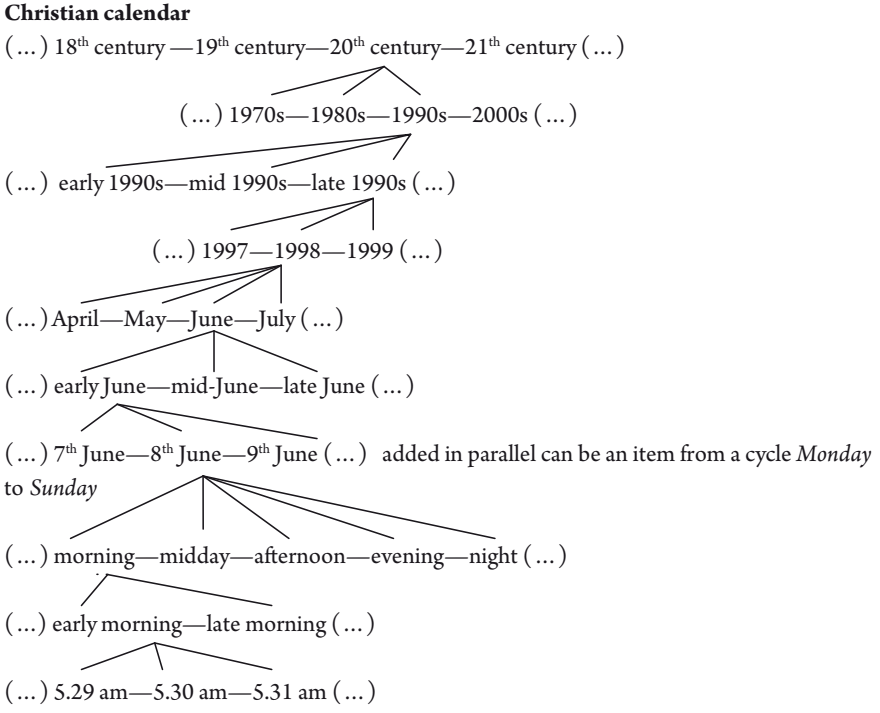


Figure 3.9. Non-lexicalised nodes in a hierarchy of time.

3 | 7 | 3 Scalar non-branching hierarchies

Non-branching hierarchies which are not derived from branching ones need to meet several criteria. Since they are made up of a sequence of items whose arrangement follows a certain principle (based on the underlying extralinguistic hierarchy of concepts), the relation between the items is **asymmetric and catenary** (Cruse 1986: 187). The ordering must be inherent to the meaning of the lexical items, such as the criteria of size, weight, age, speed, etc. It is inherently denoted that *creeping inflation* depreciates a currency less than the *galloping inflation*, which is lesser in intensity than *hyperinflation*. The sequence of quantitatively distinguished types of inflation is based on a scale where individual items possess a different degree of some property (e.g. speed, intensity). Another ordering principle is simply the order of the parts, with no underlying graded property (such as days of the week, months of the year).

Cruse asserts that such sequences of items must be semantically inherent in (at least some) members of the set. As he exemplifies on the ordered set *mound—hillock—hill—mountain*, "the semantic trait of 'relative size' is criterial" in such a set, while in others, where the meaning of one item is not entailed in the other, the trait is only expected

(ibid.: 187–188). This is connected with another criterion for true non-branching hierarchies, namely that the organising property is "foregrounded", i.e. "they contract a uni-dimensional contrast in respect of size" (ibid.: 188) as seen in the example above.

Ordered sets of this type can express either a **degree** of some property (where the inherent relation is A is bigger/smaller/longer/stronger etc. than B, B is bigger/smaller/longer/stronger etc. than C, and so on), or simply an **order** in a set which is not based on a gradable property (*January—February—March* etc.). However, some sort of gradation can be supplied by saying that *February* occurs later than *January* etc. on the underlying time scale. With degrees in the army, navy etc. such gradable property (*A stands higher/above // is more powerful than B*) can be formulated easily.

An internal difference within the category of degree (see Chap. 3.7.4) is worth noting, particularly in measure terms denoting time and distance. Standard degree-terms organised in a set "represent a more or less linear progression in terms of values of the underlying property" (Cruse 1986: 194), whereas the other type, terms expressing measure, rise geometrically (ibid.). Sequences of times of day, days in the week, months of the year, stages of life etc. belong to the first type of degrees, which splits a whole (time, distance) into relatively comparable successive or neighbouring parts. Measure terms with geometrical increase represent a sequence of higher-grade units, each of which is composed of a certain number of lower-grade components, such as *second—hour—day—week—month—year* or a metric distance scale *millimetre—centimetre—metre—kilometre* (ibid.). Here a branching hierarchy (meronomy) overlaps with a scalar non-branching one (degrees).

3 | 7 | 4 Chains vs. cycles/helices

In hierarchies, items at lower levels are members of sets which, once labelled, form a smaller set of hypernymic items at a higher level, and this continues upwards until it ends up with a single, most general concept at the top of the hierarchy. Another type of organised conceptual and lexical configurations is proportional series, which are based on one-to-one relationships. Although they are basically not hierarchical, some aspects of hierarchy can be identified even there (see later when endonymy and exonymy are discussed).

Non-branching hierachies are thus constructed as a "linear sequence on either a spatial or a temporal axis" (Cruse 1986: 189). Among them, two organising principles can be established: the sets either "exhibit pure linear ordering, in which case they will be called **chains**; or they may have a hybrid/linear/cyclical ordering", and these are called **helices** (ibid.: 189). Chains are fully governed by the image schema called "linear order" (Taylor 2003: 136). A different classification is suggested by Crystal, who generally talks about **series**. These are either **open-ended**, typically represented by the number system of any language (*one, two, three, …*), or **not open-ended**. Such series have the form of **cycles**, i.e. they start again once the end is reached (e.g. the days of the week, the months of the year) (Crystal 1995: 168). A characteristic example of such cyclical series in the

language of economics is the stages of the business cycle as it tends to repeat itself. The period of the business cycle consists of an *expansion*, *peak*, *contraction* (*recession*, or even *depression*), and *trough*.

Helices can be considered a subtype of chains as they differ only in one point—that they are cyclical. Otherwise they are organised in the same way as chains—they have linear sequence, a first and last item, unambiguously ordered items in between the two, and are characterised by directionality and asymmetry. However, helices continue cyclically and the same lexeme will be used to start the next circuit (e.g. *Monday* comes after *Sunday* again, but it will be another *Monday*, of the next week). This does not happen in chains (the life of an individual starts with *birth*, goes through several ontogenetic stages and ends in *death*; no further *birth* comes after this point to repeat the linear chain as would happen in a helical chain). Boundaries between constituent parts of chains and helices may or may not be precise, and though they may be precisely defined, they are often set arbitrarily.

As helices are a type of cyclical chain which is based on the relation that an item is specifically placed between two other items of the cycle, Cruse claims that the names of colours "*red*, *orange*, *yellow*, *green*, *blue*, *purple* form what is perhaps the only truly cyclically organised set in the language" (1986: 190). This cycle is not hierarchic, since it is not directional. However, in terms of physical properties of light defined by wave lengths (which form a directional scale) the ensuing colours do not form a helix, so Cruse's claim can be disputed. More relevant seems to be the point that the last items in helical chains of days of the week, months or seasons of the year do not really refer to the same period of time. Put simply, *spring* 2014 is not identical with *spring* of the next year, 2015. Nevertheless, the lack of referential identity clashes with identity in denotation (i.e. the objective meaning of *spring* and its relative position to other seasons is the same), as well as with its lexical sameness (there is no new word for the same season in each successive year).

Items in cyclical chains, helices, carry the information about their position in a chain as part of their meaning. Cruse (1986: 191–192) explains: "the majority of terms in helical chains are inherently ordered. Inherent ordering is definitely the rule in sets with a significant conventional component." There are various instances of natural and conventional ordering being mixed, though. In the southern hemisphere, the order of months and their reference to a certain time is identical with the north, as this is a convention of Euro-American civilization. But July is a winter month and October is a spring month in the southern hemisphere (such as in South Africa or Argentina); the application of lexical items for seasons is thus governed by their established meaning and they are assigned to time periods depending on the occurrence of natural conditions fitting the meaning. However, the order of seasons remains the same all over the world for speakers of European languages. Naturally, in some tropical areas with virtually no distinction between seasons they only need two of them, and this is reflected in local languages (distinguishing just between hotter and less hot periods, or between wetter and drier seasons).

Terms of a lexical chain can be divided as to how they are delimited on the **scale** into:

- **ranks**, which means terms on a discontinuous scale with discrete individual values;
- **degrees**, i.e. terms on a continuous scale; they are non-gradable, unlike
- **grades**, which also operate on a continuous scale, but can be graded (Cruse 1986: 192).

Since **rank-terms** "vary in discrete jumps" (Cruse 1986: 192), it logically follows that these discontinuous-scale terms are characterised by properties of non-gradability, such as impossibility of intensification and approximation. It is not correct to say **There were nearly 7 passengers on the bus*, since integers are discrete. Number names of any kind (cardinal, ordinal, multiplicative, fractions) are ranks. As numbers increase, the words for units and tens are helically repeated. Similarly, ranks in military, navy or ecclesiastical hierarchies are rank-terms. It is not possible to use a statement referring to ranks such as **Peter is already a bit more than a private, but not yet a corporal*.

Non-gradable **degree-terms** do not change from one into another (up or down) by discrete jumps, but there is a conventional order in such sets and its items may overlap (but cannot be swapped). Generally, degree-terms display fuzzier boundaries. Cruse uses as an example the stages of development of a human: *baby*, *child*, *adolescent*, *adult* (1986: 193). Although the boundaries between the stages can be set differently, the order is unquestionable. Degree-terms are thus characterised by the possibility that one term expresses different values of a property within the extent represented by the term on the continuous scale. *Children*, or generally *humans*, differ from each other in age, height, maturity, etc. within some roughly accepted boundaries. The fuzziness of boundaries is similar to that between neighbouring items in the minimal set *morning—midday—afternoon—evening—night*, but this set of times of day is cyclical, as its items are recycled when it is completed: it is a helix.

The gradable subtype, **grade-terms**, can be compared and intensified and, in terms of form class, are typically adjectives. A set of gradable adjectives expressing a (rising) degree of a property are e.g. adjectives referring to temperature, size, speed and quality. The most obvious series, *minuscule/miniature—tiny—small—medium—big/large—huge—gigantic/giant* include items which are included or entailed in others, such as *big/large* which is included in the meaning of *huge* and *gigantic*; and similarly what is *minuscule* and *tiny* is also *small*. *Big/large* and *small* are somehow normal or more general words for being big / largeness and smallness, respectively.

Gradable terms also correspond to their antonyms, which are positioned in an identical distance from the middle of the scale, but in the opposite direction. *Freezing* is thus an antonym to *boiling*, not to *hot*, which has its opposite in *cold.* It is usually easier to establish the extreme grades on a scale, as they are polar adjectives, opposites (*freezing* vs. *boiling*, *minuscule/miniature* vs. *gigantic/giant*), but it is more difficult to do this in the middle of the scale. The grade-terms can, however, have a confusing denotation when intensified or compared. If something is *very cold*, it does not have to be *freezing* (*The next day in Maracaibo was very cold for that longitude in summer; it was only 25 degrees of Celsius.*)

The comparative form does not correspond to an absolute form of the neighbouring item either (*Paris is smaller than London* does not mean that **Paris is small/tiny*). There are notorious paradoxical statements, such as *A Soviet dwarf is the biggest dwarf in the world*. Using comparatives and superlatives, Hladký and Růžička illustrate the implicitness of comparison by e.g. *A small elephant is a large animal* and *I'm the smallest giant in the world* (1998: 30). They explain that "in implicit comparison … *small* and *big*, *few* and *many* etc., deprived of their connotation ´smaller than´, ´bigger than´ etc, do not refer to independent, opposite qualities; they do not cluster about a given quantity" (ibid.).

The tree diagram below (Fig. 3.10) summarises the types of lexical hierarchies discussed in Chapter 3. Those which are placed on the left (i.e. branching hierarchies) will be the main focus of the following two chapters since hierarchies of concepts (which are related, but differentiated) form the structure of virtually every scientific as well as practical discipline.

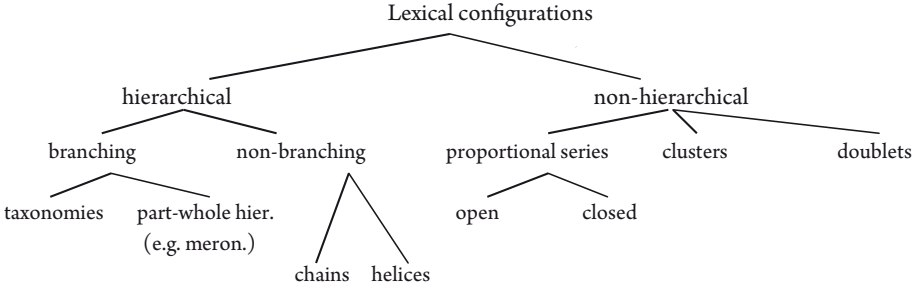


Figure 3.10. Taxonomy of lexical configurations.

4| Biological taxonomy

4 | 1 The principles of binomial nomenclature and biological taxonomy

Taxonomy in **biology**, in this work representing the natural or concrete-based type (i.e. based on material entities)[28] of lexical hierarchies, studies the theoretical and practical identification of taxons, and the definition, classification and creation of a natural classificatory system of organisms. The basic unit of classification is a **taxon**, which is any natural and distinguishable set of organisms, whether living or extinct, which has such clearly definable features that it can be accepted as a unit of classification. Above the level of genus, taxons are defined and established with the help of phylogenetical study, which is focused on reconstructing the evolution of organisms and establishing their genetic relations.

Taxonomic study therefore involves three subsequent, but also overlapping stages:

- alpha-taxonomy, which characterises, names, defines and diagnoses taxons (particularly the genera);
- beta-taxonomy, which strives to create a natural higher classification of taxons, using all available sources of a trait;
- gamma-taxonomy, which studies evolution, the origin of species, their variation, as well as their internal organisation and relations (Rosypal 2003: 13).
- Taxonomic traits (Cz. *znaky*) are properties which involve various states (Cz. *stavy*), i.e. situations describing the relevant trait. Taxonomic assessment is based on a set of data referring to the taxon in question, i.e. a set of states of the traits, not the traits alone.

The states of traits may differ in several ways:

- qualitatively (e.g. presence/absence, shape);
- meristically (e.g. number of elements);
- continuously quantitatively (e.g. measures).

28 The natural or concrete-based type of lexical hierarchies is contrasted with the artificial type, based on abstract concepts. The natural taxonomy, however, is highly scientific, and the criteria for establishment of higher levels of taxons are not generally perceptible, but have been selected artificially.

It is obvious that proper knowledge of genus-specific features of organisms and their correct identification and determination are vital for adequate treatment and protection of populations or habitats of such species. Natural higher taxonomies do not only serve as a useful and economical way of storing information about numerous species, but they also have a great importance for correct prediction of properties of species at lower levels. Species and classes of species are grouped together within taxons at a higher level on the basis of some shared features; these features are presumed to result in some shared relevant properties, and manifestation of these properties by individual members of such classes may therefore be deduced from their place in taxonomic classes.
The principal methods of creating biological classification include:

(a) **phenetic classification**: a numerical taxonomy which disregards phylogenesis and rather assesses the overall degree of similarity (Rosypal 1992: 21); its outcomes are tree-shaped dendrograms;
(b) **cladistic** or **phylogenetic classification**: it is based solely on phylogenetic relations. It accepts only evolutionary natural branches (holophyletic, but not paraphyletic taxons) (ibid.: 22);
(c) **evolutionary classification**: it attempts to harmonise cladogenetic relations with an overall degree of divergence. It aims to express both the process and outcomes of the phylogentic process (ibid.: 22).

Apart from **cladistic (phylogenetic)** interpretation of cladogenesis (i.e. the order and type of of all evolutionary lines) (Flegr 2005: 427) and **computational phyletics** there are being developed **molecular methods** (Rosypal 1992: 20–21), which bring new results and lead to redefining the so far used taxonomic trees.

Scientific nomenclatures in biology are always Latin, which makes them unequivocal and internationally comprehensible (i.e. within the scientific community) (cf. Rosypal 1992: 12–13). Individual national communities have developed their own **national** or even **vernacular nomenclatures** to refer to organisms relevant to it, whether they occur on its territory, or are important economically, culturally, scientifically, or in any other way. However, complete national nomenclatures are usually not necessary and fail to become part of language use. The Czech language has developed an almost complete scientific botanical and zoological nomenclature, alternative to the comprehensive Latin nomenclature, but Czech names of exotic taxons or taxons from very numerous classes are missing; and many names of less frequently occurring species and higher taxons are unfamiliar with ordinary language users.

The **hierarchical classification** introduced by Carolus Linnaeus (Carl von Linné) in the 18th century consists of **categories** at different **levels**. Such categories include taxons, which are labelled; and such taxons mostly include several subordinated taxons (these are relatively coordinated), and so on. Every subordinated taxon has only one superordinated taxon, which is referred to as the principle of **exclusiveness**. The lower a taxon appears in a classificatory hierarchy, the more similar and related its subordinated taxons usually are.

Categories in such classifications are divided into:

- the **basic** (Cz. *základní, hlavní*) **categories**: each taxon is classified as their member (membership in a family, genus, species);
- the **supplementary** (Cz. *doplňkové*) **categories**: they are terminologically derived from the terms in basic categories and their position in a hierarchy is clearly given;
- the **additional** (Cz. *dodatečné*) **categories**: their names are not derived from the terms in basic categories and their hierarchical position may (such as the category of *tribus* in animals) but need not be determined (e.g. *group*, *sectio, legio, cohors*) (Rosypal 1992: 11).

(We may recall the difficulty of assigning a proper level to *groups*, *subgroups* and *branches* in the classification of languages in Chap. 3.2.2., as their determination is arbitrary).

Binomial nomenclature in botany and in zoology is applied in compliance with internationally accepted codes, particularly the *International Code of Nomenclature for Algae, Fungi, and Plants* (abbrev. ICN) and the *International Code of Zoological Nomenclature* (ICZN), respectively. There are also separate nomenclature codes for bacteria (*International Code of Nomenclature of Bacteria*, ICNB) and for viruses (*International Committee on Taxonomy of Viruses*, ICTV) (Binomial nomenclature). The codes of rules share their general principles, although they differ in some respects. E.g. zoological nomenclature can use an identical name for a genus and for its species, such as Lat. *Bufo bufo* (En. *common/European toad*), or Lat. *Vulpes vulpes* (En. *red fox*), which is not possible in botany.

In Latin, taxons of some basic, supplementary, and sometimes also additional categories end in the same, binding suffix. Such suffixes, used at certain taxonomic levels, vary from kingdom to kingdom. For example, animals have the typical suffix *-idae* marking a family, whereas plants and fungi mark families by *-aceae.* The basic taxonomic categories are as follows (in **Latin**, English and Czech):

● ***dominium*** *(domain, doména)* (e.g. *Eukarya)*;

●● ***regnum*** *(kingdom, říše)* (e.g. *Animalia = animals, živočichové, Plantae = plants, rostliny)*;

●●● ***phylum*** *(phylum, kmen)* (e.g. *Arthropoda = člen ovci);* an additional category for plants;

●●●● ***subphylum*** *(subphylum, podkmen),* an additional category for plants, a supplementary (derived) category to *phylum*;

●●●●● ***divisio*** *(division, oddělení)* (e.g. *Magnoliophyta/Angiospermophyta*[29] *= angiosperms, krytosemenné, Equisetophyta*[30] *= horsetails, přesličky);* this is an additional category for animals; plants use an obligatory suffix *-phyta*, fungi use *-mycota;*

●●●●●● ***classis*** *(class, třída)* (e.g. *Insecta/Hexapoda = insects, hmyz; Magnoliopsida/Dicotyledonae/Magnoliatae = dicotyledons, dvouděložné)*; plants use the obligatory suffix *-(o)psida*, algae use the suffix *-phyceae*, and fungi use *-mycetes*;

29 It will not occur infrequently that taxons at all levels are referred to by two or even more terms, proving that synonymy has not been avoided in scientific taxonomy.

30 However, taxonomic classifications are not unified; some of them list *horsetails* as the **phylum** *Sphenophyta*; and, similarly, *clubmosses* are classified as the **phylum** *Lycopodophyta* and *ferns* as the **phylum** *Filicinophyta*; elsewhere, they are classified as **divisions** of higher plants, *Lycopodiophyta* (*clubmosses*) and *Polypodiophyta* (*ferns*).

●●●●●●● ***ordo*** *(order, řád)* (e.g. *Diptera = dvoukřídlí; Eleagnales = oleaster/Eleagnales, hlošinotvaré); -ales (-tvaré)* being the obligatory suffix for plants;
●●●●●●●● ***familia*** *(family, čeleď)* (e.g. *Muscidae = mouchovití; Elaeagnaceae = oleaster (family), hlošinovité)*; obligatory suffixes for animals and plants are *-idae* and *-aceae,* respectively;
●●●●●●●●● ***genus*** *(genus, rod)* (e.g. *Musca = fly, moucha; Elaeagnus = oleaster, hlošina; Hippophae = buckthorn, rakytník)*;
●●●●●●●●●● ***species*** *(druh)* (e.g. *Musca domestica = moucha domácí, Elaeagnus) angustifolia = oleaster/Russian olive, hlošina úzkolistá; Hippophae rhamnoides = sea buckthorn, rakytník řešetlákový).*
●●●●●●●●●●● ***race*** *(rasa),* ***breed*** *(plemeno)* are used at the lowest level for some domesticated animals, as well as ***variety*** *(odrůda/varieta)* or ***cultivar*** for some, usually agricultural and horticultural, plants.

Supplementary categories are formed out of basic categories by attaching **prefixes**, namely *super- (= nad-), sub- (= pod-), infra- (= infra-,* lower than *pod-).*

Botanical taxonomy systematically uses the supplementary categories ***subclassis*** (= *subclass*, *podtřída*), marked by the suffix *-idae*, and ***superordo*** (= *superorder*, *nadřád*), marked by the suffix *-anae*.

Zoological classification allows the use of the categories ***subordo*** *(= suborder, podřád),* ***infraordo***, and ***superfamilia*** *(= superfamily, nadčeleď,* characterized by the suffix *-oidea)*, all of them placed between the levels of *ordo* and *familia*.

Subfamilia (= *subfamily, podčeleď*) uses an obligatory suffix *-inae* in zoological terminology and *-oideae* in botanical and mycological terminologies. Lower than at the level of *subfamilia* the regular pattern of alternation between the basic and supplementary categories is interrupted, i.e. no **supergenus* or **superspecies* categories exist (but the category of ***tribus*** is often used between the levels of *subfamilia* and *genus*).

Natural taxonomies also recognise so-called ***semispecies*** for transitional taxons, which are transitional in terms of evolution and not well-isolated from other species, and ***superspecies***, referring to species which are related but different due to geographical isolation. As every species is characterised by reproductive isolating mechanisms (i.e. they cannot mate with other species), this property can lead to species being distinguished (so-called ***cryptic species***) which otherwise appear to be identical. Taxonomic division even continues within species (i.e. the lowest taxon in scientific taxonomy): if two populations differ in some permanent properties, but still can interbreed, they are called ***subspecies*** (*poddruhy*), and sometimes *breeds* (*plemena*) or ***races*** (*rasy*). In botany, lower categories are still hierarchised in taxonomy, namely ***variety*** (*odrůda*) and ***form***. This complexity of lower taxons is mentioned to manifest the apparent rule that if some relevant distinctive features can be identified, further branching into taxons at lower levels is possible.

Only monophyletic taxons in the narrow sense may be regarded as **natural taxons** as they reflect the historical evolution of taxons and share one common hypothetical ancestor. The taxon involves the common ancestor with all its descendants and forms

a clade. (Monophyly) The *dog* family is, for example, monophyletic, although there is an ongoing nomenclature debate whether the genus including the domesticated species (*Canis familiaris*) and its wild ancestor (*Canis lupus*) should not be rather, and logically, referred to by the name of the ancestor (a wolf), i.e. *Lupus*. (Dog)

A paraphyletic taxon involves the common ancestor, but not all descendants (the common ancestor is also an ancestor of taxons not included in the hierarchy). A polyphyletic taxon does not include its common ancestor and it contains items whose similarity has evolved independently and is not based on genetical relation (Rosypal 1992: 17).

The type of classificatory hierarchy established by Linnaeus is traditional and not fully consistent as to the classification of certain taxons into certain categories. The important criterion, however, is **the relative position** of taxons to their subordinate as well as superordinate taxons. This is what makes a natural and functional hierarchy.

The concept of **nomenclature** is not identical with that of **classification**. These two are obviously related, but classification involves combining taxons or other objects into sets on the basis of similarities and differences. Classification is a broader concept. When species are being classified and a biological classification is being built, the names given to species do not have to relate to their classification (taxons can be named after different properties, or even after people, places, cultural phenomena, etc.). Linnaeus' trivial names with a quite arbitrary attribute (adjective or noun) replaced previous descriptive polynomial nomenclature (Binomial nomenclature).

In binomial nomenclature some degree of unity is guaranteed, as a species tends to keep its binomial name when it is reclassified, i.e. shifted to another family or order where it seems to fit better. It may be given a new name based on classification in a new category, rendering the original one a secondary synonym. Also, the relative independence of naming at higher taxonomic levels is limited by the fact that the names of these levels are usually derived from names of (token) genera (Binomial nomenclature).

The separate development of individual biological disciplines has led to the establishment of different codes for nomenclature applied in zoology, botany, virology and bacteriology. These nomenclatures differ as to the extent, principles and terminology used. A bio-code applicable for all kingdoms of organisms is being designed. All codes of nomenclature (except for the virological one) share some principles (Rosypal 2003: 17–18):
(1) the principle of **binomial nomenclature**:

Names of taxons are Latin or adaptable by Latin, and may be arbitrary (i.e. not necessarily related to the properties of taxons). Names of genera and higher taxons are one-word nouns, always in the nominative case. Names of **genera** are singular nouns, whereas names of **higher taxons** are plural nouns. Names of **species** are two-word (binomial), consisting of the generic noun and its attribute (or epithet) designating the species; **subspecies** use three-word (or trinomial) names, i.e. with an additional attribute. Names of taxons often include names of their codifiers and the date of codification.
(2) the principle of **priority**:

The oldest appropriately published name of a taxon is usually considered as its valid and correct name. This rule guarantees stability of nomenclature. If an even older

but unused name was found, the established name would continue to be used. Later published terms for the same taxon are its (invalid) **junior synonyms**.
(3) the principle of **homonymy**:

Unequivocalness of nomenclature is achieved by ensuring that two or more different taxons within a given nomenclature are not referred to by the same term. (However, the opposite relation, i.e. that two or more terminological names refer to the same taxon, is not rare—see synonymy.)
(4) the principle of **nomenclatoric types**:

A name of a species can only be used to designate a species including the firstly-described and taxonomically binding type. A genus has its **type species**, as well as a family has its **type genus**: e.g. the *dogwood* family (*Cornaceae*, *dřínovité*) has its type genus *Dogwood* (*Cornus*, *dřín*). This connection goes higher: the family *Cornaceae* is a type family of the order *Cornales* (*Cornales, dřínotvaré)*, the order *Cornales* constitutes a type order in the superorder *Cornanae* (cf. the type genus *Rosa* and its higher taxons, Fig. 4.8). The type species and type genus must always be included in taxonomies using the name for higher levels, and they may only refer to sets of living things which include the taxon in question.

4 | 2 Representation of evolution in tree diagrams

The taxonomy of organisms is usually presented simplistically from the node, which is branched into three domains. However, this is not the ultimate top of the tree diagram. If we consider living things (i.e. not e.g. minerals or inorganic substances) as the subject studied by biology, then they are the highest taxons: the ***living organisms/systems***. The next level consists of two types of living systems, the ***non-cellular*** (*viruses*) and the ***cellular* types**. The branch of the cellular living organisms/systems is divided into those composed of **prokaryotic cells**, themselves divided into two **domains**: *Bacteria* and *Archaea*, and those composed of **eukaryotic cells**, constituting the domain *Eukarya*. It is the domain which is considered as the highest taxon.

Why are the three (or two, if we ignore the division based on prokaryotic and eukaryotic cells) levels above *Eukarya* not classified as taxonomic levels? Remembering the evolutionary principle which governs taxonomies will help: the highest taxon in biological family-tree diagrams tends to be the common ancestor. As it will be shown, **evolutionary trees** largely correspond with the present-day classificatory taxonomies; the ranks and orders in evolutionary tree diagrams reflect which category of organisms is assumed to have developed from the one which stands closer to the foot of the trunk in the same line. All taxons in the domain *Eukarya* are believed to have evolved from one ancestor.

Therefore, **cellular organisms** are currently classified into **3 domains** (the highest taxons), viz. *Archaea*, *Bacteria* and *Eukarya* (*Eukaryota*).

The *eukaryotic organisms* are classified into **5 kingdoms**:

- *plants* (*Plantae*, *rostliny*),
- *fungi* (*Fungi*, *houby*),

- *chromists* (*Chromista*),
- *Protozoa* (*Protozoa, prvoci*),
- *animals* (*Animalia, živočichové*).[31]

The division of living organisms into three domains and five kingdoms is, however, constantly subject to revision.

All **living organisms**—2 groups:
● **non-cellular living systems** *(Subcellulata, nebuněční/podbuněční)* (i.e. *viruses, viroids, virusoids*)
●● **protoorganisms** *(Eobionta, Progenota / praorganismy)*
●● **viruses** *(Vira, viry)*

● **cellular living systems** (single-celled and multicellular organisms)
- **PROKARYOTS** (cells of the **prokaryotic type**—include **2** domains)
●● domain: **BACTERIA** *(Bacteria, baktérie)*
(e.g. ●●●●●● subclasses *cyanophytes (Cyanophyta, sinice)*, *Prochlorophyta (Prochlorophyta, prochlorofyty)*)
●● domain: **ARCHAEA** *(Archaea, archea)*

- **EUKARYOTS** (**JADERNÍ**, cells of the **eukaryotic type**—include **1** domain)
●● domain: **EUKARYA** *(Eukarya)* (consists of 5 kingdoms):
●●● kingdom: **Plants** *(Plantae, rostliny)*
●●● kingdom: **Fungi** *(Fungi, houby)*
●●● kingdom: **Chromista** *(Chromista, Chromista)*
●●● kingdom: **Protozoa** *(Protozoa, prvoci)*
●●● kingdom: **Animals** *(Animalia, živočichové)*

Figure 4.1. Classification of organisms.

●●● **říše** (regnum)	*rostliny (Plantae)*	*živočichové (Animalia)*
●●●● **kmen** (phylum)	an addition al category in botany	*členovci (Arthropoda)*
●●●●● **oddělení** (divisio)	*krytosemenné (Angiospermae)*	an additional category in zoology
●●●●●● **třída** (classis)	*dvouděložné (Dicotyledonae)*	*hmyz (Insecta)*
●●●●●●● **řád** (ordo)	*mýdelníkotvaré (Sapindales)*	*motýli*
●●●●●●●● **čeleď** (familia)	*javorovité (Acera**ceae**)*	*bělásk**ovití***
●●●●●●●●● **rod** (genus)	*javor (Acer)*	*bělásek*
●●●●●●●●●● **druh** (species)	*javor červený (Acer rubrum)*	*bělásek zelný*

Figure 4.2. Hierarchy of the basic categories in Czech and Latin biological taxonomies with the characteristic suffixes.

31 According to J. Jelínek and V. Zicháček, *Biologie pro gymnázia* (Olomouc: 2004), 5, 17.

Biological taxonomy classifies taxons on the basis of their evolutionary relatedness. In Czech (Poštolková et al. 1983: 12) the formal side of a name should indicate the taxonomic level, e.g. orders of animals are referred to by plural nouns (*šelmy*), families by plural adjectives (*psovití*), genera by singular nouns (*hyena*) and species by a combination of nouns and adjectives in this (i.e. marked) order (*hyena skvrnitá*). This sounds too ideal and simple to be absolutely true. Besides kingdoms, also animal **phyla, subphyla, and classes are labelled by plural nouns**, not only orders. **Adjectives in the plural** number are not only used for names of **families**, but also for **subclasses and superorders**, etc. With the existence of supplementary levels (*sub-* and *super-* categories), the indication of taxonomic level simply by the form of a term is not reliable. Moreover, neither the combination noun + adjective in the names of species is consistently used; instead, the combination of a head noun and a modifying noun in postposition is sometimes used (*pes vlk, medvěd brtník, střevíčník pantoflíček, javor klen, jilm vaz*, etc.).

There is an apparent and logical correspondence between the classification of the highest taxons of living organisms and the evolutionary tree. This gives the botanical and zoological taxonomies another dimension, which is usually absent from taxonomies based on an non-material principle, such as the taxonomies in the area of finance and accounting. The characteristic feature of biological taxonomies is thus **their diachronic dimension**, i.e. the classificatory systems are based on the evolutionary theory, and the position and order of taxons in a classification reflect **the chronology of hypothetical evolution** of one group of organisms from another. Consequently, **the genetic relation** between them is shown, as well as their **complexity**.

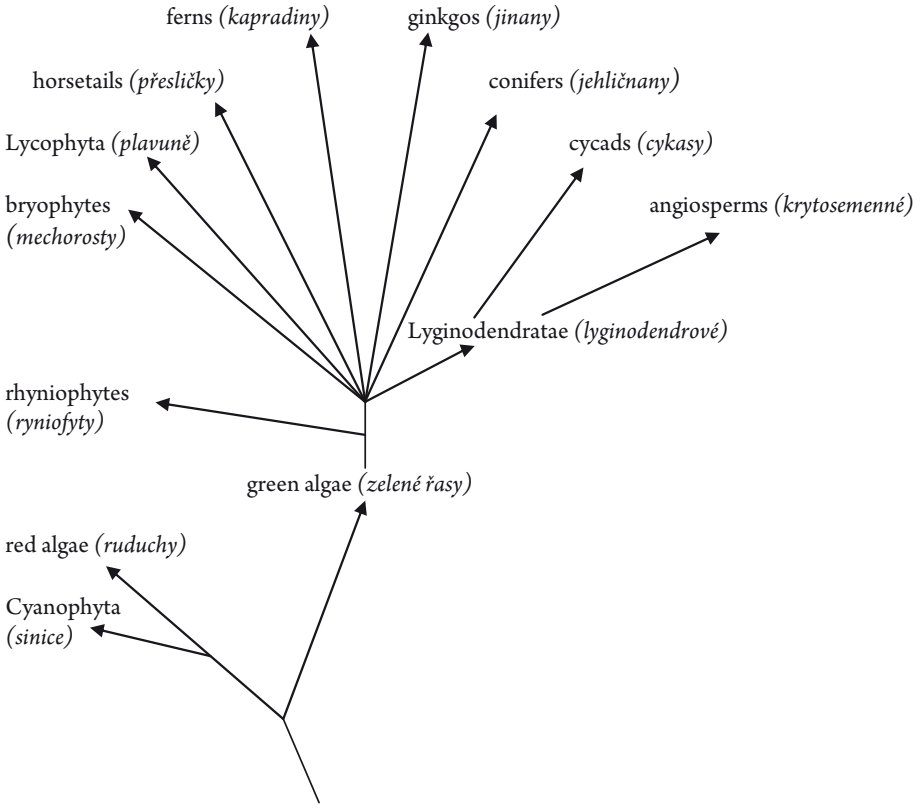
For instance, it is assumed that the current *higher plants (Cormobionta* or *Embryophyta* or *Embryobionta)* evolved in the Cambrian period from *green algae* (the present-day division *Chlorophyta* in the subregnum *lower plants, Protobionta*) by moving from water to the ground, first temporarily and periodically in coastal areas, and that later their evolutionary adaptation enabled them to survive outside of aquatic environment permanently (Jelínek & Zicháček 2004). (*Embryophytes* and *green algae* also form a group, referred to collectively as the hypertaxon *green plants* or *Viridaeplantae*). Similarly, *clubmosses (Lycopodiophyta, plavuně), horsetails (Equisetophyta, přesličky),* and *ferns (Polypodiophyta, kapradiny)* are believed to have evolved from some primitive groups of *Rhyniophyta*. The former three are divisions of *Cormobionta*, conventionally listed in order of complexity (from the simplest to the most complex form), and *Rhyniophyta* are listed first, before them. This indicates both that *Rhyniophyta* are the most primitive and the oldest division within *Cormobionta*.

The following four divisions (see Figs. 4.3 and 4.4) of *Cormobionta*, specifically *gymnosperms* (seed plants with naked seeds, *rostliny nahosemenné*), are the evolutionary descendants of or links higher up in the chain of evolution than *Rhyniophyta.* More exactly, they continue from extinct *gymnosperms* which flourished in the Devonian period and which are called *progymnosperms* (*Progymnospermatae, prvosemenné rostliny*). The subsequent evolution of *gymnosperms* led to the differentiation between *conifers* and *ginkgos* as one big branch, and the *Lyginodendratae* (*rostliny lyginodendrové*) and *cycads* as the

other. One group of the *Lyginodendratae* is an ancestor of a big group of *angiosperms*, further differentiated into the class of *dicotyledons* (*Magnoliopsida, rostliny dvouděložné*) and the younger and derived class of *monocotyledons* (*Liliopsida, rostliny jednoděložné*). The *angiosperms* are believed to have evolved as the last major group of plants from within the *gymnosperms* during the Jurassic period (with big diversification in the Cretaceous period) (Jelínek & Zicháček 2004).

All this is expressed in the levels of taxonomy, with the oldest and most original (**ancestor**) types of organisms mentioned first, printed on the left, or at either the top or the bottom of tree diagrams, depending on where the beginning is placed in the diagrams, so that their derivatives or evolutionary younger taxons (**successors**) are listed on the right or next in order. Broadly and generally specified types of organisms which became differentiated, more complex and which evolved into many different and complex types, are higher in the hierarchy, being superordinate taxons.

The apparent correspondence between the **evolutionary tree** and a taxonomy is demonstrated through the comparison of the following diagram of evolution of *higher plants* (*Cormobionta/Embryophyta*) with the taxonomic classificatory hierarchy of plants. The diagram of evolution starts from the bottom (like a tree growing), whereas the classificatory hierarchy is presented in the reverse order: the superordinate, most abstract taxons are shown at the top, and the lower levels, denoting specific groups of subordinated taxons, unfolding downwards. Indentation is frequently used to reflect hierarchy.



Source: J. Jelínek & V. Zicháček, *Biologie pro gymnázia* (2004), 48. English translation added by RV.

Figure 4.3. Evolution of higher plants (*Cormobionta/Embryophyta*).

● Kingdom (regnum, říše): **Plants *(Plantae, rostliny)***
  ●● subkingdom (subregnum, podříše): ***lower plants (Protobionta, nižší rostliny)***
    ●●● division (divisio, oddělení): ***red algae*** *(Rhodophyta, ruduchy)*
    ●●● division (divisio, oddělení): ***green algae*** *(Chlorophyta, zelené řasy)*[32]
  ●● subkingdom (subregnum, podříše): ***higher plants (Cormobionta, vyšší rostliny (a mechorosty))***
    ●●● division (divisio, oddělení): ***rhyniophytes*** *(Rhyniophyta, ryniofyty)*
    ●●● division (divisio, oddělení): ***mosses*** *(Bryophyta, mechorosty)*
    ●●● division (divisio, oddělení): ***clubmosses*** *(Lycopodiophyta, plavuně)*[33]
    ●●● division (divisio, oddě lení): ***horsetails*** *(Equisetophyta, přesličky)*[34]
    ●●● division (divisio, oddělení): ***ferns*** *(Polypodiophyta, kapradiny)*
    gymnosperms *(Gymnospermae, rostliny nahosemenné)*:
      ●●● division (divisio, oddělení): ***Lyginodendratae*** *(Lyginodendrophyta, rostliny lyginodendrové)*
      ●●● division (divisio, oddělení): ***cycads*** *(Cycadophyta, cykasy)*
      ●●● division (divisio, oddělení): ***ginkgos*** *(Ginkgophyta, jinany)*
      ●●● division (divisio, oddělení): ***conifers*** *(Pinophyta, jehličnany)*[35]
    ●●● division (divisio, oddělení): ***angiosperms*** *(Magnoliophyta, krytosemenné)*

Sources: J. Jelínek & V. Zicháček, *Biologie pro gymnázia* (2004), 6, 7, 48; *Visual Encyclopedia* (1996), 118–127, *Wikipedia*. Combined and completed by RV.

Figure 4.4. Taxonomy of plants (see the evolutionary history above).

4 | 3 Botanical taxonomic system and its taxonyms

Plants are a large group of living organisms, containing about 300,000 species. As early as in ancient Greece, Aristotle divided living things into *plants* and *animals*. These two groups are called the kingdoms *Vegetabilia* (later renamed to *Plantae*) and *Animalia* in Linnaeus' system. It was soon evident, however, that *plants* (*Plantae*) included unrelated groups such as *fungi* and some *algae*, which were later removed and identified with other kingdoms.

32 Alternatively, *red algae* (*Rhodophyta*), *green algae* (*Chlorophyta*) and *brown algae* (*Phaeophyta*) are classified as **phyla** in the kingdom *Protista* (*algae, řasy*), not used in the previous taxonomy. (*Visual Encyclopedia* 1998: 116).

33 Some modern taxonomies classify *clubmosses* and *firmosses* as members of the **class** *Lycopodiopsida*, one of three classes (along with *spikemosses* (*Selaginellopsida*) and *quillworts* (*Isoetopsida*)) composing the **division** *Lycophyta*. Therefore, using the term *clubmosses* for the division *Lycopodiophyta* (or *Lycophyta*) is a phenomenon of vernacular languages where a name of a type taxon frequently **refers to various taxonomic levels**. Similarly, both the *bryophytes* (divison *Bryophyta*) and the class *Musci* (or *Bryopsida*) are commonly referred to as the *mosses*, whereas the class *Bryopsida* is known also as the *true mosses*.

34 *Visual Encyclopedia* (1998: 120) lists *horsetails* as the **phylum** *Sphenophyta*, *clubmosses* as the phylum *Lycopodophyta* and *ferns* as the phylum *Filicinophyta*.

35 Similarly, *gymnosperms* (not classified as to their taxonomic level) are divided into **four phyla** in alternative classifications: *conifers* (phylum *Coniferophyta*, *cycads* (phylum *Cycadophyta*), the *ginkgo* or *maidenhair tree* (phylum *Ginkgophyta*), and *gnetophytes* (phylum *Gnetophyta*). (*Visual Encyclopedia* 1998: 122)

The system of plants is based on the fact that, apart from the fact that all living things are made up of cells and they have the same hereditary substance, plants have some common features suggesting that they have evolved from few prehistoric forms and they probably have the same origin. The degree of identity or similarity is the criterion of organising plants into a system. The larger a variety of living organisms is, the more groups are necessary. Taxons are entities or groups of entities that probably form a group based on shared features, and each taxon is assigned a position in the hierarchy.

Linnaeus created a **uniform system** for naming genera and species of organisms, the **binomial nomenclature**. He based the principles defining genera in botany on flower parts which remain stable during evolution. Such a principle enables an item to be placed quickly in a relevant category. This way Linnaeus systematised not only the plant, but also the animal and mineral kingdoms. The system is objectively acceptable despite being created artificially.

Table 4.1. Taxons used in the kingdom *Plantae*.

English	**Latin**	**Czech**	**Example of taxon** (En/Lat/Cz)	**Note**
kingdom	regnum	říše	*plants / Plantae / rostliny*	
	subregnum	podříše	*higher plants / Cormobionta/ Embryobionta / vyšší rostliny*	alternative classifications group plants as *seed plants* (*Spermatophyta/Spermopsida*), and higher up also as *vascular plants* (*Tracheophyta, cévnaté r.*) and *land plants* (*Embryophyta*)
division	divisio	oddělení	*angiosperms* or *flowering plants / Magnoliophyta / krytosemenné rostliny*	According to Strassburger (1983): *seed plants / Spermatophyta / semenné rostliny*
subdivision	subdivisio	pododdělení		According to Strassburger (1983): *angiosperms / Angiospermae/ Angiosperm-ophytina/ Magnoliophytina / krytosemenné rostliny*
class	classis	třída	*monocots / Monocotyledonae/ Liliatae / jednoděložné r.*	
subclass	subclassis	podtřída	*- / Liliidae / -*	
superorder	superordo	nadřád	*- / Lilianae / -*	
order	ordo	řád	*asparagus* o. */ Asparagales / chřestotvaré*	
family	familia	čeleď	*garlic* f. */ Alliaceae / česnekovité*	
genus	genus	rod	*onion / Allium / cibule*	
species	species	druh	*common/wild/sweet onion / Allium cepa / cibule kuchyňská*	

●●● kingdom (říše / regnum): **Rostliny** *(Plantae)*
●●●● subkingdom (podříše / subregnum): **Nižší rostliny** *(Protobionta)*
●●●●● division (oddělení / divisio): **Ruduchy** *(Rhodophyta)*
●●●●● division: **Zelené řasy** *(Chlorophyta)*
●●●●●● class (třída /classis): **Zelenivky** *(Chlorophyceae)*
●●●●●● class: **Kadeřnatkovité** *(Ulvophyceae)*
●●●●●● class: **Trubicovkovité** *(Bryopsidophyceae)*
●●●●●● class: **Žabovlasovité** *(Cladophorophyceae)*
●●●●●● class: **Spájivky** *(Conjugatophyceae, Zygnematophyceae)*
●●●●●● class: **Parožnatky** *(Charophyceae)*

●●●● subkingdom (podříše): **Vyšší rostliny (a mechorosty)** *(Cormobionta/Embryobionta)*
●●●●● division (oddělení / divisio): **Ryniofyty** *(Rhyniophyta)*
●●●●● division: **Mechorosty** *(Bryophyta)*
●●●●●● class (třída / classis): **Játrovky** *(Marchantiopsida)*
●●●●●● class: **Mechy** *(Bryopsida)*
●●●●● division: **Plavuně** *(Lycopodiophyta)*
●●●●● division: **Přesličky** *(Equisetophyta)*
●●●●● division: **Kapradiny** *(Polypodiophyta)*
●●●●● division: **Rostliny lyginodendrové** *(Lyginodendrophyta)*
●●●●● division: **Cykasy** *(Cycadophyta)*
●●●●● division: **Jinany** *(Ginkgophyta)*
●●●●● division: **Jehličnany** *(Pinophyta)*
●●●●● division: **Krytosemenné** *(Magnoliophyta)*
●●●●●● class: **Rostliny dvouděložné** *(Magnoliopsida)*
●●●●●● class: **Rostliny jednoděložné** *(Liliopsida)*

Figure 4.5. Taxonomy of plants in Czech and Latin (regnum Plantae). (The number of dots symbolises the distance in taxonomic levels from the highest possible taxon: ● *cellular living systems,* ●● *domain Eukaryota*)[36]

36 This taxonomy of plants and the following taxonomy of fungi, including a few examples of lower taxonomic levels, adheres to the taxonomic system presented in the recently published *Biologie pro gymnázia* by J. Jelínek and V. Zicháček (2004).

●●● kingdom (říše/regnum): **Houby** *(Fungi)*
●●●●● division (oddělení/divisio): **Chytridiomycety** *(Chytridiomycota)*
●●●●● division: **Mikrosporidie** *(Microsporidiomycota)*
●●●●● division: **Zygomycety** *(Zygomycota)*
●●●●● division: **Houby vřeckovýtrusné** *(Ascomycota)*
●●●●●● class (třída/classis): **Kvasinky** *(Endomycetes, Hemiascomycetes)*
e.g. ●●●●●●●●●● species (druh/species): **kvasinka pivní** *(Saccharomyces cerevisiae)*
●●●●●●●●●● species: **kvasinka vinná** *(Saccharomyces ellipsoideus)*
●●●●●● class: **Vřeckovýtrusné houby** *(Ascomycetes)*
e.g. ●●●●●●●●●● species: **paličkovice nachová** *(Claviceps purpurea)*
●●●●●●●●● genus (rod/genus): **štětičkovec** *(Penicillium)*
●●●●●●●●●● species: *Penicillium notatum*
●●●●●●●●●● species: *Penicillium chrysogenum*
●●●●●●●●●● species: *Penicillium roquefortii*
●●●●●●●●●● species: *Penicillium camembertii*
●●●●●●●●●● species: *Penicillium gorgonzola*
●●●●●●●●●● species: **smrž obecný** *(Morchella esculenta)*
●●●●●●●●●● species: **lanýž černý** *(Tuber melanosporum)*
●●●●● division: **Houby stopkovýtrusné** *(Basidiomycota)*

Figure 4.6. Taxonomy of fungi in Czech and Latin (*regnum Fungi*). (The number of dots symbolises the distance in taxonomic levels from the highest possible taxon: ● *cellular living systems,* ●● *domain Eukaryota).*[37]

Taxonymy of the kingdom of ***plants* (*Plantae*)** in Latin, and slightly less so in Czech, is highly regular. Both its subkingdoms end in the suffix ***-bionta*** (*Protobionta = nižší rostliny*, *Cormobionta = vyšší rostliny*); all divisions in both subkingdoms end in ***-(o)phyta*** (*Rhodophyta, Chlorophyta; Rhyniophyta, Bryophyta, Lycopodiophyta, Equisetophyta, Polypodiophyta, Lyginodendrophyta, Cycadophyta, Ginkgophyta, Pinophyta,* and *Magnoliophyta*). The corresponding Czech names of divisions do not have a common ending; they are mostly one-word plural noun terms, mostly of Czech origin (*ruduchy, mechorosty, plavuně, přesličky, kapradiny, jehličnany*), but there are also two-word Czech terms consisting of a plural noun and an adjective (*zelené řasy*, *rostliny krytosemenné*). One such two-word name is a hybrid composed of a Czech head noun and a Latin-based specifying adjective (*rostliny lyginodendrové*), two terms are morphologically modified loans from classical languages (*ryniofyty, cykasy*) and one is an already domesticated word of foreign etymology (*jinany* < Japanese *ginkyō* < Chinese *yínxìng*).

37 J. Hladký in his study *The Czech and the English Names of Mushrooms* (1996) introduces a taxonomy of *fungi* which differs structurally from the classification presented by Jelínek and Zicháček (2004). The five divisions are *Myxomycotina*, *Chytriodiomycotina*, *Oomycotina*, *Eumycotina* and *Fungi imperfecti* (*Deuteromycetes*). The suffixes indicate a different level from the above-listed *-(o)mycota*. Hladký also notes that some authors do not regard *fungi* as a kingdom, but classify them as a division, and the above-mentioned "divisions" are regarded as subdivisions or classes (ibid.: 16).

But, quite surprisingly, the **regularity reappears in Czech at a lower level** of the hierarchy. Names of classes in the division *Magnoliophyta* end in ***-psida*** (*Magnoliopsida*—also *Rosopsida* is used for the segregate class of higher *Dicotyledons*[38] *(dvouděložné)*; *Liliopsida*), and the analogy in naming is used in Czech as well, though of a different type (*rostliny dvouděložné, rostliny jednoděložné*). Names of orders in classes *Magnoliopsida* and *Liliopsida* are invariably marked by the suffixes ***-ales*** in Latin and ***-(o)tvaré*** in Czech.

In an alternatively organised taxonomy (Aichele & Golte-Bechtleová 1996: 25), divisions still end in ***-phyta*** (*Bryophyta—mechorosty*, *Pteridophyta—kapraďorosty*, *Spermatophyta—semenné rostliny*) and subdivisions (of *Spermatophyta*) end in ***-phytina*** (the level *gymnosperms* consists of *Coniferophytina* and *Cycadophytina*, the level *angiosperms* includes *Angiospermophytina* or *Angiospermae* or *Magnoliophytina*, these three terms being synonymous).

Class: ***dicotyledons***	Třída: ***Rostliny dvouděložné***		Classis: ***Magnoliopsida*** (synonyms ***Dicotyledonae, Magnoliatae***)
(Total: 75 orders, nearly 200,000 species.)			
Order:	Řád:	*šácholanotvaré*	Ordo: *Magnoliales*
		leknínotvaré	*Nymphaeales*
		pryskyřníkotvaré	*Ranunculales*
		kaparotvaré	*Capparidales*
		růžotvaré	*Rosales*
		bobotvaré	*Fabales*
		mákotvaré	*Papaverales*
		aralkotvaré	*Araliales*
		krtičníkotvaré	*Scrophulariales*
		hvězdnicotvaré	*Asterales*
		hluchavkotvaré	*Lamiales*
Class: ***monocotyledons***	Třída: ***rostliny jednoděložné***		Classis: ***Liliopsida*** (synonyms ***Monocotyledonae, Liliatae***)
(Total: 20 orders, approximately 40,000 species)			
Order:	Řád:	*liliotvaré*	Ordo: *Liliales*
		kosatcotvaré	*Iridales*
		zázvorníkotvaré	*Zingiberales*
		vstavačotvaré	*Orchidales*
		šáchorotvaré	*Cyperales*
		lipnicotvaré	*Poales*
		arekotvaré	*Arecales*

Figure 4.7. Czech and Latin names of (selected) orders in the classes *Magnoliopsida* and *Liliopsida*.

38 In modern taxonomies, the former single class *Magnoliopsida* (also *Dicotyledonae* or *Magnoliatae*, *dvouděložné*) has been replaced by two segregate classes, *Magnoliopsida* for *lower Dicotyledonae* (*nižší dvouděložné rostliny)* and *Rosopsida* for *higher Dicotyledonae* (*vyšší dvouděložné rostliny).*

In fact, the taxonomy in individual areas of biology has (or may have) more levels than normally quoted. The complexity depends on the criteria used for classification. Thus, taxons at lower levels are grouped (and often re-grouped) by common features into classes. Taxonomic discussion often occurs concerning the distribution of certain families between higher-level groupings. Names of the **supplementary levels**, coined by authorative sources, are **not usually translated into Czech or English**; instead, Latin terms are sufficient as these terminological items are not used outside the relevant scientific community. Logically, as such taxonomic levels have been created rather recently and as there are no formerly existing names that would have to be respected, the terminological units are created highly regularly. Such artificially formed terminological units strictly follow the ideal assumption of scientific nomenclatures, i.e. that the **morphology** of a taxonomic unit (not at the lowest level where the binomial principle—not suffixes—is the unifying feature, but rather at the level of superordinate classes of taxons) **should reveal its position in the hierarchy**. Transparency connected with such onomatological regularity is useful for easy orientation in the system and for identification of taxons.

One such purely scientifically-used level is **subclass** (*podtřída*). The class *Dicotyledonae* (or *Magnoliatae, dvouděložné*) consists of subclasses which invariably end in the suffix ***-idae***: *Magnoliidae, Ranunculidae, Caryophyllidae, Ham(m)amelididae, Rosidae, Cornidae, Dilleniidae, Lamiidae, Asteridae*. The same suffix is used analogously in the class *Monocotyledonae* (or *Liliatae, jednoděložné*): *Alismatidae, Liliidae, Arecidae*, etc.[39]

Another supplementary taxonomic level is **superorder** (*nadřád*). Subclasses consist of one or are divided into more superorders. The solely used suffix here is ***-anae***. For instance, the subclass *Magnoliidae* is divided into superorders *Magnolianae* and *Nympheanae*, and the subclass *Rosidae* into superorders *Rosanae, Fabanae, Myrtanae, Rutanae, Celastranae, Euphorbianae* and *Aralianae*. Again, the identical suffix *-anae* is used to mark superorders in the class *Monocotyledonae* (*Liliatae*): e.g. the subclass *Liliidae* comprises superorders *Lilianae, Orchidanae, Typhanae*. Neither the names of subclasses, nor those of superorders have equivalents in vernacular languages, i.e. in English and in Czech.

Superorders consist of **orders**, the basic taxonomic level, ending in the suffix ***-ales*** (Czech ***-(o)tvaré***), and orders are made up of usually plentiful **families**, always marked by the suffix ***-aceae*** (Czech ***-ovité***). English uses the Latin names or a paraphrase (e.g. *Fagaceae*, or *the beech family*). **Genera**, grouped in families, are not recognisable by a single common suffix, since they are either nominal naming units borrowed from general language, used to refer to the individual taxons long before any scientific taxonomy was created, or they are nouns formed with respect to the noun morphology of individual languages. Both these groups then conform to the rules of derivation, composition

39 There are several authoritative taxonomic classifications of plants; the recent sources usually stick to **Cronquist**'s classification of subclasses (named after Arthur Cronquist, 1919–1992, a prominent American systematic botanist and taxonomist). Likewise, an influential classification of angiosperm superorders using the suffix *-florae* is called **Dahlgren**'s after its author.

or semantic shift (metaphor) used in word-formation. Thus, several typical nominal endings are used in Latin, corresponding to its noun classes and types: *-us* (*Prunus, slivoň*), *-is* (*Corydalis, dymnivka*), *-es* (*Aphanes, nepatrnec*), *-um* (*Sedum, rozchodník*), *-ium* (*Geranium, kakost*), *-a* (*Mentha, máta*), *-ia* (*Tilia, lípa*), *-aria* (*Fragaria, jahodník*), *-ea* (*Picea, smrk*), *-ica* (*Urtica, žahavka/kopřiva*), *-ago* (*Solidago, zlatobýl*), *-io* (*Senecio, starček*), etc. The same principle has been applied in Czech, thus having terms using the typical masculine derivational suffixes *-ec, -ek, -ík, -ník, -ák, -ač, -ič, -ín*, etc., the feminine suffixes *-ice, -nice, -ina, -inka, -anka, -ička, -ka, -a, -yně*, etc., and the neuter suffixes (or rather nominative endings in individual declension patterns) *-o* and *-e*. Frequently in Czech, but even more so in English, also compound nouns have been formed (*dobromysl, mateřídouška, sedmikvítek, devětsil, pětiprstka, nahoprutka, konitrud, hadí kořen*; *buttercup, redwood, hemlock, cypress pine, plum-yew*, etc.).

Unlike the names of genera in the Czech and English botanical taxonomy, which are mostly difficult to recognise and distinguish formally (with the partial exception of the above-quoted Czech compound type) from other nouns in general language (this is why speaking about Latin does not make much sense in this respect), the most concrete level of **species** has an established distinctive binomial form in Latin, as well as in Czech (with a marked order noun + attribute). This is systemically absent from English where species are, nonetheless, also often termed by a combination of two words (noun + noun, adjective + noun), although some have a one-word naming only. This absence accounts for **greater terminological vagueness in English**, **less transparent taxonomies at the basic level** (the essential noun denoting genus in a two-word name of a species may differ from one species of the genus to another, so that the formal link is lost[40]), and necessarily higher **reliance on the exact Latin terminology** in scientific discourse.

Hladký (1996: 48–50) in his work on the names of mushrooms observed the same phenomena, but also noted that in Czech and Slovak popular books on mushrooms every Latin scientific name is translated into the two languages according to the established principles, whereas in English books a new English name is rarely given, unless it has been established already. As the naming of species in Latin and Czech invariably uses the order ´head + modifier´, it places onomatological emphasis on the head, identical with the relevant genus. The English order is ´**modifier + head**´, which disables clear classification by the name. In addition, the head frequently differs from the name of the corresponding genus, often even being identical with the name of a different genus (cf. Fig. 4.15).

Botanical taxonomy is also characterised by the so-called **type genera**: a name of a typical representative of the generic taxonomic level (type genus) is used to provide the base for derivation of a name or names for higher levels. As well as the concept of a species or a genus is included in the meaning of taxons at higher levels of the extra-linguistic hierarchy, the linguistic stock of the typical genus or species is included in the names

40 See below for the commentary on polysemy in Chapter 4.5. Also, *cf.* dissociation in naming of animals in Tables 4.5 and 4.6.

given to higher levels of taxonymy, i.e. a taxonomic superordinate derives its name from the name of a prototypal subordinate (e.g. Cz. *růže—růžovité—růžokvěté*, Lat. *Rosa—Rosaceae—Rosales*, see Tab. 4.2). The hyponymic relation is therefore completely obvious in such cases, compared with the other sister items in the taxonomy.

In most cases there are two hierarchical relations which can be identified at the same time in classificatory hierarchies of botany:

– **taxonomy** between items at different levels in the same branch of the hierarchy. Semantically, the mutual relationship between such items is **hyponymy or hypernymy** (marking subordination or superordination) and **co-hyponymy** between items at the same level (sister items), subordinated to one common superordinate.

– **meronomy** between a superordinate item understood as a single entity (e.g. the *rose* family, *Rosaceae*, seen as a set) and all individual members of such a family at the lower level (i.e. all genera belonging to the *rose* family, e.g. the genera *Rosa*, *Sorbus*, *Prunus*, etc.). Analogously, all species of a certain genus are its parts, just as all families of a certain order are its component parts. A meronomic relationship is based on the part-whole relation, therefore the notion of a **single entity**[41], for instance class, order, or family, is essential here. It is then possible to say that the *rose* family (*Rosacae*) **consists** (as of its **parts**) **of** the genera *Rosa*, *Sorbus*, *Prunus* and others, and that the genera *Rosa*, *Sorbus*, *Prunus* etc. are parts of the *rose* family, i.e. the corresponding whole (see Chap. 3.4).

This makes it different from the taxonomic relationship: *Sorbus* is not a part of the *rose* family, this plant is **a type of** plant classified in the *rose* family on the basis of some relevant common features (viz. the type of flower and fruit). *Sorbus* is a type of *Rosacae* (members of the *rose* family, *růžovité*; unfortunately, English has to use the periphrastic expression, it cannot use a phrase with a single-word family-name as Czech can, such as "jeřáb se řadí mezi růžovité"). Similarly, *Prunus*, *apple* (*Malus*), *pear* (*Pyrus*), and others are **types** of ***Rosaceae*** plants (the genera are **members** of the family). *Rowan* (*Sorbus aucuparia, jeřáb ptačí)*, *Sorbus aria (jeřáb muk)* and other species of *rowan* are types of *Sorbus* (the genus consisting of individual species). Each of these species **is** *Sorbus* (this cannot be claimed in meronomies*: *a leaf is a tree*). At the same time, each individual species in any genus of the *rose* family is a type of the plants grouped in the order *Rosales* or the class *Magnoliopsida (dicotyledons, dvouděložné)*, i.e the higher, superordinate levels of the hierarchy. In **transitive** hierarchies based on dominance a low-placed taxon **is a type of** all its superordinate taxons (e.g. *rowan is a dicotyledon*). All in all, such diverse taxons as *rowan (Sorbus aucuparia), fig cactus (Opuntia ficus-indica), sago palm (Cycas revoluta), black locust (Robinia pseudoacacia, trnovník akát), redwood (Sequoia sempervirens, sekvoje vždyzelená), reed (Phragmites communis, rákos obecný)*, etc., are plants—each individual species **is a plant**, i.e. a type (representative) of the highest hierarchic level, the regnum *Plantae*.

41 *Cf.* Cruse (1986: 185): "How (...) do we obtain the series of common nouns *family*, *genus*, *species*, etc. (as in *Five species of tulips grow in our garden*)? The answer is that they are not directly derived from a taxonomy—the derivation requires an extra step. First, the taxonomy must be transformed into a kind of meronomy, by re-interpreting classes as individuals."

Table 4.2. Links between names of classes, orders, families, genera and species through the names of **type genera** in English, Latin and Czech.

	Class/classis/třída	**Order**/ordo/řád	**Family**/familia/čeleď	**Genus+species**/dtto/ rod+druh (example)
English	division: *Conifers*	*Coniferales*	*pine* (family)	*Scots pine*
Latin	divisio: *Pinophyta / Coniferophyta*	*Coniferales*	*Pinaceae*	*Pinus sylvestris*
Czech	oddělení: *Jehličnany*		*borovicovité*	*borovice lesní / sosna*
English	*dicotyledons*	*Magnoliales*	*magnolia* (fam.) / *Magnoliaceae*	*Yulan magnolia*
Latin	*Magnoliopsida / Dicotyledoneae*	*Magnoliales*	*Magnoliaceae*	*Magnolia denudata*
Czech	*rostliny dvouděložné*	*šácholanotvaré*	*šácholanovité*	*šácholan olysalý*
English		*rose* (order)	*rose* (family)	*rose*
Latin		*Rosales*	*Rosaceae*	*Rosa sp.*
Czech		*růžokvěté*	*růžovité*	*růže*
English		*bean* (order)	*legumes / Fabaceae*	
Latin		*Fabales*	*Fabaceae / Leguminosae*	*Faba bona* Medic. / *Faba vulgaris*
Czech		*bobotvaré*	*bobovité*	*bob obecný*
English		(order) *Asterales*	*Asteraceae / com-posite* (f.) / *daisies*	*Italian aster*
Latin		*Asterales*	*Asteraceae / Compositae*	*Aster amellus*
Czech		*hvězdnicotvaré*	*hvězdnicovité / složnokvěté*	*hvězdnice chlumní / astra kopcová*
English		*Lamiales*	*Lamiaceae / mint* (fam.)	*white dead-nettle*
Latin		*Lamiales / Scro-phulariales*	*Lamiaceae*	*Lamium album*
Czech		*hluchavkotvaré*	*hluchavkovité*	*hluchavka bílá*
English	*monocotyledons*	*Liliales*	*lily* (fam.) / *Liliaceae*	*Regal lily*
Latin	*Liliopsida / Monocotyledoneae*	*Liliales*	*Liliaceae*	*Lilium regale*
Czech	*rostl. jednoděložné*	*liliotvaré*	*liliovité*	*lilie královská*
English		*Iridales*	*iris* (fam.) / *Iridaceae*	*Siberian iris*
Latin		*Iridales*	*Iridaceae*	*Iris sibirica*
Czech		*kosatcotvaré*	*kosatcovité*	*kosatec sibiřský*
English		*Orchidales*	*Orchidaceae / orchids*	*green-winged orchid / green-veined orchid*
Latin		*Orchidales*	*Orchidaceae*	*Orchis morio*
Czech		*vstavačotvaré*	*vstavačovité*	*vstavač kukačka*
English		*Cyperales*	*sedges / Cyperaceae*	*bulrush / papyrus sedge / paper reed*
Latin		*Cyperales*	*Cyperaceae*	*Cyperus papyrus /alternifolius*
Czech		*šáchorotvaré*	*šáchorovité*	*šáchor papírodárný / papyrus*
English		*Poales*	*grasses / Poaceae*	*Kentucky bluegrass*
Latin		*Poales*	*Poaceae* (formerly *Gramineae*)	*Poa pratensis*
Czech		*lipnicotvaré*	*lipnicovité*	lipnice luční

Note: Alternative terms and levels are quoted from the following sources: *Wikipedia* (Wi), *Biologie pro gymnázia* (Bi), *Visual Encyclopedia* (VE), *Co tu kvete?* (Co), *Britannica Concise Encyclopaedia* (EB), *Kompletní encyklopedie stromů a keřů* (Ko), *Stromy* (St).

1. ***Cellular organisms (buněčné živé organismy)*** (Bi)
2. **Domain** (dominium, doména): ***Eukaryote (Eukaryota, Eukarya)***
3. **Kingdom** (regnum, říše): ***Plantae / plants (Plantae, rostliny)***
(*land plants / embryophytes (Embryophyta)* (Wi)
vascular plants / tracheophytes (Tracheophyta, cévnaté rostliny) (Wi)
(division) *seed plants / spermatophytes (Spermatophyta)* (Wi))
4. **subkingdom** (subregnum, podříše): ***Cormobionta (vyšší rostliny)*** (Bi)
(**subdivision** (subdivisio, pododdělení) (Co): ***Angiospermae / Angiospermophytina / Magnoliophytina (krytosemenné)*** (all Co))
5. **division** (divisio, oddělení) (EB): ***Magnoliophyta* / *angiosperms* / *flowering plants*** (all EB)
//**phylum** (VE): ***Angiospermophyta* / *flowering plants*** (both VE) // **division** (Bi):
Magnoliophyta (Magnoliophyta, krytosemenné) (Bi)
6. (formerly: **class *Dicotyledonae*** (VE, Bi, Co) / ***Magnoliopsida*** (Wi) / ***Magnoliatae*** (Co) / ***dicotyledons*** (Wi, VE) / ***dicots*** (EB) ***(Dicotyledonae, rostliny dvouděložné)***)
class (classis, třída): ***Rosopsida* / *eudicots* / *tricolpates*** (all Wi) ***(vyšší dvouděložné rostliny)***
7. **subclass** (subclassis, podtřída): ***Rosidae*** (Co)
8. **superorder** (superordo, nadřád): ***Rosanae***
9. **order** (ordo, řád) the ***rose* order *(Rosales, růžokvěté)***
10. **family** (familia, čeleď): the ***rose* family *(Rosaceae, růžovité)***
(contains about 3,000 species and accounts for 45% of the species in the rose order.)
11. a. **genus** (genus, rod): ***Rosa*** (about 100 species)
12. **species** (species, druhy):
(type* subgenus *Rosa:)[42]
apple rose (Rosa villosa / rosa pomifera, růže jablíčková)
burnet rose (Rosa pimpinellifolia, růže bedrníkolistá)
dog-rose (Rosa canina, růže šípková)
(Rosa rubus, růže ostružiníková)
evergreen rose (Rosa sempervirens)
field/trailing rose (Rosa arvensis / Rosa repens, růže plazivá / růže rolní) (Co, 124)
multiflora/Japanese/baby/seven-sisters/many-flowered rose (Rosa multiflora, růže mnohokvětá) (Wi)
musk rose (Rosa moschata, růže mošusová)
prairie rose (Rosa setigera)
prickly (wild) rose / bristly/wild/Arctic rose (Rosa acicularis) (Wi)
rugosa/beach/Japanese/Ramanas rose (Rosa rugosa, růže svraskalá) (Wi)
11.b. **genus *Rubus*:**
(*bramble*—any plant of the genus *Rubus*, consisting usually of prickly shrubs, including *raspberries* and *blackberries*.)
raspberry (Rubus idaeus, maliník)
wild red raspberry (Rubus idaeus ssp. sachalinensis)
blackberry (Rubus fruticosus, ostružiník)
black raspberry / blackcap (Rubus occidentalis)
blackberry / boysenberry (Rubus ursinus)
(Rubus caesius, ostružiník ježiník)

42 Genus *Rosa* consists of four subgenera, viz. *Hulthemia*, *Hesperrhodos*, *Platyrhodon* and the type subgenus *Rosa*, which itself is divided into 11 sections (List of Rosa Species).

(Rubus deliciosus, ostružiník chutný)
(Rubus spectabilis, ostružiník skvělý)
(Rubus odoratus, ostružiník vonný)
loganberry (Rubus loganobaccus)
11.c. **genus *Eriobotrya*:**
loquat / Japanese medlar (Eriobotrya japonica, eriobotryja japonská / mišpule japonská / lokvát)
11.d. **genus *Malus*:**
apple (Malus sylvestris, jabloň lesní)
(Malus sylvestris / Malus communis ssp. acerba, jabloň lesní)
(Malus baccata, jabloň drobnoplodá)
(Malus domestica, jabloň domácí)
(Malus pumila, jabloň nízká)
paradise apple (Malus pumila ssp. *paradisiaca)*
11.e. **genus *Pyrus*:**
pear / European pear (Pyrus communis, hrušeň obecná/pěstovaná)
pear (Pyrus pyraster, hrušeň planá / polnička)
11.f. **genus *Sorbus*:**
rowan / European mountain ash (Sorbus aucuparia / Pirus/Pyrus aucuparia, jeřáb ptačí / jeřáb obecný (Co, 124))
wild service tree / checker tree (Sorbus torminalis / Pirus/Pyrus torminalis, břek obecný / jeřáb břek) (Co, 124))
whitebeam (Sorbus aria / Crataegus aria / Pyrus aria, jeřáb muk)
service tree / rowan (Sorbus domestica, jeřáb oskeruše)
(Sorbus intermedia, jeřáb prostřední)
11.g. **genus *Mespilus*:**
medlar tree (Mespilus germanica, mišpule německá/obecná)
11.h. **genus *Prunus*:**
sweet cherry (Prunus avium / Cerasus avium, třešeň ptačí)
(Prunus avium var. *duracina, třešeň chrupka)*
(Prunus avium var. *juliana, třešeň srdcovka)*
(Prunus cerasus, třešeň višeň / višeň obecná)
(Prunus cerasus var. *austera, morelka stinná)*
sour cherry / tart cherry (Prunus cerasus / Cerasus vulgaris)
(Prunus mahaleb, mahalebka obecná)
*Japanese flowering cherry (**Cerasus** serrulata, višeň pilovitá / sakura)*
*Japanese flowering cherry (**Cerasus** serrulata* 'Kanzan', *višeň pilovitá / sakura)*
*(Prunus serrulata / **Padus** serrulata, střemcha/sakura ozdobná)* (Ko, 96–97)
(Prunus serrulata, třešeň pilovitá / sakura) (St, 190)
(Prunus serrula, třešeň tibetská)
winter-flowering cherry (Prunus subhirtella /miqueliana/taiwaniana / Cerasus herincquiana/subhirtella, třešeň chloupkatá)
plum / European plum (Prunus domestica)
Japanese plum (Prunus salicina)
damson plum (Prunus insititia)
blackthorn (Prunus spinosa L., *trnka obecná / slivoň trnitá)*
*almond (Prunus dulcis / **Amygdalus** communis, mandloň obecná)*[43]
prunus (Prunus tenella, mandloň nízká)

43 As the **genus *Prunus*** is extremely large, it is often re-classified and divided into smaller specific genera – e.g. the **genus *Amygdalus*/*almond*** (*mandloň*), the **genus *Padus*/*Mayday tree*** (*střemcha*), the **genus *Cerasus*/*cherry*** (*třešeň/višeň*), the **genus *Persica*/*peach*** (*broskvoň*), the **genus *Armenica*/*apricot*** (*meruňka*).

*apricot (Prunus armeniaca / **Armenica** vulgaris, meruňka obecná)*
*peach (Prunus persica / **Persica** vulgaris, broskvoň obecná)*
*(European) bird cherry / Mayday tree / maybush (Prunus padus / **Padus** avium / Cerasus padus, střemcha hroznovitá/obecná)* (Ko, 96)
(Prunus serotina, střemcha pozdní)
11.i. **genus *Cydonia*:**
common quince (Cydonia oblonga / Cydonia vulgaris, kdouloň obecná)
Japanese quince (Chaenomeles sp., kdoulovec)
11.j. **genus *Crataegus*:**
hawthorn (Crataegus sp., hloh)
11.k. **genus *Cotoneaster*:**
common Cotoneaster (Cotoneaster integerrimus/integerrima, skalník obecný/celokrajný)
(Cotoneaster x praecox, skalník časný)
11.l. **genus *Spirea*:**
Vanhouttei spirea / bridal wreath (Spiraea x vanhouttei, a cross between *Spirea cantonensis* and *Spirea trilobata, tavolník van Houtteův)*
11.m. **genus *Potentilla*:**
cinquefoil (Potentilla sp.) (about 500 species)
shrubby/bush cinquefoil (Potentilla /dasiphora fruticosa, mochna křovitá)
tormentil (Potentilla erecta / Potentilla tormentilla / Tormentilla erecta / Fragaria tormentilla, mochna nátržník)
(Potentilla anserina, mochna husí)
11.n. **genus *Fragaria*:**
strawberry (Fragaria virginiana)
strawberry (Fragaria chiloensis)
wild/European strawberry (Fragaria vesca, jahodník obecný)

Figure 4.8. Taxonomic levels in English (Latin, Czech): **superordinate and sister** (i.e. co-hyponymic) **categories of the genus *Rosa***.

Regular and unambiguous use of typical derivative suffixes reaches a maximum in the names of plants in Latin, followed by Latin names of fungi. Czech terminology tends to be the most consistent in the same areas. Other areas of biological taxonomy are marked by higher **plurality** of forms, even in Latin. English nomenclature is regular where it uses quotational Latin terms; elsewhere, various types of word-formation are used. **Periphrastic form is characteristic in English**, whereas **derivational morphemes** indicate levels in taxonomy **in Latin and in Czech** (e.g. the *birch* **family** vs. *Betul**aceae***, *bříz**ovité***).

44 Note the formally inconsistent and richly synonymous nomenclature of esp. higher taxons. (Compare with Tab. 4.5 for analogy with the animal genus *Panthera*.)

Table 4.3. Typical Latin and Czech taxonomic suffixes used in divisions, classes, orders, and families of plants (*Plantae, rostliny*), fungi (*Fungi, houby*), chromists (*Chromista*), Protozoa (*Protozoa, prvoci*) and animals (*Animalia, živočichové*).

X = terms do **not** have a regular form or the number of members at a certain taxonomic level is very low (up to two).

	Regnum	Subregnum	Division / Phylum	Class	Order	Family
Latin	X ***(Plantae)***	*-(o)bionta*	*-(o)phyta*	*-(o)phyceae,* *-(o)psida*	*-ales*	*-(a)ceae*
Czech	X ***(Rostliny)***	X	X	X	*-tvaré*	*-ovité*
Latin	X ***(Fungi)***	-	*-(o)mycota*	*-(o)mycetes*		
Czech	X ***(Houby)***	-	X	-		
Latin	X ***(Chromista)***	-	*-(o)phyta* *-(o)mycota*	*-(o)phyceae*		
Czech	X ***(Chromista)***	-	*-(o)fyta* *-(o)mycety*	X (mostly fem. plur. *-ivky*, Adj + *řasy*)		
Latin	X ***(Protozoa)***	-	*-(o)phora,* *-(o)zoa,* *-o)poda,* *-(o)phorida*			
Czech	X ***(Prvoci)***	-	X (mostly masc. plur. *-ovci*, fem. plur. *-(e)nky, -ovky*)			
Latin	X ***(Animalia)***	(div.:) *-ica*	(phylum:) X (plur., ending *-a*, rarely *-es*) (subphylum:) *-ata*, once *-ita*	X (plur., ending *-a*, rarely *-es*)	X	*-idae*
Czech	X ***(Živočichové)***	(odd.:) *-ica* (2 Latin terms - *Diblastica, Triblastica*)	(kmen:) X (plur., often ending *-ovci*, also *-atci*) (podkmen:) X (masc. plur. *-enci, -ovci, -atci, -atí*)	X (different forms of plural)	X (different forms of plural)	-ovití

Despite the assumption that an artificially-formed taxonomy must be unambiguous, some confusion still looms. Names of **classes** in the subkingdom *Protobionta (lower plants)* share the final suffix *-phyceae*, but the corresponding Czech taxons are formed in **two different ways**: adjectival (plural, ending in *-ovité*) and nominal (plural, feminine, ending in derivational suffixes *-ivky* or *-atky*):

*zelen**ivky**—Chloro**phyceae***
*kadeřnatk**ovité**—Ulvo**phyceae***
*trubicovk**ovité**—Bryopsido**phyceae***
*žabovlas**ovité**—Cladophoro**phyceae***
*spáj**ivky**—Conjugato**phyceae**, Zygnemato**phyceae***
*parožn**atky**—Charo**phyceae***

The problem of a partially inconsistent Czech terminology is that the suffix ***-ovité*** is, apart from the classes of *lower plants*, also used in the other subkingdom of *Plantae*,

namely in the *higher plants* (*Cormobionta, vyšší rostliny*), in the divisions *Pinophyta (jehličnany)* and *Magnoliophyta (krytosemenné rostliny)*, to mark **families** *(čeledi)*, i.e. taxons two levels below classes in the taxonomic hierarchy:

the *cypress* family	*cypřišovité*	*Cupressaceae*
the family *Taxodiaceae*	*tisovcovité*	*Taxodiaceae*
the *yew* f. / f. *Taxaceae*	*tisovité*	*Taxaceae*
the *pine* family	*borovicovité*	*Pinaceae*
the *olive* family	*olivovníkovité*	*Oleaceae*
the family *Ulmaceae*	*jilmovité*	*Ulmaceae*
the family *Myrtaceae*	*myrtovité*	*Myrtaceae*
the *dogbane* family	*toješťovité*	*Apocyanaceae*
the family *Salicaceae*	*vrbovité*	*Salicaceae*
the family *Platanaceae*	*platanovité*	*Platanaceae*
the *maple* f. /f. *Aceraceae*	*javorovité*	*Aceraceae*
the *birch* f. / f. *Betulaceae*	*břízovité*	*Betulaceae*
(the *filbert* family	*lískovité*	*Corylaceae)*
the family *Punicaceae*	*marhaníkovité*	*Punicaceae*
the *ebony* family	*ebenovité*	*Ebenaceae*
the *mulberry* family	*morušovité/morušovníkovité*	*Moraceae*
the family *Magnoliaceae*	*šácholanovité*	*Magnoliaceae*
the *pea(flower?)* family[45]	*motýlokvěté*	*Leguminosae*
the *bean/legume* family	*bobovité*	*Fabaceae*
the *beech* family	*bukovité*	*Fagaceae*
the *horse-chestnut* family	*jírovcovité*	*Hippocastanaceae*
the *dogwood* family	*dřínovité*	*Cornaceae*
the fam. *Scrophulariaceae*	*krtičníkovité*	*Scrophulariaceae*
the family *Bignoniaceae*	*trubačovité*	*Bignoniaceae*
the *lily* family	*liliovité*	*Liliaceae*
the *palm* family	*arekovité/palmy*	*Arecaceae/Palmae*
the family *Begoniaceae*	*kysalovité*	*Begoniaceae*
the family *Orchidaceae*	*vstavačovité*	*Orchidaceae*
the *touch-me-not* family	*netýkavkovité*	*Balsaminaceae*

Figure 4.9. English, Czech and Latin names of selected families of conifers (division *Pinophyta*) and trees, bushes and herbs in the division *Magnoliophyta*. (Periphrastic alternatives of both types, i.e. using the domestic or adapted name (the yew family) and the quotational Latin name (the family *Taxaceae*) are usually acceptable in English.)

45 Three families of plants, including herbs as well as trees, are combined into the ***pea(flower?)* family *(Leguminosae, motýlokvěté)*** due to their typical fruit, legumes. These families are *(Mimosaceae, citlivkovité)*, *(Caesalpiniaceae, sapanovité)* and a very large family with a number of genera, *(Fabaceae, bobovité)* (Kremer 1995: 212). Some classifications regard **legumes** or **pulses** as the family *Fabaceae sensu latu / Leguminosae*, consisting of the subfamilies (sometimes raised to families) *Faboideae* (*Fabaceae sensu strictu*), *Caesalpinioideae* (*Caesalpiniaceae*) and *Mimosoideae* (*Mimosaceae*) (cf. in *Wikipedia* at http://en.wikipedia.org/wiki/Fabaceae).

Latin terms for families bring to mind the taxons denoting classes in *Protobionta*; however, they are not completely identical: in families of the *Cormobionta* the suffix is ***-ceae***, whereas in *Protobionta* a broader suffix is used, ***-phyceae***. The Czech terms for families in the *Cormobionta*, e.g. *krtičník**ovité**, trubač**ovité***, etc. cannot be formally distinguished from some classes of the *Protobionta*, e.g. *kadeřnatk**ovité**, žabovlas**ovité***, etc. Thus, although both nomenclatures were formed artificially, with a particular aim of avoiding ambiguity and with emphasis on indicating the hierarchical level by the form, **ambiguity** occurs, albeit at different levels and in different subkingdoms of the kingdom *Plantae*. This shows that one form (a derivational morpheme, suffix) has **various meanings or functions**, as it denotes different categories. Taxonomic morphemes are then similar in their multi-functional application to the grammatical morphemes (e.g. *-s* in *car**s*** x *he live**s***) and lexical morphemes (*un-* in ***un****button* x ***un****pleasant*) in a living language.

In the regnum ***Fungi***, the Latin nomenclature regularly uses the suffix ***-mycota*** in the names of **divisions** (*Chytridiomycota, Microsporidiomycota, Zygomycota, Ascomycota, Basidiomycota)*. The corresponding Czech nomenclature is not as systematic as the Latin one (*chytridiomycety, mikrosporidie, zygomycety, houby vřeckovýtrusné, houby stopkovýtrusné*): 2 out of the 5 names of divisions end in *-mycety,* and another 2 are labelled with compound Czech names). **Classes** in Latin end in the suffix ***-mycetes*** *(Endomycetes, Hemiascomycetes, Ascomycetes)*; the systematicity is again not reflected in the Czech nomenclature *(kvasinky, vřeckovýtrusné houby).*

4 | 4 Zoological taxonomic system and its taxonyms

Despite the frequent impossibility of distinguishing genera and species by their form (i.e. words used) in English, the Czech and Latin botanical taxonomies are systematic and regular. Nevertheless, the zoological terminology is substantially less systematic in these two synthetic languages. One reason is an apparently higher diversity of taxons in the animal kingdom, which makes construction of a single phylogenetic tree much more difficult. No linking **type genera**, families etc. are used here, unlike in botany (e.g. the subclass ***Ros****idae*, the superorder ***Ros****anae*, the ***rose*** order—***Ros****ales*, the ***rose*** family—***Ros****aceae*, the genus ***Rosa***). Instead, suffixes in Czech as well as in Latin are not specific for all taxons at a certain level in zoology; they are **plural and heterogeneous above the level of families**. The only (almost) consistent part of the zoological nomenclature in the two synthetic languages is the names of taxons at the **family** level: they all end in ***-idae*** in Latin and ***-ovití*** in Czech.

E.g. the class *insects* (*Insecta, hmyz*) consists of two subclasses: *Apterygota* (*bezkřídlí*) and *Pterygota* (*křídlatí*). Some of the *Pterygota* orders, apart from those frequent ones which end in *-o(i)dea* (*Blattodea, švábi*), have names ending in *-(o)ptera* (*Coleoptera, brouci*), some also in *-nata* (*vážky, Odonata*). A higher degree of uniformity can be found within some classes: names of **orders** of *birds* (class *Aves*) and *(bony) fish* (class *Osteichthyes*) always end in ***-formes*** in Latin; however, their Czech equivalents are **formally diverse plural nouns and adjectives**. Plurality of suffixes is impossible in botanical taxonomy.

●●● říše (regnum): **Živočichové** *(Animalia)*
●●● (oddělení (divisio)): **Diblastica** *(Diblastica)*
●●●● kmen (phylum): **Vločkovci** *(Placozoa)*
●●●● kmen: **Houbovci** *(Porifera)*
●●●● kmen: **Žahavci** *(Cnidaria)*
●●●● kmen: **Žebernatky** *(Ctenophora)*
●●●● kmen: **Morulovci** *(Mesozoa)*
●●● (oddělení): **Triblastica** *(Triblastica)*
(2 řady—**Prvoústí** *(Protostomia)* a **Druhoústí** *(Deuterostomia)*)
●●●● kmen: **Ploštěnci** *(Plathelminthes)*
●●●● kmen: **Pásnice** *(Nemertini)*
●●●● kmen: **Vířníci** *(Rotatoria)*
●●●● kmen: **Hlísti** *(Nemathelminthes)*
●●●● kmen: **Měkkýši** *(Mollusca)*
●●●●●● třída (classis): **Paplži**
●●●●●● třída: **Přílipkovci**
●●●●●● třída: **Kelnatky**
●●●●●● třída: **Plži** *(Gastropoda)*
●●●●●●● podtřída (subclassis): **předožábří** *(Prosobranchiata)*
●●●●●●● podtřída: **zadožábří** *(Opisthobranchiata)*
●●●●●●● podtřída: **plicnatí** *(Pulmonata)*
●●●●●● třída: **Mlži** *(Bivalvia)*
●●●●●● třída: **Hlavonožci** *(Cephalopoda)*
●●●● kmen: **Kroužkovci** *(Annelida)*
●●●● kmen: **Drápkovci** *(Onychophora)*
●●●● kmen: **Členovci** *(Arthropoda)*
●●●●● podkmen (subphylum): **Trojlaločnatci** *(Trilobita)*
●●●●● podkmen: **Klepítkatci** *(Chelicerata)*
●●●●●● třída: **Hrotnatci** *(Merostomata)*
●●●●●● třída: **Pavoukovci** *(Arachnida)*
●●●●● podkmen: **Žabernatí** *(Branchiata)*
●●●●●● třída: **Korýši** *(Crustacea)*
●●●●● podkmen: **Vzdušnicovci** *(Tracheata)*
●●●●●● třída: **Mnohonožky** *(Diplopoda)*
●●●●●● třída: **Stonožky** *(Chilopoda)*
●●●●●● třída: **Chvostoskoci** *(Collembola)*
●●●●●● třída: **Hmyz** *(Insecta)*
●●●● kmen: **Chapadlovci** *(Tentaculata)*
●●●● kmen: **Ostnokožci** *(Echinodermata)*
●●●● kmen: **Polostrunatci** *(Hemichordata)*
●●●● kmen: **Strunatci** *(Chordata)*
●●●●● podkmen: **Pláštěnci** *(Tunicata)*
●●●●● podkmen: **Kopinatci** *(Cephalochordata)*
●●●●● podkmen: **Obratlovci** *(Vertebrata)*
●●●●●● třída: **Kruhoústí** *(Cyclostomata)*
●●●●●● třída: **Pancířnatci** *(Placodermi)*
●●●●●● třída: **Paryby** *(Chondrichthyes)*
●●●●●● třída: **Ryby** *(Osteichthyes)*
●●●●●● třída: **Obojživelníci** *(Amphibia)*

●●●●●● třída: **Plazi** *(Reptilia)*
●●●●●● třída: **Ptáci** *(Aves)*
●●●●●● třída: **Savci** *(Mammalia)*

Figure 4.10. Taxonomy of animals (*Animalia*)[46]—formal diversity of the names of taxons at the same hierarchical level in Czech and Latin. (Plural number is the only unifying formal mark.)

Table 4.4. Variety and mutual incongruence of **derivational suffixes** (with linking vowels, if repeated regularly), **final compound bases** and **plural endings** used within some taxonomic levels in the Latin and Czech zoological taxonomies.

Level in taxonomy	Latin	Czech	English (if domestic or adapted)
phylum	*Plathelminth**es***	*ploš**těnci***	–
	*Mollusc**a***	*měkkýš**i***	*molluscs*
	*Chord**ata***	*strun**atci***	*chordates*
subphylum	*Urochord**ata** / Tunic**ata***	*plášt**ěnci***	*tunicates / sea squirts*
	*Vertebr**ata** / Crani**ata***	*obratl**ovci***	*vertebrates*
superclass	*Gnatho**stomata***	*čelist**natci***	*jawed vertebrates*
class	*Cest**oda***	*tasem**nice***	*cestodes / tapeworms*
	*Oste**ichthyes***	*ryb**y***	*(bony) fish*
	*Amphib**ia***	*obojživel**níci***	*amphibians*
	*Mamm**alia***	*sav**ci***	*mammals*
subclass	*Pteryg**ota***	*křídl**atí***	*winged insects*
	*Ornithur**ae***	*dr**aví** ptá**ci***	–
superorder	*Tele**ostei***	*kost**natí***	*teleosts*
	*Peleo**gnathae** / Ratit**ae***	*běž**ci***	*ratite birds*
	*Placent**alia** / Euther**ia***	*placentál**ové***	*placental mammals /eutherians*
order	*Odon**ata***	*váž**ky***	*– (dragonflies and damselflies)*
	*Hymeno**ptera***	*blano**křídlí***	*hymenopterans*
	*Passeri**formes***	*pěv**ci***	*passerine/perching birds / songbirds*
			owls
	*Strigi**formes***	*sov**y***	*galliforms*
	*Galli**formes***	*hrab**aví***	–
	*Pelecani**formes** / Steganop**odes***	*veslon**ozí***	–
	*Anseri**formes***	*vrubo**zobí***	*– (pikas, hares and rabbits)*
	*Lago**morpha***	*zajíc**ovci***	*carnivores*
	*Carni**vora***	*šelm**y***	*odd-toed/odd-hoofed ungulates*
	*Perisso**dactyla***	*licho**kopytníci***	
family	*Chrysomel**idae***	*mandelink**ovití***	–
	*Salmon**idae***	*lososo**vití***	salmonids
	*Equ**idae***	*koň**ovití***	equids
	*Anthrop**oidae***	*op**ice***	anthropoids

Latin binomial names of species in zoology (governed by the ICZN) are also often of a different sort than their counterparts in botany: the adjectival modification is often

46 As well as in the outline of botanical taxonomy, I adhered to the taxonomic system presented in *Biologie pro gymnázia* by J. Jelínek and V. Zicháček (2004), 91–200.

replaced by a nominal **reduplication**, i.e. the generic name is repeated in the position of a specific modifier.

lín obecný	– *Tinca tinca*
lipan podhorní	– *Thymallus thymallus*
parma obecná	– *Barbus barbus*
úhoř říční	– *Anguilla anguilla*
šprot obecný	– *Sprattus sprattus*
ropucha obecná	– *Bufo bufo*
rak říční	– *Astacus astacus*
mlok skvrnitý	– *Salamandra salamandra*
leguán zelený	– *Iguana iguana*
čejka chocholatá	– *Vanellus vanellus*
rorýs obecný	– *Apus apus*
netopýr hvízdavý	– *Pipistrellus pipistrellus*
sysel obecný	– *Citellus citellus*
skunk pruhovaný	– *Mephitis mephitis*
jezevec lesní	– *Meles meles*
vydra říční	– *Lutra lutra*
hyena skvrnitá	– *Crocuta crocuta*
rys ostrovid	– *Lynx lynx*
liška obecná	– *Vulpes vulpes*
bizon	– *Bison bison*
daněk skvrnitý	– *Dama dama*
gorila	– *Gorila gorilla*

The second element in such reduplicative names of taxons may even be slightly modified:

makrela obecná	– *Scomber scombrus*
tuňák obecný	– *Thunnus thynnus*

Figure 4.11. Reduplicative names of species in the Latin zoological nomenclature.

Another distinctive feature of nomenclatures in vernacular languages is **higher dissociation** of naming units within narrow semantic fields. The more systematic character of Latin nomenclature stands out in comparison with the traditional Czech and English terminology: as shown in the example below, Latin quite strictly marks members of the genus *Panthera* by using the generic name *Panthera* first, followed by a distinguishing name of species, the epithet. It is thus obvious that these cat-like animals are related and joined in the same genus. This apparent feature is absent from the Czech and English nomenclatures, as various species of the genus are referred to by formally differentiated, historical names. Nevertheless, Latin zoological terminology is not completely systematic, which is manifested by the Latin names of *cougar/puma* (*Puma/Felis*) and *cheetah* (*Acinonyx*) in the genus *Panthera* (see Tab. 4.5). A similar tendency is manifested by terms in the genus *Canis* according to some classifications (see Tab. 4.6). The necessary binomial character of the Czech nomenclature was achieved by adding a distinguishing

adjective; however, unlike in botanical taxonymy, a genus is not clearly marked by the shared generic head noun.

Table 4.5. Higher degree of dissociation in naming in Czech and English compared with Latin—the genus *Panthera*.

English	Latin	Czech
lion	**Panthera** leo	lev pustinný
tiger	**Panthera** tigris	tygr džunglový
Bengal/Indian tiger	**Panthera** tigris tigris	tygr džunglový indický
Siberian tiger	**Panthera** tigris altaica	tygr ussurijský/sibiřský
leopard / panther	**Panthera** pardus	levhart skvrnitý
snow leopard / ounce	Leo/**Panthera** uncia / Uncia uncia (sometimes regarded as the member of the genus *Uncia*)	levhart sněžný / irbis
jaguar	**Pantherus**/**Panthera** onca	jaguár americký
cougar / puma / mountain lion / panther	Puma/Felis concolor	puma americká
cheetah	Acinonyx jubatus	gepard štíhlý

Table 4.6. Higher degree of dissociation in naming in Czech and English compared with Latin—the genus *Canis*.[47]

gray/timber wolf	**Canis** lupus	vlk obecný
jackal	**Canis** aureus	šakal obecný
coyote	**Canis** latrans	kojot prériový
dingo	**Canis** dingo	**pes** dingo
dog	**Canis** familiaris	**pes** domácí
fox	Vulpes vulpes	liška obecná
gray fox	Urocyon cinereoargenteus	liška šedá
Arctic fox	Alopex lagopus	liška polární
fennec	Fennecus/Vulpes zerda	fenek berberský

Note: Taxons in the lower table are usually regarded as separate genera (*Vulpes*, *Urocyon*, *Alopex*, *Fennecus*), which is adequately reflected in their Latin names, but sometimes as members of the genus *Canis*.

47 Although all Latin names of taxons in the genus *Canis* bear the generic name *Canis*, only two Czech in Table 4.6 do. Not only do Cz. *vlk*, *šakal*, *kojot*, *vlček* belong to the genus *Canis*, the nonsystematic naming in Czech (as well as in English) extends beyond the boundaries of the genus. Members of several different genera are referred to as *pes* in Czech: e.g. in the genus *Pseudalopex* (*Pseudalopex gymnocercus*, *pes pampový*), the genus *Chrysocyon* (*Chrysocyon brachyurus*, *pes hřívnatý*), etc.

The number of basic levels in zoological taxonomy is identical with that of botanical taxonomy. As supplementary and additional taxons are distinguished, the total number of levels exceeds 15. Some taxonomic levels are included which are not used in the botanical classification, namely **phylum**, **subphylum**, **superclass**, **suborder**, **superfamily** and **subfamily**. Alternative approaches to classification exist, the main distinction being between the traditional systematic taxonomy and the modern method using molecular comparative analysis to identify genetically related taxons. This study leads to re-grouping of taxons and to the creation of some separate genera. The traditional taxonomy is presented in the example below.

1. ***Cellular organisms (buněčné živé organismy)***
2. **domain** (dominium, doména): ***Eukaryote (Eukaryota, Eukarya)***
3. **kingdom** (regnum, říše): ***Animalia / animals (Animalia, živočichové)***
4. **subkingdom** (subregnum, podříše): ***Metazoa (Metazoa, mnohobuněční)***
5. **division** (divisio, oddělení): ***Triblastica (Triblastica)***
(type: ***Deuterostomia (druhoústí)***)
6. **phylum** (phylum, kmen): ***chordates (Chordata, strunatci)***
7. **subphylum** (subphylum, podkmen): ***vertebrates (Vertebrata, obratlovci)***
8. **superclass** (superclassis, nadtřída): ***(Gnathostomata, čelistnatci)***
9. **class** (classis, třída): ***mammals (Mammalia, savci)***
10. **superorder** (superordo, nadřád): ***Placental mammals (Placentalia/Eutheria, placentálové)***
11. **order** (ordo, řád): ***carnivores (Carnivora, šelmy)***
12. **suborder** (subordo, podřád): ***Fissipedia (Fissipedia, pozemní šelmy)***
13. **superfamily** (superfamilia, nadčeleď): ***Feloidea (Feloidea)***
14. **family** (familia, čeleď): ***Felidae (Felidae, kočkovití)***
15. **subfamily** (subfamilia, podčeleď): ***Pantherinae / big cats (Pantherinae, velké kočky)***
(other subfamilies: *cats (Felinae, malé kočky)*, *cheetahs (Acinonychiae, gepardi)*)
16. **genus** (genus, rod): ***Panthera*** (about 100 species)
(other genera: *ounces (Uncia, sněžní levharti)*; two genera are added on the basis of modern methods of genetical comparison: *Neofellis* (e.g. *Neofelis nebulosa*, *levhart obláčkový*) and *Pardofellis* (e.g. *Pardofelis marmorata*, *kočka mramorovaná*))
17. **species** (species, druhy):
lion (Panthera leo, lev)
leopard/panther (Panthera pardus, levhart)
jaguar (Panthera onca, jaguár)
tiger (Panther a tigris, tygr)

Figure 4.12. Taxonomic levels in English (Latin, Czech): **superordinate and sister** (i.e. co-hyponymic) **categories of the genus *Panthera***.

4 | 5 Taxonymic inconsistencies: synonymy and polysemy

4 | 5 | 1 Terminological synonymy

Synonymy, although regarded as highly undesirable in scientific terminologies, has not been avoided. Synonymy contradicts the principle of economy in a language, which requires that a concept distinguishable from others has one signifying form. Even in the relatively consistent botanical taxonomy, numerous species, genera, families and higher taxons are known under several names. Such lexical items, which exist parallel to each other and have the same denotation and an identical referent, i.e. a set of subordinated taxons referred to by the name of the class or set, are virtually synonymous.

One of such synonymous terms is sometimes regarded as more general, i.e. in fact hypernymous or taxonomically superordinate to others, but this trait is not reflected in the hierarchy (e.g. all of the following are names of families, which means that these taxons are at the same level in the hierarchy). Such synonyms are **complete synonyms** since they seem to have the same descriptive, expressive and social meaning in certain contexts. They differ neither in style (all of them are formal) nor expressiveness (terms should not reflect it). The only difference may be in **distribution**, as some of the terms may be preferred by certain authorative authors, schools and other sources, and some may reveal a tendency to become more central (and predominate in use) than others—in certain countries, institutions, etc., at certain times, by certain authors.

bobovité / vikvovité / luštinaté / motýlokvěté—Fabaceae / Viciaceae / Leguminosae / Papilionaceae
miříkovité / mrk vovité / okoličnaté—Apiaceae / Daucaceae / Umbelliferae
hvězdnicovité / složnokvěté—Asteraceae / Compositeae
čekankovité / složnokvěté—Cichoriaceae / Compositeae
hluchavkovité / pyskaté—Lamiaceae / Labiatae
hvozdíkovité / silenkovité—Caryophyllaceae / Silenaceae

Figure 4.13. Synonymy in the Czech and Latin names of plant families (Latin names are used in English as well).

Considerably more examples of synonymy exist between items at the lowest level in a classificatory hierarchy, namely names of species.

Ulmus laevis / Ulmus effusa—vaz obecný / jilm vaz—European white elm
Ulmus minor / Ulmus carpinifolia / Ulmus campestris—jilm ladní / jilm habrolistý—smooth-leaved elm
Ulmus glabra / Ulmus montana / Ulmus scabra—jilm horský / jilm drsný—Scots elm / Wych elm
Potentilla erecta / Potentilla tormentilla / Tormentilla erecta / Tormentilla officinalis / Potentilla officinalis / Potentilla tetrapetala / Fragaria tormentilla (7 synonyms!)*—mochna nátržník—tormentil*
Prunus padus / Padus avium—střemcha hroznovitá / střemcha obecná—
Pseudoacacia robinia—trnovník akát / trnovník bílý—black locust / false acacia
Eriobotryja japonica—eriobotryja japonská / mišpule japonská / lokvát—loquat / Japanese medlar

Figure 4.14. Synonymy in the Latin, Czech and English names of plant genera and species.

However, although such lexical items are clearly synonymous, that is having the same meaning (identical denotation), several subtypes differing in nuances of use or origin may be distinguished:

A. Synonyms differing in formation:

Such synonyms were formed in different ways because of **distances in place, time and/or motivation** of their formation. E.g. both *black locust* and *false acacia* refer to the physical properties of the relevant tree and make comparison by using a metaphor, but the motivations of these word-forming processes are different. Analogous naming processes relating to the same taxon took place in Czech as well: the term *trnovník bílý* refers completely to its appearance, whereas the names *trnovník akát* or simply *akát* make an allusion to a similar leafy tree, *acacia*.

Azalea is a large group of varieties of bushes which belong to the same genus as *Rhododendrons*. The discovery of deciduous plants similar to *rhododendrons* (which are evergreen) confused European botanists so that they described the new plants as a separate genus. This mistake was later corrected, however, the alternative name has remained in use. The Latin name of *svídovec květnatý* is either *Cornus florida* or *Cynoxylon floridum*, depending on who described and coined the taxons. Another example, mentioned later, is *Potentilla fruticosa* or *Dasyphora fruticosa* (*mochnovec křovitý*), as varieties of this same plant found growing in different places of the northern hemisphere were classified as segregate taxons.

A further subdivision of members of synonymous pairs in this group can be made into:

A.a. Names originating in the general language (often perceived as unmotivated and domestic expressions) which only later were adopted into taxonomies or given a precisely defined meaning. E.g. in Czech or Latin, to be included in botanical or zoological taxonomies, general names were typically extended by the names of species (epithets) to distinguish between these, e.g. *jeřáb ptačí* (*Sorbus aucuparia*), etc.

A.b. Names artificially formed, i.e. derived or composed from the existing stock or coined on the basis of metaphor. This is very frequent in taxons where the practical need for distinguishing was very low before the development of science and creation of systematic taxonomy (e.g. different genera of insects, herbs, algae, etc., such as *ploskohřbetka smrková* (*Cephaleia abietis*)), in higher classificatory levels in taxonomies (e.g. *stejnokřídlí* (*Homoptera*)), or completely absent in the past (unknown species and genera of exotic plants and animals which were only brought to light by scientific exploration in recent decades or centuries, domestic species and genera discovered and described only recently, etc.).

To provide examples of synonym pairs consisting of members in which a more "scientific", i.e. explicitly classifying name was formed for a known taxon, *šípek* and *růže šípková* (*Rosa canina*) may be used, similarly *pomerančovník* and *citroník čínský* (*Citrus sinensis*), *datlová palma* and *datlovník pravý* (*Phoenix dactylifera*), etc.

B. Synonyms differing in geographic origin:

Two subtypes of pairs of synonymous words may be identified here:

B.a. One lexical unit referring to a foreign taxon is of **domestic origin**—whether old, or artificially created for taxonomic purposes—and **the other** is a **loan word** usually from the area where the taxon is normally found: e.g. the Czech terms *eriobotryja japonská* and *mišpule japonská* have a synonym *lokvát* (*Eriobotrya japonica*), borrowed from Chinese (Cantonese)[48] and used also in English (*loquat*). Similarly, *Japanese flowering cherry* is termed *višeň pilovitá* (*Cerasus serrulata*) and *třešeň pilovitá* (*Prunus serrulata*) in Czech and Latin (two scientific synonyms are caused by ambiguity concerning the proper generic classification of the plant), but *sakura*, a borrowing from Japanese, is another, generally known synonym in this at least three-member synonymic set. The so-called living fossil from the mesozoic era and the only representative of the gymnosperm order *Ginkgoales*, *Ginkgo biloba*, is known as *ginkgo*[49] both in English and Czech, beside its domestic synonyms *maidenhair tree* and *jinan dvoulaločný*, respectively.

B.b. One lexical unit referring to a taxon is of **domestic origin** and the synonymous one was coined in another **regional variety of the same language**; this is particularly characteristic of English with its truly global status. This explains the terminological alternatives in British, American, Australian, and other Englishes. Such different coinages may be especially found in relatively recent vocabulary, e.g. in the areas of culture, politics, social sciences, and also economy. E.g. the British account title *creditors* is semantically identical with the American account *accounts payable*, and British *debtors* corresponds to the American *accounts receivable*. There are also certainly mere cultural equivalents in national standards which should not be confused with such British-American synonymous

48 Cantonese *luh kwat*, literally "rush orange".
49 Japanese *ginkyō*, from Chinese *yínxìng*.

pairs; e.g. the *Parliament* and its *House of Commons* cannot be considered as a synonym to the US *Congress* and its *House of Representatives*. These are just functional equivalents, but their denotations differ as these are unique and internally dissimilar entities existing in different contexts.

The question is whether lexical equivalents in different national standards are real synonyms. They are often regarded as **tautonyms**, not synonyms.

C. Synonyms differing in style:

One dividing line can be drawn here between two-word scientific names which are at a stylistically higher level (used in varieties of language higher up on the scale of formality) and their one-word equivalents, familiar to the general public and used in colloquial style, in non-professional varieties. E.g. *osika* in Czech will be classified as a stylistically inferior item to its cognitive synonyms, terms from botanical nomenclature, viz. *topol osika* or *osika obecná* (*Populus tremula*); (*koňský) kaštan* is stylistically lower than *jírovník maďal*, and in English *green algae* possibly stands lower than *Chlorophyta*, a Latin term used as an alternative. The economic term *assets* stands stylistically higher than its synonyms, *property* or *possession(s)*, as well as *liabilities/commitments* and *debts*, *enterprise* and *business*, *acquisition* and *gain* or *purchase*.

This category certainly partly overlaps with the previous category of origin, as well as with the following of terminological precision. Expressions based on the classical languages (Latin, Greek) tend to be stylistically higher (and more specialised, more scientific and longer) than their domestic equivalents. A binomial scientific name is also stylistically marked, used in specialised contexts, and enables more accurate reference because it is capable of distinguishing species, often expressing the links with higher taxonomic levels (apart from those at the same level), and it should be unequivocal.

Variation (i.e. the permissible semantic differences) among cognitive synonyms may arise from the **variation in language**, i.e. the existence of various dialects and registers. Evoked meaning, which itself is connected with dialect and register variation in language, does not affect the truth-value of propositions. **Dialects**, whether geographical, social or temporal, are varieties of a language capable of distinguishing between individual groups of users. At the lexical level, a lexical item is a means of dialectal variation if it is typical of a certain group of speakers and recognised as such by most other speakers. Lexical items may prove to be dialectal if they are familiar to other users, but considered odd or rare by the other users, who at the same time should clearly be able to classify them as dialectal. A dialectal lexical item may also be characteristic of a combination of dialect types, e.g. a word may be used by a certain age or social group within a regional variety.

Two lexical items used in different dialects of a language may be exact translations of each other, meeting identical contextual relations in the two dialects. Nevertheless, these two items are not regarded as absolute synonyms in these two dialects, but **merely cognitive synonyms** (cf. Cruse 1986: 282). This is a consequence of the **associations** which a unit from one dialect is capable of evoking after it is transferred into another

dialectal environment. For two items to be absolute synonyms, a complete agreement in denotation and distribution (use), but also in associations would be required. This is the reason why e.g. American equivalent terms are not regarded as absolute synonyms (nor, quite often, as synonyms at all) in British English and vice versa.

Dialect variation enjoys some currency in the use of terminologies where alternative items, cognitive synonyms, are available because the adequate choice enables speakers to identify with the group by using the appropriate slang. As much as it is common to talk about *pay*, *earnings*, *outgoings*, *debt*, and *bucks* in the lower-class social environment in respect of family finance, it would not be acceptable in a higher-class well-to-do family where probably the cognitive synonyms typical of a different social dialect would be used, i.e. *salary*, *income*, *expenses* or *expenditure*, *liability* or *commitment*, and *dollars*, respectively. Czech university students and teachers of linguistics prefer to say *syntax*, *reference*, *genitiv*, *indikativ*, *parataxe*, etc. to the equivalent terms used by children and teachers at primary schools, namely *skladba*, *odkaz*, *2. pád*, *oznamovací způsob*, and *souřadnost*, respectively.

Dialect variation (mostly social and temporal) in the preceding examples already verges on another source of evoked meaning, the variation in **register**. Particularly the dimension of **field**, which refers to the field (i.e. the topic) of a discourse, affects the choice and thus also expectability of occurrence of certain lexical items in certain contexts. Cognitive synonyms then are those different words with identical denotation which are used on different occasions, depending on their typical use in different fields of discourse.

Another dimension of register variation is **mode**, that is how a message is transmitted (basically, in the spoken and written mode). Synonyms may be differentiated from each other by their appropriateness for a certain mode.[50] A combination of markedness of a word for the dimension of field (occupational slang) and mode, as well as the third dimension, tenor (i.e. mutual relationship between participants in communication) is frequent. It is difficult to imagine a Czech speaker describing a scene by using scientific binomial terminology or scientific synonyms, because the appropriate option for spoken medium with generally communicative purposes are their shorter, one-word synonyms: *"Kolem komunikací krásně kvetly *třešně pilovité* a *jírovce maďaly*." *"Na *brachyblastu brslenu evropského* jsme našli hnízdo *ťuhýka obecného*". *"Tlakem způsobeným hmotností vozidla jsme způsobili smrtelné zranění *ježku východnímu*.". The spoken sentences will certainly use non-terms, synonymous in denotation, but differing in style: "Kolem *silnic* krásně kvetly *sakury* a *kaštany*." "Na větvi nějakého *keře/stromu*/?*brslenu*? jsme našli *ptačí* hnízdo." "Přejeli jsme *ježka*." (Compare Hofmann's (1993) observation mentioned in Chap. 2.6.4 that hyponyms are marked and that generic words are preferred, as they block both too general hypernyms and too specific hyponyms.)

50 The difference—not cognitive—between synonyms in terms of register turns up when they are displaced from their normal environment, *cf.* Cruse (1986: 284): "Field and mode variants resemble dialectal variants in that they can be regarded as semantically neutral (in the relevant respect) when they occur in their normal contexts, but become alive with associations (i.e. evoked meaning) when transported to alien environments."

Style is then a set of characteristic features which cause the language to vary depending on the mutual relationships between participants in a communication and on the situation. Synonymy is yielded by the variation in mode, field and tenor (the formality vs. informality of the relation between communicants), but many synonymous words are also used to express cultural subtleties and to replace lexemes which are highly expressive. Euphemisms, dysphemisms, taboo words, etc. seem to carry expressive or emotional meaning, in addition to the above-mentioned evoked meaning. However, emotively coloured cognitive synonyms are of importance in communication where they are chosen to suit specific situations; they are marginal or irrelevant for the rather static context we are concerned with, namely scientific lexical hierarchies.

D. Synonyms differing in terminological or taxonomic accuracy:

A more modern approach to taxonomy and expanding knowledge may cause re-evaluation of existing classifications and, consequently, of naming. In order to maintain consistency with the general usage and scientific discourse so far, the older term is not completely abandoned; it continues to be valid, but it is replaced in more rigorous contexts. The example of dividing the broad family *Prunus* into a few separate smaller families, resulting in the existence of synonyms in the Latin taxonomic terminology, has been given earlier, e.g. *Prunus armeniaca / Armenica vulgaris* (*apricot, meruňka obecná*), *Prunus persica / Persica vulgaris* (*peach, broskvoň obecná*), *Prunus dulcis / Amygdalus communis* (*almond, mandloň obecná*), *Prunus padus / Padus avium / Cerasus padus* (*bird cherry / Mayday tree, střemcha obecná*), *Prunus avium / Cerasus avium* (*třešeň ptačí / ptáčnice*), etc.

Inclusion of a taxon in its subordinate class according to some classifications, and recognition of these two as separate classes in alternative ones, leads e.g. to the synonymy of the names of species *Cornus sanguinea / Swida sanguinea (svída krvavá)*, *Cornus alba / Swida alba (svída bílá)*. Different opinions of authoritative sources on the taxonomic structure are reflected in terminological variety.

4 | 5 | 2 Terminological polysemy

Domestic, often descriptive, metaphorical and/or more general words are used as synonyms to more accurate terms with narrower denotation. *Wintergreen* (*Gaultheria*), plant in the *heath* order (*Ericales*), is used as an alternative common name for several other herbs: *Pyrola* (*shinleaf*) and different *Gaultheria* species, especially *Gaultheria procumbens* (also *teaberry / checkerberry*) (*Britannica*: 2020). On the other hand, *creeping snowberry* is a plant of the genus *Gaultheria* in the *heath* family, whereas *snowberry* is a shrub belonging to the genus *Symphoricarpos* (*pámelník*) of the *honeysuckle* family (*Britannica*: 1730). *Creeping snowberry and snowberry* are then unrelated, despite the shared (head) name. The principle of using a name of a taxon to mark a different, taxonomically distant, taxon, when **modification** is added, is frequent in English with its tendency to compounding:

see below for the use of the terms *cedar*, *cypress* and *pine* to mark taxons in distinct genera or families.

Instances of this type are similar to **polysemy**, which is defined as a situation when one lexeme has **more specialised meanings** (senses). E.g. the noun *lotus* denotes any of several different plants. The lotus of the Greeks was *Ziziphus lotus* (family *Rhamnaceae*), the Egyptian *lotus* is a white *water lily* (*Nymphaea lotus*), the sacred lotus of the Hindus is *Nelumbo nucifera*, an aquatic plant, the lotus of North America is a similar aquatic plant, *Nelumbo pentapetala*, and *lotus* is also a genus of the *pea* family (*Leguminosae/Fabaceae*) (*Britannica*: 1110). Polysemy to such an extent is, however, rather a feature of the common lexis, where specialised senses of a word have developed for use in different contexts, and not of a scientific nomenclature of one discipline. Nevertheless, using the same word (though in combination with others, in compound terms) to refer to distantly related or unrelated taxons involves some features of polysemy.

English botanical terminology uses descriptive or figurative **compound terms** to refer to species and to genera which are not core enough to have an old, one-word term. Instead of consociative **derivation used in Czech and Latin** to create names for new taxons at the generic level (*ječmen/Hordeum, ječmenka/Hordelymus*; *oves/Avena, ovsíř/Avenula, ovsec/Helictotrichon, ovsík/Arrhenatherum, ovsiřík/Ventenata, ovsíček/Aira*; *metlička/Avenella, metlice/Deschampsia*; *pšeníčko/Milium)*, **compounding is preferred in English**. The second, i.e. the head, noun frequently uses a name of a well-known taxon which the newly-named taxon resembles. These two, however, do not have to be closely related. The result is terminological confusion in English, almost absent from **Czech and Latin**, where names related to **different genera** (i.e. the first component of binomial terms) **must differ**. Czech and Latin keep the unique name of a genus in the name of its species and modify it by adding a specific adjective or noun (the **binomial nomenclature** of species), whereas English combines words to form names of species and genera quite independently.

E.g. the noun ***cypress*** preceded by a distinguishing noun or adjective refers both to true *cypresses* (genus *Cupressus*, *cypřiš*) and *false cypresses* (genus *Chamaecyparis*, *cypřišek*). If two species from these two genera appear next to each other, they bear no formal mark of their respective genera (e.g. *Monterey cypress* × *Nootka cypress*—see Fig. 3.21 below). Similarly, ***cedar*** is not only any of four species of ornamental and timber evergreen coniferous trees of the **genus *Cedrus* in the *pine* family**, viz. the *Atlas cedar (Cedrus atlantica, cedr atlaský)*, the *Cyprus cedar (Cedrus brevifolia)*, the *deodar (Cedrus deodara, cedr himalájský)*, and the *cedar of Lebanon (Cedrus Libani, cedr libanonský)*, but also some species from the **genus *Chamaecyparis*** in the *cypress* family (*Alaska cedar, cypřišek nootecký; Port Orford cedar*), from the **genera *Juniperus*** (*eastern red cedar, jalovec viržinský*), ***Cryptomeria*** (*Japanese cedar/redwood, kryptomerie japonská*), ***Thuja*** (*eastern white cedar, zerav/túje západní*), ***Calocedrus*** (*incense cedar, pazerav sbíhavý*), etc., **all of them** in the ***cypress* family**, not in the *pine* family where true *cedars* belong. Other examples are *Norfolk Island* ***pine*** (*Araucaria excelsea*), *Parana pine* (*Araucaria angustifolia*) and other members of the separate family *Araucariaceae* (*blahočetovité*), not the *pine* family (*Pinaceae*) again.

Order: ***Coniferales*** (50 genera, 550 species)
- family : ***Araucariaceae (Araucariaceae, blahočetovité)*** (2 genera, 30–40 species)
- family : ***Cephalotaxaceae*** (1 genus, 4–7 species)
- family : ***Pinaceae* / the *pine* family *(Pinaceae, borovicovité)*** (10–12 genera, 200 species)
- family : ***Podocarpaceae*** (7–18 genera, 130 species)
- family : ***Taxodiaceae (tisovcovité)***
- family : ***Taxaceae* / the *yew* family *(tisovité)*** (5 genera, 20 species)
- family: ***Cupressaceae* / the *cypress* family *(Cupressaceae, cypřišovité)*** (19 genera, over 130 species)
  - genus : ***Calocedrus* / *incense cedar***
  incense cedar (Calocedrus decurrens, pazerav sbíhavý)
  - genus : Cryptomeria (1 species)
  Japanese redwood/cedar / peacock pine (Cryptomeria japonica, kryptomerie japonská)
  - genus : ***Chamaecyparis* / *false cypress*** (6 species)
  Formosan cypress (Chamaecyparis formosensis)
  Hinoki cypress (Chamaecyparis obtusa, cypřišek tupolistý)
  Lawson cypress / Port Orford cedar / ginger pine (Chamaecyparis lawsoniana, cypřišek Lawsonův)
  Nootka cypress / yellow cypress / Alaska cedar (Chamaecyparis nootkatensis, cypřišek nootecký)
  Sarawa cypress (Chamaecyparis pisifera, cypřišek hrachonosný)
  white cypress/cedar (Chamaecyparis thyoides)
  - genus : ***Cupressus* / *cypress*** (20 species)
  Gowen cypress (Cupressus goveniana)
  Italian cypress (Cupressus sempervirens, cypřiš pravý)
  Kashmir cypress (Cupressus cash meriana)
  Mexican cypress (Cupressus lusitanica)
  Monterey cypress (Cupressus macrocarpa, cypřiš velkoplodý)
  mourning cypress (Cupressus funebris)
  Sargen cypress (Cupressus sargentii)
  smooth cypress (Cupressus glabra)
  (Cupressus arizonica, cypřiš arizonský)
  (Cupressus torulosa)
  - genus: ***Fitzroya* / *alerce***
  - genus : ***Juniperus*/*juniper*** (60–70 species)
  Eastern red cedar (Juniperus virginiana, jalovec virginský)
  - genus: ***Pilgerodendron* / *white alerce***
  - genus : ***Thuja*/*arborvitae***
  American arborvitae / eastern white cedar
  (Thuja occidentalis, zerav/túje západní / „strom života")
  Oriental/Chinese arborvitae
  (Thuja orientalis / Platycladus orientalis / Biota orientalis, zerav(ec) východní)
  giant arborvitae (Thuja plicata, zerav obrovský / túje obrovská)

Figure 4.15. Terminological inconsistency in the *cypress* family (Cupressaceae)—use of the head nouns *cypress* and *cedar* in compound names for taxons from different genera.

5 | Lexical hierarchies in the nomenclature of economics

5 | 1 Lexical sources of the language of economics

The oldest layers of English economic terminology are made up of Anglo-Saxon (Old English), but also of Old Norse, Latin and Norman French words. Such naming units can be classified into several types, depending on the following criteria of classification:

According to their form:

- **unmotivated lexemes**, usually consisting of one morpheme—they form the oldest layer of the English economic terminology. Such words have always had an economic sense *(buy, fee, yield)* or their economic sense was established in the early feudal period (*pay, sell, price, rent, wage*). The oldest level are domestic (i.e. Anglo-Saxon) words (e.g. *buy*), but the influence of Norman and Central French and Latin became evident from the 13th and particularly 14th centuries (e.g. *cost*—Middle English, from the Old French noun *coust*, verb *co(u)ster*; similarly *pay, save, debt*, etc.);
- **derived or compound lexemes**; they appeared at later stages of development of the English lexicon; they are often Romance (Latin and French) or Greek loans, hence their derivational character (*company, corporation, consumption, depreciation, monopoly, expense, security, inflation*). The need for creating terms for more specialized concepts led to further derivation (*pre-payment, reimbursement, purchaser*) and compounding: often using Anglo-Saxon bases (*goodwill, welfare, buyout, turnover, loss leader*), but also making hybrid combinations (*profit and loss account, called-up share capital, trade creditors, gross profit, sales force, short-term debt*) and combining two or more Romance bases (*fixed assets, current liabilities, accelerated depreciation, inheritance tax, deferred revenues*).

According to their meaning:

- **monosemantic lexemes** (at least originally): such words have always had an economic meaning, although the concepts which they denote or their semantic extension have developed (*buy, yield, debt, account, money, tax, cash, cheque, expense, money, …*);
- **polysemous lexemes**: their specialised economic meaning was established during the development of feudal or industrial society and remains in use today (*sell, pay,*

save, bill, note, price, interest, credit, demand, income, …). Hughes[51] (1988, as quoted in Crystal 1995: 137) presents a table showing that a specialised economic sense of general words began to be established as late as in the late 13th century, with the period of major growth between 1550 and 1700. In contrast with the words which originally had an economic sense in English, such as *buy*, *fee, yield* (evidenced as early as in the 1st half of the 10th century AD), and e.g. *debt*, *account*, *money*, *tax*, which were added in the 1st half of the 14th century AD, the economic sense was **acquired** by already existing words, such as *pay*, *sell*, *price*, *rent* (probably in the 2nd half of the 13th century), and an increasing number of others in the subsequent periods (*wage*—mid-14th century; *company*, *save*, *bill*—around 1400, etc.).

Hughes (1988, in Crystal 1995) notes that the economic vocabulary is considerably different from that of science and technology, as it is characterised by dominance of **neologisms**, mostly formed on the basis of words or morphemes from classical languages. The vocabulary of economy rather adds **new meanings to existing general terms**, drawing on familiar and established notions. The reason for this preference may be the **centrality of economy** for everyday lives, which means, in consequence, that reference to its basic concepts is done through the core of vocabulary. Another reason is the effort towards **higher comprehensibility**—hence reliance on familiar, well-established expressions and concepts.

5 | 2 Lexico-semantic properties of the financial and accounting terminology

The language of accountancy, like every professional variety of language, has to respond to the need of the professional community to have a consistent and unambiguous tool of communication and reference, both within the community and outwards. The most important and specific part of professional slang is its terminology, which makes it functional in terms of its purpose, i.e. enables users to talk about the pecularities of the subject matter—the relevant professional field—by providing linguistic signs, terms, for various specific concepts constituting that field. Occurrence of special terms also has a distinguishing role – the **province** of the language, i.e. the field in which the language is used, is easily recognisable, and users can take for granted that words are used so that they denote concepts in accordance with the established rules of nomenclature of the given field. This fixing of terms is certainly **conventional**, but once it is done, it should be respected by professional and lay users alike.

Terms, despite an apparent obligation to respect them once they have been generally accepted, can be coined quite easily in cases when a new concept has to be referred to or an existing one has to be divided into separate specific instances, calling for new

51 G. Hughes, *Words in Time: a Social History of the English Vocabulary* (Oxford, Blackwell, 1988).

terms referring to them. Such new terms can be derived from items of the existing nomenclature of the professional area—by morphological derivation; by compounding or combination of existing terms; they can be taken from the vocabulary of the ordinary, neutral language and given a specific meaning in the specific field; they can be borrowed from other languages (where, ideally, they refer to the identical concept); or they can be completely newly formed.

When examining Czech accounting terminology and comparing it with that of English, it is possible to notice several principal differences between the two languages, as well as between each of them and German and French. These typical differences in naming highlight and illustrate the way in which different languages use their vocabulary as a source for the formation of new terminological units.

1. Authentic Czech terminology and, logically, translation from Czech into English (if a convenient English equivalent is not available and the translation strives to convey the original meaning accurately) is usually **more explicit and literal** than authentic English terminology. Czech terms tend to be more **descriptive** than English ones. Translation from Czech into English (validity of such expressions in English is certainly questionable and functional equivalents need to be sought instead; however, translating word-by-word is sometimes the only choice) often translates each component of an original Czech term so that no piece of meaning is lost in the equivalent English translation.

In this way, e.g. *Samostatné movité věci a soubory movitých věcí* (account number 022 in the Czech Chart of Accounts) is translated, truly literally, as *Individual movable assets and sets of movable assets* (with optional listing of typical types of such assets in the following brackets—*machines, tools, equipment, transportation means, furniture*), but in British terminology different configurations of such enumeration are used instead (*machinery, equipment, vehicles, furniture and fixtures*), and the equivalent terms denoting these types of fixed tangible assets are usually *Machinery and equipment* and *Fixtures and fittings*. In American terminology, the term *Capital equipment—units and property classes* is used.

Similarly, *Pořízení materiálu* (111) is translated literally as *Acquisition of material* or *Material procurement*, the latter term sounding more natural without the use of the prepositional *of*-construction, but US terminology includes the term *Cost of material*, probably avoided by Czech translators due to the semantic vagueness of the word *cost*. *Emitované krátkodobé dluhopisy* (241) is translated as *Issued short-term bonds*, preserving all semantic components of the Czech account title, but US terminology has *Issued and outstanding notes payable*, stressing rather the obligation to repay such notes in a short time than their short-term character as such. Again, the too-general and polysemous expression *note* was cautiously rejected in the Czech-English (literal) translation and replaced by a less ambiguous term, *bond*.

To provide one more example, *Zákonné sociální pojištění* (524) has traditionally been translated with regard to the form and content of the Czech term as *Legal social insurance*, whereas the corresponding British and US term is *(Statutory) social security insurance*. The word *security* is added here to the literal translation of the Czech *sociální*

pojištění because the *insurance* contributions in question are paid for *social security*. Sometimes, however, the difference is more subtle, such as in *Drobný dlouhodobý nehmotný majetek* (formerly *Drobný nehmotný investiční majetek*, 018) which was translated as *Low-value intangible fixed assets*, although it is sufficient to use the term *Small intangible assets*, omitting the redundant adjective *fixed* because all types of intangible (as well as tangible) assets are subclasses of fixed assets. Genuine English terms also tend to be shorter: *Bank loans* as an equivalent to *Běžné úvěry od bank a družstevních záložen / Běžné bankovní úvěry*, although it is not always the case (*Služby—Outside services used*, *Prodané cenné papíry a vklady* (literally *Shares/securities and ownership interests sold*)*—Book value of securities and direct investment sold*).

Table 5.1. Descriptive Czech terms and their English translations, compared with the concise genuine English terms.

Czech[52]	Translation into English	Genuine English term
014 Ocenitelná práva	**Valuable** rights	Rights
018 Drobný nehmotný investiční majetek	*Low-value* intangible **fixed** assets	*Small* intangible assets
06 Dlouhodobý finanční majetek	Long-term financial assets / **Financial** investments	Investments / Financial assets
23 Běžné úvěry od bank a družstevních záložen / Běžné bankovní úvěry	**Current** bank loans **and cooperative small loan company loans (credits)** / **Current** bank loans	Bank loans
Zúčtování rezerv a časového rozlišení provozních výnosů	*Accounting for* provisions/reserves and accruals to **operating** revenues	*Clearing of* reserves and accrued revenue

There are also several instances where a literal translation **fails** substantially to provide an appropriate terminological equivalent. Its functional adequacy is therefore questionable although the nature of the account is fully described and remains more or less comprehensible. Such inadequacy can be demonstrated by the term *Representation expenses*, suggested as a translation for *Náklady na reprezentaci* (513), which can be matched with *Entertainment*, used commonly in English. *Semi-finished products* is used for *Polotovary vlastní výroby* (122), where a clearly formed term *Manufactured parts* is available (formed analogously to *Manufactured goods*, *(Hotové) výrobky* (123)). Such literal translations already lose all advantages connected with their periphrastic character because combinations of meaningful lexemes cannot always be transferred from one language to another. Sometimes the meaning is understandable, but the form is more or less unacceptable; however, sometimes neither the meaning nor the form are acceptable. Here we verge on a large area of completely incorrect literal translations (such as **economic result* for *hospodářský výsledek* and **unfinished production* for *nedokončená výroba*).

52 The numbers refer to the numbers of accounts in *Účtová osnova pro podnikatele*, see Appendix G.

2. Translation from Czech into English has a **different motivation** than the original and fixed English term has. Two examples have already been provided above. Similarly, using the expression *Other//Legal/Statutory social security expenses* for *Ostatní* (528)//*Zákonné* (527) *sociální náklady* seems to fulfil the descriptive or explanatory function, but does not represent a proper terminological equivalent, since the expression *Fringe benefits* (*other//statutory*) is used in authentic English (US) accounting terminology. The Czech term *Dlouhodobý hmotný majetek* (02) is correctly translated as *Tangible fixed assets*, used in British English, however, a differently formed term *Property, plant and equipment* was established in the US.

Table 5.2. Different motivation of terms in Czech, literal English translations (frequent in Czech-English business dictionaries) and authentic English terms (US financial statements).

Czech terms (*Účtová osnova*)	Literal translations / terms based on British English (traditionally in Cz-E dictionaries)	Authentic English terms (US financial statements)[53]
022 Samostatné movité věci a soubory movitých věcí	Individual movable assets and sets of movable assets (machines, tools, equipment, transportation means, furniture) / Machinery, equipment, vehicles, furniture and fixtures	Capital equipment: units and property classes / Independently movable assets and asset groupings
042 Pořízení hmotných investic	Acquisition of tangible fixed assets / Tangible fixed assets under construction	Acquisition in progress of PP&E
061 Podílové cenné papíry a vklady v podnicích s rozhodujícím vlivem	Shares and ownership interests with controlling influence in enterprises	Securities and direct investments (controlling interest)
071 Fondy ze zisku	Retained earnings funds / Funds created from net profits	Reserves (appropriated retained earnings)
513 Náklady na reprezentaci	Representation expenses (entertainment expenses) / Entertainment and promotion expenses	Entertainment
527 Zákonné sociální náklady	Legal social security expenses / Statutory social security expenses	Fringe benefits (statutory)
596 Převod podílu na hospodářském výsledku (společníkům)	Transfer of profit or loss to partners	Income distribution to partners

3. An important difference between genetically related languages can be observed when terminologies of several Indo-European languages are compared. One such difference is

53 According to R. Mládek, *Světové účetnictví*—US GAAP, 2nd edition (2002).

observable in the **structure of nominal groups**. English shows a tendency to **condensation**, i.e. use of nouns as attributes when positioned before head nouns of nominal phrases. This is not a general rule, since English terminology also widely uses **genitival** (*of -*) **constructions**, which in turn are clearly predominant in and characteristic of the French terminology (along with other prepositional constructions). In the same places the German language uses solid compounds where the attribute(s) is (are) incorporated as element(s) preceding the head in a compound written as one word. Czech as an inflectional language uses both types: groups consisting of (an) adjectival attribute(s) and a head noun, as well as groups consisting of nouns where those in the attributive function have appropriate inflections—case endings. Also noun groups using a preposition are not uncommon in Czech, along with inflection.

On comparing German and English terms, it also becomes obvious that the majority of German terms are **solid compounds**, often with derivational affixes or linking letters, whereas English uses simpler words, often derived, but not merged into one word (semantically, however, a multi-word term is considered to be an **open compound**).

Table 5.3. Typical term-formation tendencies in the Czech, English, German and French accounting terminologies.

Czech	English	German	French
obrat pohledávek	debtor/sales ratio	(r) Forderungsumschlag	(la) rotation des créances
cenová odchylka	price variance	(e) Preisabweichung	(le) écart sur prix (unitaire) / (le) écart de prix
cenný papír splatný na viděnou	sight document	(s) Sichtpapier	(la) titre payable ā vue
daň z příjmu	income tax	(e) Einkommensteuer	(le) impôt sur le revenu
konsolidovaná předvaha	consolidation statement, consolidating work sheet (US)	(r) Konsolidierungsbogen	(le) état de consolidation
převod zůstatku	carry forward / opening balance (US)	(r) Saldovortrag	(le) report a nouveau
společný podnik	joint venture	(e) Gelegenheitsgesellschaft	(la) société/association en participation, (la) entreprise conjointe
účetní kniha	ledger / book of account / account book	(s) Handelsbuch / (s) Geschäftsbuch	(le) livre de comptes
účet rozvahový	balance sheet account	(s) Bilanzkonto	(le) compte de bilan
úhrada ve splátkách	instalment	(e) Ratenzahlung	(le) paiement a tempérament

Source: J. Báča, R. Schroll, I. Zelenka, *Účetní česko-anglicko-německo-francouzský výkladový slovník* (1994).

5 | 3 Taxonymic inconsistencies in the language of economics: polysemy and synonymy

It is possible to identify a bigger extent of **polysemy** in English compared with Czech. There are, on the one hand, words with several meanings, i.e. polysemy according to the definition, and, on the other hand, one notion is referred to by several terms, i.e. the same denotation has several linguistic symbols. This is an obvious case of **synonymy**, i.e. sameness of meaning, a semantic relationship often resulting from polysemy of one lexeme. Synonymy, in theory, should be avoided in terminology, but just the contrary appears to be true here: it is surprisingly frequent in English accounting terminology. Several major examples of **polysemous words** (mostly combined with other words into multi-word terms), often entering synonymic sets, are listed below:

Debt, with the basic meaning *dluh*, is used for *dluhopisy* (255, *Vlastní dluhopisy—Treasury debt*), *dlužné cenné papíry* (253, *Dlužné cenné papíry—Marketable debt (/ short-term investments in debt instruments)*), as well as for *pohledávky*, i.e. in a completely opposite meaning—some other party´s debt to us (*odepsaná pohledávka—written-off debt, nedobytná pohledávka—bad debt*), clashing with the term ***claim*** (*nedobytná pohledávka—irrecoverable claim, přihlásit pohledávku—to submit/file a claim, vzájemné pohledávky—mutual claims*). The term ***receivable*** is the third alternative with identical denotation, i.e. an amount of money owed (not yet paid) to us by someone else.

The difficult and ambiguous semantic situation of the lexeme *debt* can be compared to the verb and noun ***rent***, which is used both for the meanings ***najmout/pronajmout*** and the reflexive ***najmout si/pronajmout si*** (*an owner ~ hirer/lessor/landlord* ***rents*** *some property* ***to*** *a user ~ renter/lessee/tenant*, or vice versa: *a renter/tenant/lessee* ***rents*** *some property* ***from*** *a hirer/landlord/lessor*). The distribution of meaning seems clearer in ***hire***: *to hire* means ´to pay to use (st.) for a shorter period or to pay (so.) to do a job temporarily´, whereas *to hire (st.) out* means ´to allow someone to use (st. or oneself) temporarily in exchange for money´, which, however, can in both senses be expressed by a (mostly American) equivalent *rent*.

Cost also has several senses which certainly call for lexical differentiation which would reflect the semantic differences. *Cost* is basically used in the meaning *náklad(y)*, where it forms a relatively consistent and regularly structured lexical field of the N+N (*cost*) type: *unit cost—jednotkové náklady, maintenance cost—náklady na údržbu, labour cost—náklady práce, production cost—výrobní náklady*, or the Adj/Pass.Part.+N type: *current cost—běžné náklady, marginal cost—mezní náklady, indirect cost—nepřímé náklady, average cost—průměrné náklady; fixed cost—fixní/stálé náklady, estimated cost—předběžně kalkulované náklady*. Nevertheless, even in this basic sense alternative lexemes (namely ***expenses***, ***charges***, ***expenditures***) are either possible (*additional cost/charges/expenditures—dodatečné náklady, extraordinary cost/expenses mimořádné náklady, development cost/expenses—náklady na vývoj*) or fixed in some terms (*operating expenses / operational*

cost—provozní náklady, drobné náklady—petty expenses, miscellaneous expenses / different cost—různé náklady, sundry expenses / joint cost—sdružené náklady).

Another meaning of *cost* is ´***cena***´, competing with ***price***, ***value***, and again with ***charge*** and ***expense*** (*unit cost / unit/single price—jednotková cena, at cost / at a price—za cenu, depreciated cost/price / residual cost/value / net book value—zůstatková cena*).

However, the most serious confusion becomes evident when the conceptual difference between the notions ´***náklady***´ and ´***výdaje***´ needs to be expressed lexically. *Výdaj* can be translated by several identical expressions, i.e. *expense*, *expenditure*, *cost*, *charge*, *outlay*, and *disbursement*, although there is a substantial contrast between the two terms if they are used to denote economic concepts. By definition (Collin 1992), ***cost*** is an ´amount of money which has to be paid for something´, ***expense/expenditure/outlay*** is ´money spent´, ***expenses*** is ´money paid for doing something in the course of business, but not for manufacturing a product or for purchasing stock or for paying labour´.

Revenue is used for Czech *tržby* (642, *Tržby z prodeje materiálu—Revenues from material sold / Income from materials sold*), *výnosy* (384, *Výnosy příštích období—deferred revenue / Unearned revenue*), *příjmy* (385, *Příjmy příštích období—Accrued revenue(s)*.

Income can be *příjem* (*income bond—příjmový dluhopis*), *důchod* (*income effect—důchodový efekt*), *výnos* (*income dividends—výnosové dividendy*) or *výdělek*, sometimes also equivalent to *zisk* (*Net income // net loss—čistý zisk//ztráta*).

Similar results are achieved when English equivalents are sought for Czech polysemous words: ***zisk*** has the equivalents *profit*, *earnings* (428, *Nerozdělený zisk minulých let—Retained earnings*), *(net) income* (43, *Hospodářský výsledek—Net income/ net loss* (US), *gain* (*gain on exchange of assets*). ***Náklady*** are *expenses* (Class 5, *Náklady—Expenses*), *cost(s)* (*náklady na vývoj—development cost*), *charges* (*depreciation charges—odpisové náklady*). ***Nerozdělený zisk*** corresponds to *retained income/earnings/profit* (i.e. profits which are not paid out to shareholders as dividends), and *unappropriated retained earnings* in the US GAAP.

Cena can be matched with ***price*** (such as *spotřebitelská cena—consumer price, nákupní cena—purchase/purchasing/buying price, konečná cena closing price, cena akcií—share(s) price)*, ***cost*** (e.g. *zůstatková cena—residual/depreciated cost, cena práce / pracovní náklady—labour cost, průměrná cena—average price/cost*), and ***value*** (e.g. *zůstatková cena—net book value, odhadní cena—appraisal/estimated value, tržní cena—market value/price*).

Tržby are *revenue(s)* or *income* (642, *Tržby z prodeje materiálu—Revenues from material sold / Income from materials sold*), and also *sales / sales revenue / turnover* (in BrE) and *receipts*.

Výnosy are again *revenue(s)* or *income* (64, *Jiné provozní výnosy—Other operating revenues / Other operating income*), but sometimes even *receipts* (648, *Other operating receipts* (AmE)). ***Výnos*** then is, apart from the equivalents *revenue* and *income*, also translated as *yield*, *gain*, *return*, *profit*, *earnings*, *proceeds*, *take*, etc., depending on the context and the specific sense.

Dluhopisy, next to *debt*, are mostly translated as *bonds* (473, *Emitované dluhopisy — Bonds issued/Bonds payable*), and sometimes as *debentures* (in BrE, *debentures* are bonds secured on a company´s assets).

As the evidence above proves, a single term in one language is often translated by or corresponds to **several expressions** which function either as synonyms used in different sources or are applied more or less consistently in specialised senses, often in combination with other words. However, it is confusing if one source uses more than one term as an equivalent to one in another language, although the concept referred to is basically identical. Examples below were quoted by the same author, Robert Mládek, as part of different financial statements illustrating the US GAAP or in different editions of the same book (*Světové účetnictví - US GAAP*).

Treasury stock	– *vlastní akcie* (Czech Balance Sheet, 065, 1st edition)
	– *pokladní akcie* (2nd edition)
Vlastní akcie	– *Treasury stock* (Czech Balance Sheet, 065, 1st edition)
	– *Own stock* (2nd edition)
Vlastní jmění	– *Total equity* (Czech Balance Sheet, 062, 1st edition)
Vlastní kapitál	– *Equity* (2nd edition)
	– *Subscribed stock* (2nd edition)

Figure 5.1. Synonymy arising from alternative translations by the same author (Mládek 2002).

5 | 4 Lexical hierarchies in economics, finance and accounting

The lexical hierarchies found in the field of finance and accounting do not differ substantially from those of economics as a whole: they are generally **flat**, i.e. have a low number of levels, as well as a low number of members. Like in most terminologies of sciences, the form of the terms is marked by a high share of Latin- or French-based terms (with some domestic core expressions, of course). As many such hierarchies are recent coinages, a tendency towards analogy in the forming pattern for sister items is frequent. The pattern-based formation is evident in the following example (the same derivational suffix is used— *-ing*, as well as the international/Romance lexical stock):

The work of a manager involves: [54]

- **planning (setting objectives)** (**setting objectives, deciding** how to achieve them—i.e. **developing** strategies, plans and precise tactics, **allocating resources** of people and money);
- **organising** (**analysing and classifying** the activities of the organisation and their mutual relations, **dividing the work** into manageable activities and into individual jobs, **selecting people** to manage the units and perform the jobs);
- **integrating (motivating and comm unicating)** (communicating objectives to the people responsible for attaining them, making people form teams for performing individual jobs, **making decisions** about pay and promotion, **organising and supervising** the work of subordinates, working with people in other areas and functions);
- **measuring** (measuring the performance of their staff to see whether the objectives set are being achieved);
- **developing people** (developing both their subordinates and themselves).

(I. MacKenzie, *English for Business Studies* (2002), 15.)

Figure 5.2. Analogy in the formation of terms in economics (management theory).

Nevertheless, such formally (morphologically and lexically) pure hierarchies are rare; it is more common that e.g. in classifications denoting activities the gerunds and deverbal nouns of the *-ing* type are supplemented by deverbal nouns formed differently, esp. by adding the originally Romance abstract suffixes *-ment*, *-tion/-sion* and *-ance/-ence*.

Marketing combines

- market research
- new product develop**ment**
- distribu**tion**
- advertis**ing**
- promo**tion**
- product improve**ment** , etc.

(I. MacKenzie, *English for Business Studies* (2002), 64.)

The **functions of a central bank**:

- implementa**tion** of monetary policy
  - sett**ing** interest rate ceilings and floors
  - print**ing** money, or destroy**ing** it
  - open-market opera**tion**s (buy**ing** and sell**ing** government bonds)
- exchange rate supervi**sion**
- commercial banking supervi**sion**
- act**ing** as a lender of last resort.

(I. MacKenzie, *English for Business Studies* (2002), 133–134.)

Figure 5.3. Partial analogy in the forms of deverbal nouns denoting types of activity.

54 According to Peter Drucker, a management theorist.

The above-quoted 3-level hierarchy of the basic functions of a central bank reveals an equal share of *-ing* and *-tion/-sion* suffixes used for substantivisation of verbs. Compared with a similar Czech hierarchical system, the directly **deverbal character** (whether a gerund or a derived noun) characterised by the ***-ing*** form is more frequent in English, whereas in Czech the analogous type (e.g. *ovlivňování*) is very rare. Nouns, domestic as well as domesticated, derived from verbs according to **various nominal paradigms** in all three genders, are found instead.

Funkce centrální banky:
– uskutečňování monetární politiky
  – ovlivňování (regulace) výše úrokových měr
  – kontrola množství peněz v ekonomice / emise oběživa
  (– regulace podmínek poskytování úvěru)
Nástroje centrální banky při uskutečňování monetární politiky:
– přímé (administrativní)
  – pravidla likvidity
  – úvěrové kontingenty
  – povinné vklady
  – doporučení, výzvy a dohody
– nepřímé (tržní)
  – povinné minimální rezervy
  – operace na volném trhu
  – diskontní sazba
  – reeskont směnek
  – lombardní úvěr
  – konverze měny a swapové obchody
  – intervence na devizových trzích

(K. Fuchs, P. Tuleja, *Základy ekonomie* (2003), 257–259.)

Figure 5.4. Diversity of Czech nouns derived according to various masculine, feminine and neuter paradigms.

Apart from terms denoting activities and processes, there is a large number of lexical hierarchies based on rather **static concepts**, where the terms describe their properties. Naturally, such terms are **nominal**, consisting of a head noun, often shared by a number of terms in a lexical field (such as *cost, income, value, price, account, bill, tax, interest*, etc.), and a modifying adjective or noun, referring to the distinctive features of a particular taxon within a set of related items. The forms of English and Czech terms are often completely analogous, especially when they denote abstract, internationally accepted concepts of economic theory. The degree of analogy is considerably lower in more concrete and traditional accounting terminology.

Unemployment	Nezaměstnanost
– friction**al**	– frikč**ní**
– structur**al**	– struktur**ální**
– cyclic**al**	– cyklic**ká**
– volunt**ary**	– dobrovol**ná**
– involunt**ary**	– nedobrovol**ná**

Figure 5.5. Types of unemployment—formal and semantic analogy of terms in English and Czech.

The structure of Czech hyponyms denoting individual types of unemployment is completely **analogous** to the structure of corresponding English terms:
(1) the hypernymous noun *unemployment* (*nezaměstnanost*) is a derivation containing a negative prefix (*un-* // *ne-*) and an abstract nominal suffix (*-ment* // *-ost*); however, the English noun is composed solely of Romance elements, including the root, whereas the Czech one comprises domestic morphemes only;
(2) the modifying adjectives in the first group are based on Latin in English as well as in Czech; the English adjectives are distinguished morphologically from nouns (by the derivational suffix *-al*); in the Czech ones different adjectival suffixes are added to the (adapted) roots. Similarly, *voluntary x involuntary unemployment* and *dobrovolná x nedobrovolná nezaměstnanost* manifest a striking structural similarity (unlike Czech where a compound of two adapted domestic word bases gave rise to the stem *dobrovol-*, the English adjectives are derived from imported Romance expressions).

The tendency to adhere to an identical word-formation pattern in different languages is particularly characteristic of scientific nomenclatures, often artificially formed and manifesting an ambition to express concepts precisely; thus, the terms are borrowed, expressed by adapted neoclassical terms, or **translated literally—calqued**. This is particularly not a problem in newly introduced terms where no functional equivalent exists in the recipient language. Bigger formal and semantic identity increases accuracy in the contact between two languages. As the following table demonstrates, the prevailing type is the use of semantically analogous terms from the domestic word-stock in a given language or literal translation, followed by the use of identical neoclassical words, only adapted morphologically.

anticipovaná/*očekávaná* inflace	– *expected* inflation
cyklická inflace	– **cyclical** inflation
dovezená inflace	– *imported* inflation
nedokonale **anticipovaná** inflace	– *imperfectly* **anticipated** inflation
nominální inflace	– **nominal** inflation
reálná inflace	– **real** inflation
pádivá inflace	– *galloping* inflation
plíživá inflace	– *creeping*/pervasive inflation
poptávková i./i. vyvolaná/*tažená poptávkou*	– *demand–pull* inflation
potlačená inflace	– *suppressed* inflation
potlačovaná inflace	– *repressed* inflation
skrytá inflace	– *hidden* inflation
setrvačná inflace	– inertial inflation
i. tažená nabídkou /nabídková i.	– *supply–pull* inflation
inflace tažená náklady	– *cost–pull* inflation
inflace *tlačená cenami*	– *price–push* inflation
inflace *tlačená daněmi*	– *tax–push* inflation
inflace *tlačená mzdami*	– *wage–push* inflation
inflace *tlačená náklady*	– *cost–push* inflation
trvalá inflace	– *continuous* inflation
záporná inflace	– *negative* inflation
zjevná inflace	– open inflation
zrychlující se inflace	– *accelerating* inflation

Figure 5.6. Identity vs. diversity—terms referring to the types of inflation. Italicised words = literal translation, words in **bold** = the same adapted neoclassical word.

The increasing globalisation and consequent internationalisation of terminologies is also apparent from the next example, listing the forms of (economic and political) integration. The Czech terms, though using mostly domestic lexical stock, are formally analogous to the English ones.

free trade area	– pásmo volného obchodu
customs union	– celní unie
single market	– jednotný trh (zboží)
common market	– společný trh
monetary union	– měnová unie
economic union	– hospodářská unie
political union	– politická unie

(A. Slaný et al., *Makroekonomická analýza a hospodářská politika* (2003), 227–228.)

Figure 5.7. Forms of integration (scale from the loosest to the most integrated type)—analogous formation in English and Czech.

It is then typical of the relatively **old layers of terminology** (usually before the 20th century) that Czech terms were not influenced by English, but rather by German

(in the form of calques rather than borrowings, due to a strong anti-German sentiment), French, Latin or other Slavic languages. Since Britain acquired the status of a world colonial, industrial and trading superpower in the 19th century, and this role was later taken over by the United States, English commercial, technical, political, scientific, and other terminology has become part of the awareness of professionals as well as general language users worldwide, and the influence of English on the creation of new terms in other languages has been unprecedented. Neoclassical (Romance) terms from English have been adopted with very little resistance, whereas domestic ones, especially welcome if they refer to new concepts and nuances of the existing ones, usually require morphological adaptation.

The **Romance (Latin and French) components** clearly predominate in the English hierarchy of types of company below. English lexical components were identified infrequently only as modifying adjectives, and systemically as derivational suffixes (*-ed*, *-ship*). Contrary to this, the Czech equivalents consist almost purely of the domestic stock, with a few exceptions borrowed from Romance languages through German (*akciová*, *komanditní*) and, more recently, from English (*holdingová*). Nevertheless, the influence of Western European terms is evident, as the Czech terms were formed following the same patterns.

Table 5.4. Diversity of the English and Czech economic terminology an old layer of vocabulary.

English	Composition in Eng.	Czech	Composition in Cz.
sole trader / individual proprietor(ship)	Adj*Rom* + N / Adj*Rom* + N*Rom*	samostatný/individuální podnikatel / osoba samostatně výdělečně činná / živnostník	Adj*Cz*/Adj*Rom* + N*Cz* (calque<*Ger*) / N*Cz* + Adv*Cz* + Adv*Cz* + Adj*Cz* / N*Cz*
general (commercial) partnership	Adj*Rom* +(Adj*Rom*) + N*Rom*	veřejná obchodní společnost	Adj*Cz* + Adj*Cz* + N*Cz*
limited partnership (/partnership in commandite? / special partnership?)	Adj*Rom* + N*Rom*	komanditní společnost	Adj*Rom* + N*Cz*
sleeping/silent partnership	Adj*En*/Adj*Rom* + N*Rom*	tichá společnost	Adj*Cz* + N*Cz*
(private) limited company / limited liability company *(BrE)*	(Adj*Rom*) + Adj*Rom* + N*Rom* / Adj*Rom* + N*Rom* + N*Rom*	společnost s ručením omezeným	N*Cz* + Prep*Cz* + N*Cz* + Adj*Cz*
public limited company *(BrE)* / joint-stock company / proprietary company / incorporated company *(AmE)*	Adj*Rom* + Adj*Rom* + N*Rom* / N*Rom-En* + N*Rom* / Adj*Rom* + N*Rom* / Adj*Rom* + N*Rom*	akciová společnost	Adj*Rom* + N*Cz*
holding company	Adj*Eng* + N*Rom*	holdingová společnost	Adj*En* + N*Cz*

Abbreviations: Adj – adjective; N – noun; Adv – adverb; Prep – preposition; *En* – of English origin; *Cz* – of Czech origin; *Rom* – from Romance languages (Latin or French)

Terminological hierarchies in **accounting and finance** belong to the older, gradually established layers of the English business lexicon; therefore, they manifest a larger variety of word-formation patterns and sources than a narrow nomenclature or one created over a short period of time. Similarly, the Czech accounting terminological hierarchies are relatively **heterogeneous**, although the share of domestic elements is higher in Czech than in English. Unlike the previously quoted flat hierarchies, these systems consist of **several levels**, usually three or four. The following pages include analyses of accounting hierarchies presented in the form of financial statements, focusing on their general structure (number of levels and taxons), as well as the lexicon used (morphology, word-class, origin).

Table 5.5. Balance sheet / *Rozvaha*—comparison of the morphological and etymological composition of the equivalent English and Czech terms. Higher levels are marked by capitalisation and bold print, in conformity with the source specimen document in the *Dictionary of Accounting*.

English	Composition and *origin* of the English term	Czech equivalent	Composition and *origin* of the Czech term
FIXED ASSETS	Adj (deriv., deverbal) + N (pl.) *Latin + French*	**STÁLÁ AKTIVA / DLOUHODOBÝ MAJETEK**	Adj (deriv.) + N (pl.) / Adj (compound) + N *domestic+Latin / all domestic*
Intangible assets	Adj (deriv.) + N (pl.) *Latin + French*	**Nehmotný (dlouhodobý) majetek**	Adj (derived) + N *all domestic*
Development costs	N + N (pl.) *French + French*	Náklady na vývoj	N (pl.) + Prep + N *all domestic*
Goodwill	N (compound) *domestic*	Hodnota podniku	N + N (Attr.) *all domestic*
Tangible assets	Adj (deriv.) + N (pl.) *Latin + French*	**Hmotný (dlouhodobý) majetek**	Adj (derived) + N *all domestic*
Land and buildings	N + Conj + N (pl.) *all domestic*	Pozemky a budovy	N (pl.) + Conj + N (pl.) *all domestic*
Plant and machinery	N + Conj + N (noncount)	Technická zařízení a stroje	Adj (deriv.) + N + Conj + N (plur.)
Fixtures and fittings	N (pl.) + Conj + N (pl.)	Imobilní a mobilní inventář	Adj (deriv.) + Conj + Adj (deriv.) + N *Lat.+dom.+Lat.+Lat.*
Investments	N (pl.), *French<Latin*	**Finanční investice**	Adj + N (pl.), *Latin + Latin*
CURRENT ASSETS	Adj + N (pl.) *Latin + French*	**OBĚŽNÁ AKTIVA / KRÁTKODOBÝ MAJETEK**	Adj + N (pl.) *domestic + Latin / all domestic*
Stocks	N (pl.) *domestic*	**Zásoby**	N (pl.) *domestic*
Debtors	N (pl.) *Latin*	**Pohledávky**	N (pl.) *domestic*
Investments	N (pl.) *French<Latin*	**Finanční majetek**	Adj + N *Latin + domestic*

English	Composition and *origin* of the English term	Czech equivalent	Composition and *origin* of the Czech term
Cash at bank (and in hand)	N + Prep + N (+Conj + Prep + N)	**Finanční (a pokladní) hotovost**	Adj (+ Conj + Adj) + N *Lat. (+dom.+dom.)+ dom.*
CREDITORS: Amounts falling due within one year	N (pl.): N (pl.) + Vpart. + Adj + Prep + Num + N	**KRÁTKODOBÉ ZÁVAZKY (částky splatné do 1 roku)**	Adj (compound) + N (pl.) (N(pl.)+Adj+Prep+Num+N) *all domestic (all domestic)*
Bank loans	N + N (pl.) *Ital. + dom.*	Běžné bankovní úvěry	Adj + Adj + N (pl.) *dom. + Ital. + dom.*
Trade creditors	N + N (pl.) *domestic + Latin*	Závazky z obchodního styku	N (pl.) + (Prep+Adj+N)Attr *all domestic*
Accruals	N (pl.)	Výdaje příštích období	N(pl.) + Adj + N (pl., Attr.) *all domestic*
NET CURRENT ASSETS	Adj + Adj + N (pl.)	**ČISTÁ OBĚŽNÁ AKTIVA**	Adj + Adj + N (pl.) *dom. + dom. + Lat.*
TOTAL ASSETS LESS CURRENT LIABILITIES	Adj + N (pl.) + Adv + Adj + N (pl.)	**AKTIVA CELKEM MINUS BĚŽNÁ PASIVA**	N (pl.) + Adv + Prep + Adj + N (pl.) *Lat.+dom.+Lat.+dom.+ Lat.*
CREDITORS: AMOUNTS FALLING DUE AFTER MORE THAN ONE YEAR	N (pl.): N (pl.) + VPart. + Adj + Prep + Adv + Adv + Num + N	**DLOUHODOBÉ ZÁVAZKY (částky se splatností delší než 1 rok)**	Adj (compound) + N (pl.) (N(pl.)+Prep+N+Adj+Prep+ Num+N) *all domestic (all domestic)*
Debenture loans	N + N (pl.)	Emitované dluhopisy	Adj (deriv.) + N (pl.,comp.) *Lat. + dom.*
Finance leases	N + N (pl.)	Finanční (pro)nájem	Adj + N *Lat. + dom.*
Bank and other loans	N + Conj + Pron + N (pl.)	Bankovní úvěry	Adj (der.) + N (pl.) *Ital. + dom.*
PROVISIONS FOR LIABILITIES AND CHARGES	N (pl.) + Prep + N (pl.) + Conj + N (pl.)	**REZERVY**	N (pl.) *Latin*
Taxation including deferred taxation	N + Prep + Adj (deverb.) + N	Daňové závazky včetně odložených daňových závazků	Adj + N (pl.) + Prep + Adj + Adj + N (pl.)
Other provisions	Pron + N (pl.), *domestic*	Ostatní rezervy	Adj + N (pl.), *domestic + Latin*
CAPITAL AND RESERVES	N (noncount) + Conj + N (pl.)	**VLASTNÍ JMĚNÍ**	Adj + N *all domestic*
Called-up share capital	Adj (comp./deriv., deverb.) + N(Attr.) + N *dom.+dom.+Latin*	**Upsané/ý základní jmění/kapitál**	Adj (deverb.) + Adj + N *dom.+dom.+dom./Latin*
Share premium account	N + N + N *dom. + Lat. + Lat.*	**Emisní ažio**	Adj (deriv.) + N *Lat. + Ital.*
Revaluation reserve	N(Attr.) + N *Latin + Latin*	**Přecenění majetku**	N + N(Attr.) *domestic + domestic*
Other reserves	Pron + N (pl.) *domestic + Latin*	**Ostatní rezervní fondy**	Adj + Adj + N (pl.) *domestic + Latin + Latin*
PROFIT AND LOSS ACCOUNT	N + Conj + N + N	**HOSPODÁŘSKÝ VÝSLEDEK (výsledek výkazu zisku a ztrát)**	Adj + N *all domestic*

Sources: P. H. Collin, A. Joliffe, *Dictionary of Accounting* (1992)
M. Straková, J. Bürger, M. Hrdý, *Anglicko-český slovník hospodářský* (2000), 727–729.

Balance sheet (UK)—analysis:

This balance sheet is presented in a so-called report form(the vertical format). It is characterised by a missing rank just below its title (*Balance Sheet*), viz. the superordinate terms such as *Assets* and *Liabilities and Equity* are—quite nontypically—not included. The result of this omission shown in the table is a higher number of taxons in this second highest level, as the missing two general categories are broken down into more specific accounts, such as *Fixed assets, Creditors: amounts falling due after more than year* (i.e. long-term liabilities), etc. There are 7 terms in this rank, compared with the above-indicated 2 in the equivalent American statement (see below).

Like in the following (US) statement, the summarising lines are not included in the calculation concerning the taxonomy, as they are not direct parts of it (there are two of them: *Net current assets, Total assets less current liabilities*). The US Statement of financial position has *total (…)* lines which provide aggregate figures for members of given ranks. Contrary to the UK Balance Sheet, each broken-down category is totalled in this way in the US statement, from the second-highest rank (level 2) to level 4. There are 12 such lines in the statement consisting of 48 lines, i.e. the ratio between members of the hierarchy (36) and the summarising lines is 3 to 1. These summarising lines were excluded from the calculation relevant to the lexical hierarchy, but included in the analysis of the whole form. Like the following specimens, the top rank (level 1) is considered in its basic form, without the additional information (*for the Year to …*).

Table 5.6. Balance sheet (UK) number of levels and their members, length of terms.

Rank in hierarchy	Number of members	Total number of words	Average number of words (words per term/line)	Terms included in the rank *(examples)*
Level 1	1	2	2	Balance Sheet
Level 2	7	32	4.6	Fixed assets, Current assets, Creditors: amounts falling due within one year, ...
Level 3	18	39	2.2	Intangible assets, Tangible assets, Investments, Stocks, Debtors, Cash at bank (and in hand), …
Level 4	5	12	2.4	Development costs, Goodwill, Land and buildings, …
Total	**31**	**85**	**2.74**	
Including sum lines (totals)*	33	93	2.82	+ Net current assets, Total assets less current liabilities

Table 5.7. Balance sheet (UK)—word-classes.

Rank in hierarchy	Number of words	Words per term (line)	Nouns	% of nouns	Nouns per term (line)	Adjec-tives	% of adjecti-ves	Adjectives per term (line)
Level 1	2	2	2	100%	2	0	0%	0
Level 2	32	4.6	16	50%	2.3	4	12.5%	0.6
Level 3	39	2.2	29	74.4%	1.6	4	10.3%	0.2
Level 4	12	2.4	9	75%	1.8	0	0%	0
Total	**85**	**2.74**	**56**	**65.88%**	**1.81**	**8**	**9.41%**	**0.26**
Including sum lines (totals)*	93	2.82	59	63.44%	1.79	12	12.90%	0.36

Note: The inclusion of sum lines leads to a statistically higher frequency of adjectives (from 9.41% in the pure taxonomy to 12.90% after adding the sum lines and from 0.26 adjectives per term to 0.36). Contrary to most other balance sheets, the sum lines are not the results of adding here, but rather of subtracting—namely current liabilities from other variables. The following US Statement of financial position has nearly three times as big a frequency of adjectives (28.4%; 34.9% in sum lines), not only in sum lines which start in the adjective *Total*, but due to a less nominal pre-modification in terms generally.

Table 5.8. Comparison between the English and Czech terms in the Balance sheet (UK) and *Rozvaha (ČR)*. (Brackets give figures including the two sum lines.)

	Balance sheet (UK)	*Rozvaha* (ČR) (equivalent in structure to the UK balance sheet)
Terms	31 (33)	31 (33)
Words	85 (93)	90 (98)
Words per term	**2.74 (2.82)**	**2.90 (2.97)**
Nouns	56 (59)	45 (48)
% of nouns	65.9% (63.4%)	50% (49%)
Nouns per term	**1.81 (1.79)**	**1.45 (1.45)**
Lexical words	66 (73)	79 (86)
% of lexical words	77.6% (78.5%)	87.8% (87.8%)
Lexical words per term	**2.13 (2.21)**	**2.55 (2.61)**

Note: More usual alternatives were used in the calculation of figures on the basis of the *Czech rozvaha*. Anyway, e.g. *dlouhodobý majetek* is identical with its alternative, *stálá aktiva*, in the number of words per term as well as in the number of nouns (1) and lexical words (2) per that term. Terms like the Czech equivalent to *tangible assets* were calculated as three-word terms (*dlouhodobý hmotný majetek*), as this is the most usual wording (although the attribute *dlouhodobý* is often omitted).

The preceding comparison of analogous financial statements in Czech and British versions shows very convincingly the basic differences between the Czech and English terminologies. The linguistic characteristics are **completely analogous to those characterising the two languages as such**, without being limited to specific terminologies. **Czech terms are longer** (i.e. consist of more words despite the synthetic character of Czech; English terms are more condensed), **English terms are more nominal** (include a higher percentage of nouns), **Czech terms contain more lexical words** (English as an analytic language contains more function words).

Table 5.9. Statement of financial position (US GAAP) compared with the equivalent Czech terminology of the balance sheet. (Hierarchical levels are marked by indentation.)

XYZ Inc. **Statement of financial position** **As of December 31, 2001**	**XYZ a. s.** **Rozvaha** **k 31. 12. 2001**
Assets	**Aktiva**
Current assets	Krátkodobá aktiva
Cash and marketable securities	Peníze a tržní cenné papíry
Receivables	Pohledávky
Inventory	Zásoby
Accrued and deferrred assets	Časové rozlišení a ostatní krátkodobý majetek
Total current assets	Krátkodobá aktiva celkem
Long-lived assets	Dlouhodobá aktiva
Investments	Investice
Equity investments	Investice do majetkových podílů
Fixed income investments	Dluhopisy a podobné investice
Restricted and other assets	Omezené investice a ostatní aktiva
Total investments	Investice celkem
Property, plant and equipment	Dlouhodobý hmotný majetek
Land, buildings and structures	Pozemky, budovy a ostatní stavby
Machinery, equipment and leasehold improvements	Stroje, zařízení a modernizace pronajatých prostor
Accumulated depreciation	Oprávky
Total plant and equipment	Dlouhodobý hmotný majetek celkem
Intangible assets	Nehmotná aktiva
Assets under capital lease	Pronajatý majetek (kapitálový leasing)
Patents and copyrights	Patenty a autorská práva
Goodwill	Goodwill
Accumulated amortization	Oprávky
Total intangible assets	Nehmotná aktiva celkem
Total fixed assets	Dlouhodobá aktiva celkem
Total assets	**Aktiva celkem**
Liabilities and equity	**Závazky a vlastní kapitál (pasiva)**
Liabilities	Závazky
Current liablities	Krátkodobé závazky
Accounts payable	Závazky z obchodního styku

XYZ Inc. **Statement of financial position** **As of December 31, 2001**	**XYZ a. s.** **Rozvaha** **k 31. 12. 2001**
Accrued liabilities	Časové rozlišení
Total current liabilities	Krátkodobé závazky celkem
Long-term liabilities	Dlouhodobé závazky
Bonds outstanding	Dluhopisy
Obligations under capital lease	Závazky z pronajatého majetku
Total long-term liabilities	Dlouhodobé závazky celkem
Total liabilities	Závazky celkem
Equity	Vlastní kapitál
Common stock at par	Kmenové akcie v nominální hodnotě
Additional paid-in capital	Emisní ažio
Retained earnings	Nerozdělený zisk
Unappropriated retained earnings	Nerozdělený zisk
Appropriated retained earnings	Fondy tvořené z nerozděleného zisku
Total retained earnings	Nerozdělený zisk celkem
Accumulated non-owner changes in equity	Ostatní změny ve vlastním kapitálu
Total equity	Vlastní kapitál celkem
Total liabilities and equity	**Závazky a vlastní kapitál celkem (pasiva)**

Source: R. Mládek, *Světové účetnictví—US GAAP* (2002), 91–92.
The Czech and the English statements combined by RV.

Statement of financial position (US)—analysis:

This lexical hierarchy contains 5 levels. It is a cross between a taxonomy and a meronomy, as the lower-level taxons are types of their superordinate taxons (*receivables* **are a type** of *current assets*; *receivables* **are** *current assets*). The **meronomic** aspect is based on the principle of a whole which is only complete if it includes all parts: this has to do with the function of the statement of financial position or balance sheet form, in which all assets (grouped by their liquidity and material/nonmaterial properties), as well as all liabilities (grouped again by their temporal character, maturity, and to whom they are owed) must be added up and balanced.

Level 1 is the highest taxon, the title of the statement. The additional lines (*XYZ Inc., As of December 31, 2001*) were left out of the following statistical survey as they do not belong directly to the lexical hierarchy of assets and liabilities embodied in the statement.

Level 2 has two members; they are the two contrary types of material, financial and capital relations in business, *assets* and *liabilities and equity. Total assets* and *total liabilities and equity* are sums of the values of individual members of the respective sets; I ignored them when I analysed the pure branching structure of the hierarchy, as they are not part of it. They are lines (accounts) giving total figures for their co-referent categories, i.e. *assets* or *liabilities and equity*, which were broken down to their meronyms and hyponyms. However, I included them when I analysed the lexical properties of the whole form, as

they are components of it. As is shown below, the structure of these summary terms does not influence substantially the analysis of the given lexical hierarchy.

Table 5.10. Statement of financial position (US)—number of levels and their members, length of terms.

Rank in hierarchy	Number of members	Total number of words	Average number of words (words per term/line)	Terms included in the rank *(examples)*
Level 1	1	4	4	Statement of Financial Position
Level 2	2	4	2	Assets, Liabilities and equity
Level 3	4	6	1.5	Current assets, Long-lived assets, …
Level 4	13	35	2.7	Cash and market. securities, Receivables, …
Level 5	16	46	2.9	Equity investments, Fixed income investments, Accounts payable, …
Total	**36**	**95**	**2.64 = 2.6**	
Including sum lines (totals)*	48	129	2.69 = **2.7**	+ Total assets, Total current assets, Total plant and equipment, …

Table 5.11. Statement of financial position (US)—word-classes.

Rank in hierarchy	Number of words	Words per term (line)	Nouns	% of nouns	Nouns per term (line)	Adjectives	% of adjectives	Adjectives per term (line)
Level 1	4	4	2	50 %	2	1	25 %	1
Level 2	4	2	3	75 %	1.5	0	0 %	0
Level 3	6	1.5	4	66.7 %	1	2	33.3 %	0.5
Level 4	35	2.7	19	54.3 %	1.5	10	28.6 %	0.8
Level 5	46	2.9	26	56.5 %	1.6	14	30.4 %	0.9
Total	**95**	**2.64**	**54**	**56.8 %**	**1.50**	**27**	**28.4 %**	**0.75**
Including sum lines (totals)*	129	2.69	68	52.7 %	1.42	45	34.9 %	0.94

Note: The inclusion of sum lines leads to a statistically higher frequency of adjectives (from 28.4 % in the pure taxonomy to 34.9 % after adding the redundant sum lines; from 0.75 adjectives per term to 0.94), as each sum line starts with the adjective *Total*, and in some terms as many as 2 out of 3 words are adjectives (*Total current assets*, *Total intangible assets*).

Table 5.12. Profit and Loss Account (for the Year to 31 December 1992) (UK) compared with the equivalent Czech terminology of the profit or loss account / income statement (*Výkaz zisku a ztráty*). (Hierarchical levels are not marked; the difference between income and costs at each stage is marked by bold print.)

Turnover	Tržby
Cost of sales	Náklady vynaložené na prodej
Gross profit/loss	**Obchodní marže**
Distribution costs	Odbytová režie
Administrative expenses	Správní režie
Other operating income	Ostatní provozní výnosy
Income from shares in group companies	Výnosy z podniků ve skupině
Income from other fixed asset investments	Výnosy z ostatních investic do investičního majetku
Other interest receivable and similar income	Ostatní výnosové úroky a podobné příjmy
Amounts written off investments	Částky odepsaných investic
Interest payable and similar charges	Nákladové úroky a podobné náklady
Profit/loss on ordinary activities before taxation	**Hospodářský výsledek za běžnou činnost před zdaněním**
Tax on profit on ordinary activities	Daň z příjmů za běžnou činnost
Profit/loss on ordinary activities after taxation	**Hospodářský výsledek za běžnou činnost po zdanění**
Extraordinary income	Mimořádné výnosy
Extraordinary charges	Mimořádné náklady
Extraordinary profit/loss	**Mimořádný hospodářský výsledek**
Tax on extraordinary profit	Daň z příjmů z mimořádné činnosti
Profit/loss for the financial year	**Hospodářský výsledek za účetní období**
Transfers to Reserves	Převody do rezervních fondů
Dividends Paid and Proposed	Vyplacené a navržené dividendy
Retained profit for the financial year	**Nerozdělený zisk za účetní období**

Sources: P. A. Collin & A. Joliffe, *Dictionary of Accounting* (1992);
M. Straková, J. Bürger, M. Hrdý, *Anglicko-český slovník hospodářský* (2000), 730.

Note: Almost identical P/L Accounts have been published in Collin's *Dictionary of Accounting* and *Anglicko-český slovník hospodářský* (Straková, Bürger, Hrdý; 2000); nevertheless, a few items are added in the Czech publication which are not included in Collin: *Other operating expenses* (*Ostatní provozní náklady*), ***Operating profit/loss*** (***Provozní hospodářský výsledek***), *Income from participating interests* (*Výnosy z podniků, ve kterých společnost vlastní podílové cenné papíry a vklady*), *Dividends—preference shares* (*Dividendy—prioritní akcie*), *– ordinary shares* (*– kmenové akcie*), *Other taxes not shown under the above items* (*Ostatní výše neuvedené daně a poplatky*), *Dividends—preference shares* (*Dividendy—prioritní akcie*), *Ordinary shares* (*kmenové akcie*), *Earnings per ordinary share* (*Výnosy na kmenovou akcii*), *Dividends per odinary share* (*Dividendy na kmenovou akcii*).

Some items are modified: *Amounts transferred from/to reserves* (*Částka převedená z/do rezervních fondů*); *Tax on profit/loss from ordinary activities*, *Tax on extraordinary profit/loss*—as no tax is paid on losses, the word *loss* may be omitted. On the other hand, I added the alternative */loss* to the lines ***Profit/loss on ordinary activities before taxation***, ***Profit/loss on ordinary activities after taxation***, ***Extraordinary profit/loss***, and ***Profit/loss for the financial year***, where this alternative label clearly should be supplied.

Terms printed in **bold** are profits/losses, i.e. partial results or balances calculated in certain stages of the P/L Account. *Profit/loss* is always counted as one word in the following analysis because only one of the options would be applied.

Profit and Loss Account (UK)—analysis:

The whole specimen statement is used, with *Profit and Loss Account* being the only superordinate item in the lexical system. It is neither a taxonomy, nor a pure meronomy; it is rather an organised list (of various income types from which cost and expenses/charges are subtracted to give a figure for profit or loss). The order in the list matters. All items are at the same level, partial profits (or losses) are neither hyper- nor hyponymous to them, and they are included in the analysis. All in all, they appear to be indispensable because their quantification is the actual aim of working out the statement.

Table 5.13. Profit and Loss Account (UK)—number of levels and their members, length of terms.

Rank in hierarchy	Number of members	Total number of words	Average number of words (words per term/line)	Terms included in the rank *(examples)*
Level 1	1	4	4	Profit and Loss Account
Level 2	22	86	3.9	*all other lines*
Total	**23**	**90**	**3.91**	

Table 5.14. Profit and Loss Account (UK)—word-classes.

Rank in hierarchy	Number of words	Words per term (line)	Nouns	% of nouns	Nouns per term (line)	Adjectives	% of adjectives	Adjectives per term (line)
Level 1	4	4	3	75 %	3	0	0 %	0
Level 2	86	3.9	42	48.8 %	1.9	18	20.9 %	0.8
Total	**90**	**3.91**	**45**	**50.0 %**	**1.96**	**18**	**20.0 %**	**0.78**

Note: Easy conversion between word classes in English requires some commentary on the criteria for word-class identification, especially in this specimen statement.

Adjunct nouns (i.e. non-gradable lexemes formally identical with nouns; without an adjectival suffix) in the attributive position before the heads of noun groups were, as in all other analyses, classified as nouns. Thus *profit* and *loss* in *Profit and Loss Account* and *group* in *Income from shares in group companies* are considered as **nouns** (in condensed noun groups). The word *distribution* in *Distribution costs* is a noun, but *administrative* in *Administrative expenses* is an adjective (it has a formal indication of adjectivity, viz. the adjectival derivational suffix *-ive*).

Verbal participles in the attributive position after the heads of noun groups were classified as non-finite **verbal forms**, not deverbal adjectives which would otherwise have the same form. Thus, *written* in *Amounts written off investments*, as well as *paid* and *proposed* in *Dividends Paid and Proposed* are regarded as verbal forms (passive/past participles), left over after an ellipsis of finite forms. Despite their attributive function, their verbal character—semantically, morphologically, as well as syntactically is obvious: e.g. *Dividends* [ELLIPSIS: *which are / have been / were*] *paid and proposed*.

Deverbal adjectives preceding heads, which are also used adjectively and attributively in other terms, are regarded as **adjectives** here as well: e.g. *operating* in *Other operating income* (cf. *operating system*, etc.), *fixed* in *Income from other fixed asset investments* (cf. *fixed income*, *fixed rate*, etc.), and *retained* in *Retained profit for the financial year* (cf. *retained earnings*).

Table 5.15. Statement of changes in financial position (US) compared with the equivalent Czech terminology of the Profit and loss account (*Výkaz zisku a ztráty / výsledovka*). (Hierarchical levels are marked by indentation.)

XYZ Co. **Statement of changes in financial position** **For the year ended December 31, 2002**	**XYZ a. s.** **Výsledovka** **Za rok, který skončil 31. 12. 2002**
Net sales	Čisté tržby
Cost of goods sold	Náklady na prodané produkty / výrobky
Gross profit	Hrubý zisk
Operating expenses	Správní a odbytové náklady
Selling expenses	Odbyt
Administrative and general expenses	Správní náklady
Officer salaries	Platy vedení
Research and development	Výzkum a vývoj
Other administrative and general expenses	Ostatní správní náklady
Total administrative and general expenses	Správní náklady celkem
Total operating expenses	Správní a odbytové náklady celkem
Operating income	Hospodářský výsledek z hlavní činnnosti
Non-operating items	Ostatní položky
Interest and dividends received	Úroky a dividendy přijaté
Interest paid	Úroky vydané
Gain on sale of PP&E	Zisk z prodeje dlouhodobého hmotného majetku
Loss on investments reported using the equity method	Ztráta z finančních investic
Restructuring	Tvorba rezervy na restrukturalizaci
Total non-operating items	Ostatní položky celkem
Income from general operations before taxes	Hospodářský výsledek z hlavní činnosti před zdaněním
Income taxes	Daň z příjmu
Income from general operations after taxes	Hospodářský výsledek z hlavní činnosti po zdanění
Discontinued operations	Ukončená operace
Income at discontinued operation	Hospodářský výsledek ukončené operace
Gain on sale of discontinued operation	Zisk z prodeje ukončené operace

XYZ Co. **Statement of changes in financial position** **For the year ended December 31, 2002**	**XYZ a. s.** **Výsledovka** **Za rok, který skončil 31. 12. 2002**
Total gain from discontinued operations	Zisk z vyřazené jednotky celkem
Income before accumulated effect of change in accounting method	Hospodářský výsledek před změnou účetní metody
Accumulated effect of change in accounting method	Kumulovaný dopad změny účetní metody
Income before extraordinary item	Hospodářský výsledek před mimořádnou položkou
Extraordinary item	Mimořádná ztráta
Net income	Běžný hospodářský výsledek
Other non-owner changes in income	Ostatní změny ve vlastním kapitálu
Comprehensive income	Souhrnný hospodářský výsledek

Earnings per share of common stock	**Hospodářský výsledek na kmenovou akcii**
Income from operations after taxes	Hospodářský výsledek z hlavní činnosti před zdaněním
Discontinued operation	Celkový zisk z organizační složky
Accumulated effect of change in accounting method	Kumulovaný dopad změny účetní metody
Extraordinary item	Mimořádná položka
Net income	Běžný hospodářský výsledek
Comprehensive income	Souhrnný hospodářský index

Source: R. Mládek, *Světové účetnictví—US GAAP* (2002), 439–440. The Czech and the English statements combined by RV.

Statement of changes in financial position (US)—analysis:

Table 5.16. Statement of changes in financial position (US)—number of levels and their members, length of terms.

Rank in hierarchy	Number of members	Total number of words	Average number of words (words per term/line)	Terms included in the rank *(examples)*
Level 1	1	6	6	Statement of changes in financial position
Level 2	16	56	3.5	Net sales, Cost of goods sold, Gross profit, Operating expenses, ...
Level 3	14	57	4.1	Selling expenses, Interest and dividends received, Interest paid, ...
Level 4	3	10	3.3	Officer salaries, Research and development, Other administrative and general expenses
Total	**34**	**129**	**3.79 = 3.8**	

Table 5.17. Statement of changes in financial position (US)—word-classes.

Rank in hierarchy	Number of words	Words per term (line)	Nouns	% of nouns	Nouns per term (line)	Adjectives	% of adjectives	Adjectives per term (line)
Level 1	6	6	3	50 %	3	1	16.7 %	1
Level 2	56	3.5	26	46.4 %	1.6	20	35.7 %	1.3
Level 3	57	4.1	28	49.1 %	2	14	24.6 %	1
Level 4	10	3.3	5	50 %	1.7	2	20 %	0.7
Total	129	3.79	62	48.1 %	1.82	37	28.7 %	1.09
Excluding sum lines (Total ..., Income ...)*	82	3.57	42	51.2 %	1.83	20	24.4 %	0.87

Note: Particularly amongst the terms in level 3, some deverbal attributes are used in postposition to the head nouns (*Interest and dividend* ***received***, *Interest* ***paid*** and *Loss on investments* ***reported*** *using the equity method*). Despite their character of remnants of verbal constructions, left after the ellipsis of relative pronouns and finite auxiliary verbs (*Interest* (ELLIPSIS: *which was / has been*) *paid*), they are regarded as **adjectives** in the above table. Excluding these three items, as in the UK Profit and Loss Account, level 3 would include 11 adjectives, making up 19.3 % of all words at the level, with an average of nearly 0.8 adjectives per term. The **total figure** without postpositioned deverbal attributes is **33 adjectives**, i.e. **25.6 % of words**, and the ratio of **0.97 adjectives per term**.

The classification of real and derived (mostly deverbal) adjectives is essential in such a lexical hierarchy. It reveals that approximately **half (18 out of 37) of the adjectives are deverbal** and 4 of them behave like elliptical relative clauses (in postposition), thus contributing to the creation of more condensed and formal types of terms. Deverbal adjectives are obviously related to the operational character of the Statement of changes in financial position (or Income Statement or P/L Account), where the **dynamic aspect**, i.e. verbs **referring to processes**, remain semantically present in a **nominalised terminology**, but they convert into more convenient and nominal modifiers of nouns, namely adjectives.

Table 5.18. Statement of changes in financial position (US)—typology of adjectives.

Type of adjectives	Occurrences / Percentage	Adjectives used
Real adjectives, **before** noun	19 / 51.4 %	financial, net, gross, administrative, general, total, extraordinary, comprehensive
Deverbal adjectives, **before** noun, from an active participle (**-ing**)	8 / 21.6 %	operating, selling, non-operating, accounting
Deverbal adjectives, **before** noun, from a passive participle (**-ed**)	6 / 16.2 %	discontinued, accumulated
Deverbal adjectives, **after** noun, from a passive participle (**-ed**)	4 / 10.8 %	sold, received, paid, reported
Adjectives – **total**	37 / 100 %	

Table 5.19. Statement of cash flow (US) compared with the equivalent Czech terminology of the cash flow statement (*Výkaz peněžních toků*). (Hierarchical levels are marked by indentation.)

XYZ Inc. **Statement of cash flow** **For the year ended December 31, 2002**	**XYZ a. s.** **Výkaz peněžních toků** **Pro rok, který skončil 31. prosince 2002**
Cash flows from operating activities	Peníze poskytnuté operační činností
Cash received from customers	Peníze přijaté od zákazníků
Cash received as interest	Úrok přijatý
Cash received as dividend from affiliate	Dividenda přijatá
Insurance proceeds received	Peníze z pojistného plnění
Cash paid to suppliers and employees	Peníze zaplacené zaměstnancům a dodavatelům
Interest paid	Úroky zaplacené
Income taxes paid	Daně z příjmu
Cash paid to settle lawsuit	Peníze vynaložené na ukončení soudního případu
Net cash provided by operations	Celkové peníze poskytnuté operační činností
Cash flows from investing activities	Peníze poskytnuté investiční činností
Proceeds from sale of facility	Příjem za prodej výrobního zařízení
Payment received on note	Příjem ze směnky k inkasu
Capital expenditure	Výdaje za investiční majetek
Payment for company X (net of cash)	Částka za pořízení firmy X
Net cash flow from investing activities	Celkové peníze poskytnuté investiční činností
Cash flows from financing activities	Peníze poskytnuté finanční činností
Borrowing under line of credit	Půjčka z kontokorentu
Proceeds from sale of long-term debt	Prodej dluhopisu
Proceeds from issuance of common stock	Prodej akcií
Principal payments under capital lease	Splátky jistiny z majetkového pronájmu
Dividends paid	Dividendy vyplacené
Net cash flow from financing activities	Celkové peníze poskytnuté finanční činností
Net increase in cash	Vzrůst peněz
Cash at beginning of period	Peníze na začátku období
Cash at end of period	Peníze na konci období

Reconciliation of net income to net cash flow from operating activities	**Doplňovací tabulka: srovnání hospodářského výsledku a peněžního toku**
Net income	Hospodářský výsledek
Plus (minus) items not effecting cash and changes in assets and liabilities	Plus (minus) nepeněžní položky a změny v majetku a závazcích
Depreciation and amortization	Odpisy hmotného a nehmotného majetku
Allowance for doubtful accounts	Opravná položka k nedobytným pohledávkám
Unrealized gain on investments	Nerealizovaný zisk na investici
Unrealized loss on investments	Nerealizovaná ztráta na investici
Undistributed earnings in affiliate	Podíl na hospodářském výsledku investice
Increase in accounts receivable	Vzrůst pohledávek
Decrease in inventory	Pokles zásob
Increase in pre-paid expenses	Vzrůst v nákladech příštích období

Reconciliation of net income to net cash flow from operating activities	**Doplňovací tabulka: srovnání hospodářského výsledku a peněžního toku**
Decrease in accounts payable and accrued expenses	Pokles běžných závazků z obchodního styku
Increase in interest and income taxes payable	Vzrůst splatných úroků a daní
Increase in deferred taxes	Vzrůst odložených daní
Increase in other liabilities	Vzrůst ostatních běžných závazků
Total non-cash items	Celkem
Net cash provided by operations	Vzrůst peněz

Supplemental schedule for purchase of company X	**Doplňovací tabulka: vliv nákupu firmy X**
Fair value of assets acquired	Reálná hodnota pořízených majetků
Cash paid for all outstanding equity	Částka zaplacená za kapitál firmy
Liabilities assumed	Převzaté závazky

Source: R. Mládek, *Světové účetnictví—US GAAP* (2002), 560–561.
The Czech and the English statements combined by RV.

Note: Some Czech equivalents provided by R. Mládek may sound clumsy stylistically, namely *vzrůst peněz* (*net increase in cash*), *vzrůst pohledávek* (*increase in accounts receivable*), etc., where *vzrůst* may be replaced by *nárůst*, *zvýšení*, or *přírůstek*; and *peníze poskytnuté operační činností* (*cash flows from operating activities*), where *operační činnost* should be expressed more appropriately as *provozní činnost*. In addition, the deverbal adjective *poskytnuté* does not collocate well with *provozní/operační činnost*; the verb *poskytnout* rather collocates with an animate personal agentive noun. Thus, the derived adjective may be replaced in the given term by *plynoucí z*, *vytvořené*, *vydělané*, or *získané* (i.e. *peníze vytvořené provozní činností*).

This nomenclature, particularly on the Czech side, manifests an interesting mix of nearly literal translations (such as the above-quoted *operační činnost*) and expressions motivated differently in terms of their form and semantics of component parts, although they denote the same type of flow of cash:

Cash received as dividend from affiliate ~ Dividenda přijatá
Undistributed earnings in affiliate ~ Podíl na hospodářském výsledku investice
Proceeds from sale of long-term debt ~ Prodej dluhopisu
Proceeds from issuance of common stock ~ Prodej akcií
Net cash provided by operations ~ Vzrůst peněz

It seems that the Czech terms, despite being correct in terms of equivalence, often lack some components of meaning due to lower level of descriptiveness. E.g. *prodej akcií* certainly implies that the shares must have been issued by the firm intending to sell them to investors, however, this fact is explicitly expressed in the American term. Moreover, the type of shares (*common stock*) is specified.

This approach may verge on **redundancy**, such as in *Cash received as dividend from affiliate*. As *cash received* is a more general expression - hypernym - to *dividend*, it seems to be redundant mainly because the individual types of cash received or paid listed in the statement have already been headed: *Cash flows from operating activities*. Another instance of redundancy (however, of greater semantic content as well) in the same expression is

the attributive *from affiliate*: the fact that a dividend can only be received from a business entity different from the recipient is implied and need not be expressed, but the fact that this entity is an affiliate is missing completely in the Czech expression.

Table 5.20. Cash Flow Statement (UK) compared with the equivalent Czech terminology of the cash flow statement (*Výkaz peněžních toků*). (Hierarchical levels are marked by indentation and bold print.)

Specimen Co Ltd	
Cash Flow Statement for the year to 31 December 1992	**Výkaz peněžních toků pro rok, který skončil 31. prosince 1992**
Operating activities	**Provozní činnosti**
Cash received from customers	Peníze přijaté od zákazníků
Interest and dividends received	Přijaté úroky a dividendy
Cash paid to suppliers	Peníze zaplacené dodavatelům
Cash paid to and on behalf of employees	Peníze zaplacené zaměstnancům a za zaměstnance
Interest paid	Zaplacené úroky
Net cashflow from operations	Čistý peněžní tok z provozních činností
Corporation tax paid	Zaplacená daň z příjmu
Investing activities	**Investiční činnosti**
Purchase of investments	Pořízení investic
New fixed assets acquired	Pořízení dlouhodobého majetku (/stálých aktiv)
Sale of fixed assets	Prodej dlouhodobého majetku (/stálých aktiv)
Net cashflow from investing activities	Čistý peněžní tok z investičních činností
Financing activities	**Finanční činnosti**
New share capital	Prodej akcií
Repayment on finance leases	Splátky finančního pronájmu
Dividends paid	Vyplacené dividendy
Net cashflow from financing activities	Čistý peněžní tok z finančních činností
Net cash inflow	Čistý přírůstek peněz

Source: P. H. Collin & A. Joliffe, *Dictionary of Accounting* (1992). Czech translation added by RV.

Cash Flow Statement (UK)—analysis:

Table 5.21. Cash Flow Statement (UK)—number of levels and their members, length of terms.

Rank in hierarchy	Number of members	Total number of words	Average number of words (words per term/line)	Terms included in the rank (examples)
Level 1	1	3	3	Cash Flow Statement
Level 2	3	6	2	Operating activities, Investing activities, Financing activities
Level 2: *net cashflows*	4	17	4.3	Net cashflow from operations, Net cashflow from investing activities, ...

Rank in hierarchy	Number of members	Total number of words	Average number of words (words per term/line)	Terms included in the rank (examples)
Level 3	12	45	3.8	Cash received from customers, Interest and dividends received, Dividends paid, ...
Total (excluding *net cashflows*)	16	54	3.38	
Total	20	71	3.55	

Note: The sole term at level 1 is considered without the additional temporal specification "for the year (…)", necessitated by the fact that it also functions as a title of a document prepared every year.

Table 5.22. Cash Flow Statement (UK)—word-classes.

Rank in hierarchy	Number of words	Words per term (line)	Nouns	% of nouns	Nouns per term (line)	Adjectives	% of adjectives	Adjectives per term (line)
Level 1	3	3	3	100%	3	0	0%	0
Level 2	6	2	3	50%	1	3	50%	1
Level 2: *net cashflows*	17	4.3	8	47.1%	2	6	35.3%	1.5
Level 3	45	3.8	22	48.9%	1.8	12	26.7%	1
Total (excluding *net cashflows*)	54	3.38	28	51.9%	1.75	15	27.8%	0.94
Total	71	3.55	36	50,7%	1.80	21	29.6%	1.05

Note: Deverbal adjectives placed after the head nouns of terms were classified as adjectives here (*Cash **received***, *Dividends **paid***), regardless of their (de)verbal semantics and origin. They all occur at the lowest level (level 3), where they make up the most frequent type of adjectives: *received*, *paid* and *acquired* occurred 8 times in 12 terms (and among 12 adjectives), i.e. their share is 66.7% of all adjectives at that level (and they are also used in two thirds of terms at the level). Each level uses a certain type of adjective: level 2 exclusively uses deverbal adjectives of the *-ing* type, standing before head nouns. *Net cashflows* always use the adjectival attribute "*net*", followed by "*cashflow from*" and a repeated name of a category from level 2. The combination of a noun followed by a deverbal adjective at level 3 is probably connected with the less classificatory function of these attributes (i.e. unlike level 2) and their more **dynamic function**, indicating a past action—whether the sums were received or paid, i.e. credited or debited.

Table 5.23. Aggregate average results of the analysis of financial statements.

Hierarchy (financial statement)	Number of terms (including sum lines)*	Levels	Words per term	Nouns per term	Nouns in a term (%)	Adjectives in a term (%)
Balance sheet (UK)	31 (33)	4	2.7 (2.8)	1.8 (1.8)	65.9% (63.4%)	9.4% (12.9%)
Statement of financial position (US)	36 (48)	5	2.6 (2.7)	1.5 (1.4)	56.8% (52.7%)	28.4% (34.9%)

Hierarchy (financial statement)	Number of terms (including sum lines)*	Levels	Words per term	Nouns per term	Nouns in a term (%)	Adjectives in a term (%)
Profit and Loss Account (UK)	23	2	3.9	2.0	50.0%	20.0%
Statement of changes in financial position (US)	34	4	3.8	1.8	48.1%	28.7%
Cash flow statement (UK)	16 (20)	4	3.4 (3.6)	1.8 (1.8)	51.9% (50.7%)	27.8% (29.6%)
Total average	28 (31.6)	3.8	3.3 (3.4)	1.8 (1.8)	54.5% (53.0%)	22.9% (25.2%)

* Where not indicated separately, the figure includes the sum lines (*Total …* , *Net …*, *Income before/from …* , etc.). Sum lines usually contain an adjectival element and do not strictly belong to a meronomy.

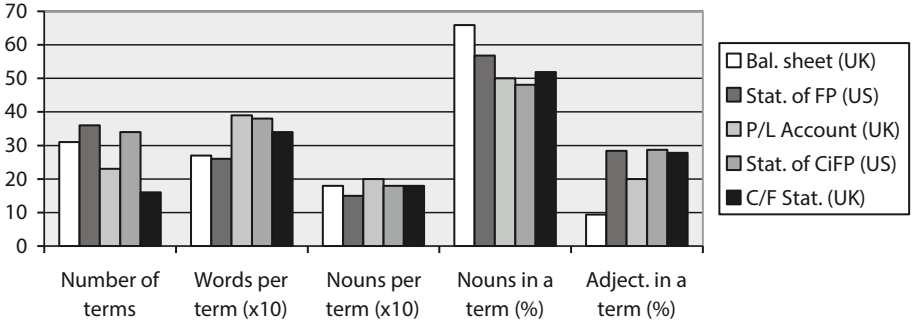


Figure 5.8. Variation in the properties of the compared financial statements (from Tab. 5.23).

In the ***Chart of Accounts***, based on the official Czech comprehensive list of accounts termed *Účtová osnova*, only 4 levels can be distinguished—quite in harmony with the average calculated in the above-analysed financial statements. The second level (*Classes of accounts, třídy účtů*) is not numerous either (8 classes for financial accounting, and 2 more are earmarked for the purposes of managerial accounting). One class of accounts is divided into 7.1 groups (level 3) on average, and the 57 groups have 264 accounts (level 4), i.e. 4.6 accounts per group. Compared with the statistics for individual financial statements, which are also separate lexical hierarchies combining meronomy and taxonomy, **accounting nomenclatures have considerably fewer levels vertically, as well as fewer members (branches) at these levels, i.e. horizontally, than biological (namely botanical) nomenclatures.**

Table 5.24. Comparison between examples of an accounting hierarchy (*Chart of Accounts*) and a botanical taxonomy (order *Coniferales*, branched down from the level of order)—number of levels and taxons.

Level	*Chart of Accounts* / *Účtová osnova*			Botanical taxonomy (example: order *Coniferales*)		
	Name of level	Number of members	Average number of subordinates	Name of level	Number of members	Average number of subordinates
1	Chart of accounts	1	(8)	Order	1	(6)
2	Class of accounts	8	7.1	Family	6	8.3
3	Group of accounts	57	4.6	Genus	50	11
4	Account	264	-	Species	550	-

Note: If *Class 7—Subledger accounts*, which is not broken down sufficiently (and for each group of *sub-ledger accounts* one account was assumed in the previous calculation), is excluded, a more realistic figure is achieved: groups of accounts have an average of **5.1** members (i.e. accounts), 256 per 50. The total average of average figures for individual levels rises then from **6.6 to 6.8 subordinates**.

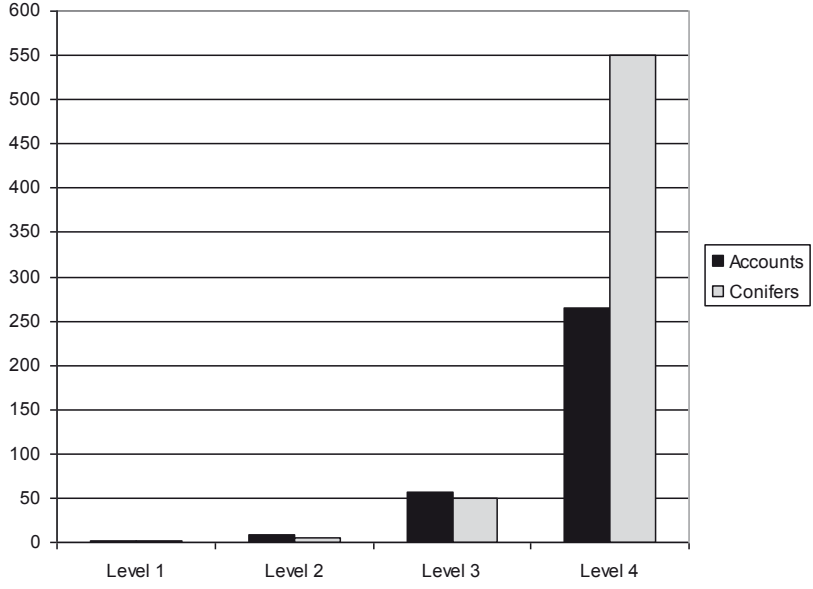


Figure 5.9. Graphic illustration of the rapid expansion in the number of taxons at the lowest level in biological taxonomies, compared with the hierarchy of the Chart of Accounts (Účtová osnova). (Orders with thousands of species, such as Rosales, Asterales, Orchidales, would extend far beyond the scope of the chart in the last column.)

6 | Lexical hierarchies in natural vs. social sciences

6 | 1 Natural vs. artificial classifications

This thesis analyses the nomenclature used in biological sciences, particularly because of its consistency and systemic character, and parallels are sought between this **natural-world-based lexical hierarchy** and those based on more **abstract systems of non-material concepts**, usually pertaining to social sciences or humanities.

The nomenclature and lexical classificatory hierarchies in accounting and finance reflect concepts and relationships between them which relate to a highly abstract and artificial human activity, namely dealing with values representing real or hypothetical quantities. Since such lexical systems seem quite **heterogeneous formally and etymologically**, as if there were no structural rules at all, comparison with a lexical hierarchy based on **more material and natural systems** may be made to examine how they have been formed and how the taxonomic and meronomic relations may be expressed in terms of naming.

It is obvious that even the classification of entities in some areas of the material world and their attributes is focused on criteria and uses approaches selected by the human mind, but the fact that methods of exact sciences have been used to study the underlying natural-world system(s) guarantees a certain level of objectivity. Be that as it may, the aim of this chapter is to look at how the composition of naming units in a language and their organisation into a hierarchy reflects or derives from the structure of real-world systems of objects or concepts and what distinguishes it from the reflection of abstract concepts. With reference to the description and findings of analyses of biological taxonomies, as well as of lexical hierarchies in accounting and finance which I provided in the previous two chapters, several areas may be identified where natural and artificial classifications differ. Their further discussion and analysis will yield the characteristic properties which underlie the differences.

6 | 1 | 1 Properties of taxons at higher levels

One difference between taxonomies in biology and mero-taxonomies in finance and accounting seems to be that **higher levels in biology, with their concrete-based and natural-world taxonomies, are less familiar than terms for superordinate levels in**

finance and accounting, with their abstract-based lexical hierarchies, where terms denote non-material entities (e.g. *liabilities*, *expenses*, *inventory*, *tax*, etc.). This appears to be quite paradoxical, but it must be borne in mind that higher taxons in the description of the material world were created artificially, as abstract and scientific terms denoting classes of concrete entities. On the other hand, superordinate terms in finance and accounting have a more general, hypernymous character, and they are the generally applicable terms, able to replace their more specialised subordinates.

Thus, terms for phyla in zoology are usually not well-known among non-specialists, i.e. ordinary users of the language, although domestic terminology has been created and used along with the Latin nomenclature. E.g. many Czech terms for phyla of animals are not familiar for non-zoologists: *pásnice (Nemertini), mechovnatci (Entoprocta), morulovci (Mesozoa), břichobrvky (Gastrostricha), rypečky (Kinorhyncha), vrtejši (Acanthocephala), bradatice* or *vláknonošci (Pogonophora), želvušky (Tardigrada), drápkovci (Onychophora), mechovky (Bryozoa* or *Ectoprocta), ploutvenky (Chaetognatha), ostnokožci (Echinodermata)*, etc. Only very few of them are part of the general language, i.e. their denotation is part of the general knowledge of the language users, e.g. *měkkýši (Mollusca)*, and possibly also *kroužkovci (Annelida)* and *strunatci (Chordata)*, which also includes the class of *mammals (Mammalia, savci)* and within it the order *Primates,* the family *Hominidae*, the genus *Homo* and the species *Homo sapiens.*

It is obvious that more abstract naming units belong to a **different stylistic layer** (usually higher) than concrete ones. Such abstract naming units were usually introduced into the vocabulary later than concrete ones, as the scientific terminology and taxonomies were usually created relatively late, with the development of human knowledge and the institutionalisation of science in the past few centuries (e.g. the Czech botanical, zoological, mineralogical and chemical terminologies were created by Jan Svatopluk Presl[55] in the 1830s and 1840s, new Czech philosophical nomenclature was founded by Antonín Marek[56], etc.).

Thus, e.g. the names of botanical families used for trees, unless they are named directly after their prominent member (type genus), such as *borovicovité, cypřišovité, vrbovité, bukovité, javorovité, lípovité, javorovité*, etc. may sound less familiar than their major representatives. Generic terminological units such as *citroník čínský* or *pomerančovník* (*orange*), *trnovník akát* (*black locust / false acacia*), *sekvojovec obrovský* and *katalpa trubačovitá* probably convey the denotation better than their corresponding superordinate families, i.e. *routovité, motýlokvěté, tisovcovité* and *trubačovité*, respectively. Well-known ornamental plants, such as the Mediterranean *oleander (Nerium oleander, oleandr/bobkovnice)*, the tropical *croton (Codiaeum variegatum, kroton)*, and *Rose-of-Sharon / shrub Althea (Hibiscus syriacus, ibišek syrský)* belong to families whose roots in Czech are based on type genera which are certainly representative biologically, but not so well-known and rooted in

55 Jan Svatopluk Presl (1791–1849) published *Rostlinář, Všeobecný rostlinopis*, *Počátky rostlinosloví*, *Ssavectvo*, *Lučba*, and *Nerostopis*.
56 Antonín Marek (1785–1877), author of *Umnice* (Logic).

popular awareness as the above-mentioned species: *oleander* belongs to the family *Apocyanaceae (toješťovité)*, *croton* to the family *Euphorbiaceae (pryščovité)*, and *Rose-of-Sharon* to the *Malvales (slézokvěté)*.

On the other hand, the reverse situation applies to a large number of herbs, trees, shrubs, animals, fungi, algae, etc. where generic or hypernymous names in the broadest sense are used (informally) for numerous referents about whose exact names ordinary people are completely ignorant: *hmyz (insect), brouk (bug/beetle), javor (maple), túje (Arborvitae), kytka (flower), housenka (caterpillar), pták (bird),* etc. All of these and similar general naming units are used to refer to entities which are well-described and equipped with names for individual genera and species in appropriate nomenclatures, but once the general public are not capable of distinguishing the individual species in the real world, it makes no sense for them to know and use the rich and precise terminology appropriately.

There are also naming units in natural hierarchies which can be used at different levels in such hierarchies, with different degrees of abstraction. In the classification of birds, *finch* is defined as any of several hundred species of small songbirds with a short wide pointed beak, classified in several families, including the *bunting (strnad), canary (kanár), cardinal (kardinál), bullfinch (hýl), chaffinch (pěnkava), crossbill (křivonoska/křivka), Darwin's (Galápagos) finch, goldfinch, grass finch, grosbeak, sparrow*, and *weaver.* Some of the species, as shown above, include the term *finch* as part of the compound, whether one-word (solid) or two-word (open). Others (*bunting, canary, grossbeak, sparrow*) make no reference to their hypernymous term *finch*, but the hypernym is not part of the zoological taxonomy in any way. It is not an official taxonomic term, and its hyponyms, i.e. genera and species of birds which are referred to as *finches*, are classified into several distinct families.

A similar example is provided by the *dog* family (*Canidae*), which includes *the wolf, hyena, jackal, fox,* as well as individual dog breeds such as *Alsatian (German shepherd), poodle, labrador (retriever), greyhound, spaniel, bulldog, dachshund, terrier, collie*, etc. Just a few of the breeds of *dog* in the narrow sense are labelled with the lexical base *dog* or *h(o)und*. *Dog* in the broader sense then is the general term for several genera of carnivores belonging to the family. *Dog* is an exceptional case in any way: these are life forms that typically differ from folk genera by being polytypic, but *dogs* clearly come in many different kinds too. *Dog* is certainly not on a par with *animal*, *bird* and *fish* (Wierzbicka 1996: 365). Dog is thought of as "a kind of animal". Wierzbicka observes that "…linguistic evidence shows that primary lexemes such as *spaniel* or *poodle* belong to a special level lower than that of folk genera, though higher than that of specific taxa, normally represented by secondary lexemes, such as *Siamese cat* or *blue spruce*." (1996: 365) She suggests calling this level subgeneric (Wierzbicka 1985[57]: 232-6, qtd in Wierzbicka 1996: 365) and adds that it is found in taxa of particular cultural importance.

57 A, Wierzbicka, *Lexicography and Conceptual Analysis* (Ann Arbor: Karoma, 1985).

Unlike in *dogs*, a bigger gap is reflected in *finches* between scientific and folk taxonomy, since *finch* is not a generic term zoologically. However, the extensive reference of *finch* can be explained by a popular interest in such songbirds and thus their cultural importance as well. Wierzbicka concludes:

> …not all biological categories thought of as coming in many named kinds are life forms. If a biological category comes in many named kinds but is treated linguistically (e.g. in conjoined phrases) as being on the same level as folk genera (that is, as categories which do not come in many named kinds) then it is not a life form but a (rather exceptional and culturally salient) folk genus subdivided into named subgenera. (1996: 365–366)

6 | 1 | 2 Polysemy of vernacular generic names

The existence of **English terms or synonyms to terms** (coined more explicitly) **which use words in the head position that are also used by other, unrelated terms** is a feature which **distinguishes taxonomies based on natural hierachies** of physical entities **from those based on systems of abstract concepts**. Taking an example from botany, *cedar* should properly refer to evergreen coniferous trees of the genus *Cedrus* in the *pine* family.[58] The *´true´ cedars* only include four species, the *Atlas cedar (Cedrus atlantica, cedr atlaský)*, the *Cyprus cedar (Cedrus brevifolia, cedr krátkolistý)*, the *deodar (Cedrus deodara, cedr himalájský)*, and the *cedar of Lebanon (Cedrus Libani, cedr libanonský)*. However, many other conifers are also referred to as *cedars*, e.g. some *junipers (*e.g. *Eastern red cedar, Juniperus virginiana), Arborvitae (Eastern/Northern white cedar, Thuja occidentalis, zerav západní)*, *incense cedar (Calocedrus decurrens, pazerav sbíhavý)*, *Tasmanian cedar* (*Athrotaxis*), *Japanese cedar* (*Cryptomeria japonica, kryptomerie japonská*), *cigar-box cedar (Cedrela odorata,* in the *mahogany* family), *African cypress* (e.g. *Cape cedar, Widdringtonia juniperoides*), *Chilean cedar (Austrocedrus chilensis)*. They have cedar-like properties, i.e. they are evergreen conifers (with the exception of the *cigar-box cedar* which is a leafy tree) with aromatic, red or reddish wood, which is light, soft, and often very durable and insect-repellent. They are called *cedar*, although they are not taxonomically part of the genus *Cedrus* and some of them do not even belong to the *pine* family (*juniper*, *African cypress*, *Chilean cedar*, *incense cedar* and *arborvitae* belong to the *cypress* family).

Because *cedar* wood was so highly appreciated, the term *cedar* is used in an even broader way for partly similar hardwood and softwood: the term *white cedar* refers in the lumber trade to the *arborvitae* from North America, some species of *false cypress* (genus *Chamaecyparis*) and *McNab cypress*, *incense cedar* and *California juniper* (all of these belong to the *Cypress* family). *White cedar* is even used for nonconiferous trees, including the *chinaberry* (*Melia azedarach*, in the *mahogany* family) and some members of the families *Bignoniaceae* (*trumpet creepers*), *Celastraceae* (*staff trees*), *Myristicaceae* (*nutmegs*), *Burseraceae*, and *Dipterocarpaceae*. In strictly botanical terms, however, *white cedar* is *Cha-*

58 *Cf.* Fig. 4.15 and the commentary above it in Chapter 4.5.2.

maecyparis thyoides (i.e. member of the *Cypress* family, not the *Pine* family) (*Britannica Concise Encyclopedia* 2002: 2006).

Similarly, the use of the otherwise generic names ***ivy*** and ***oak*** would lead to confusion if they were understood as taxonomic terms. *Poison ivy* is either of two species of the *sumac,* or *cashew*, family, which is native to North America. The species found in western North America is known as *poison oak (Toxicodendron diversilobum)*. With a more abundant species from eastern North America the two species of *poison oak* are classified in either of two **genera, *Toxicodendron* or *Rhus***. *Poison ivy* has nothing in common with *ivy* (genus *Hedera*, family *Araliaceae, aralkovité*), e.g. *common ivy (Hedera helix)* and *Persian ivy (Hedera colchica)*. Nor has *poison oak* any relation to an *oak,* the tree of the genus *Quercus*, itself belonging to the *beech* family. *Oak* and *ivy* are simply such prototypical concepts that they are used for formation of terms denoting unrelated concepts which, however, share some features or bring to mind *oaks* and *ivy* in some other way.

The word ***chestnut***, extended from the fruit of some trees, is used in the names of *sweet chestnut (Castanea sativa, kaštanovník jedlý)*, belonging to the ***beech* family** (*Fagaceae, bukovité*), as well as in the name of *horse chestnut*, classed as a member of the ***horse chestnut* family** (*Hippocastanaceae, jírovcovité*). The *common horse chestnut (Aesculus hippocastanum, jírovec maďal / "koňský kaštan")* and *sweet chestnut* thus deceive ordinary language users, for these two plants are unrelated and taxonomically distant.

Such degree of similarity is unlikely to become a basis for naming in taxonomies created or established rather by professional users of the language, such as in the economic disciplines. The names of taxons with common occurrence had been established in vernacular languages long before any scientific taxonomies based on flower morphology, genetic analysis or other criteria were formed. The frequent inconsistency in the names of biological taxons in English may be explained by the principle that commonly-found **concrete-based taxons had their common names before they were classified scientifically**. The common names could not respect any other criteria of the later scientific classification except the obvious resemblance of taxons, which is why similarity on the grounds of some clearly visible physical marks often led to incorrect conclusions. Traditional names were later largely incorporated into the scientific nomenclatures, with **English relying more heavily on parallel and more exact Latin terms** and **Czech rather forming and establishing in use unambiguous domestic scientific nomenclatures**. Thus, the lexical material of natural (or concrete-based) hierarchies is often more ambiguous and inconsistent than that of abstract-based hierarchies, despite the truly scientific structure of taxonomies in the former type.

6 | 1 | 3 Other social hierarchies: military ranks

I have already noted that while two areas of activity and study may be identified generally, viz. the natural sciences (represented mostly by concrete-based lexical hierarchies) and social sciences (with mostly abstract-based lexical hierarchies), finding representative specimens of these two for a comprehensive analysis is not that easy. Whereas the former

type of sciences is quite aptly represented by biological disciplines, **social sciences** lack such an obviously suitable representative. The essential requirement for this work dealing with lexical hierarchies is that the semantic/lexical field is well-structured and segmented in the form of **a hierarchical system of concepts and corresponding terms**. This is why I chose accounting and finance: partly because of my professional involvement in the discipline, and also because it has a hierarchical organisation of concepts and terms.

However, as I realised that the variety of disciplines which may be included in social sciences is large, I searched for another well-structured lexical system related to social sciences and society, in order to use it as **a test sample** proving the observations and analyses of accounting hierarchies. Systems of layers in an organised society appeared to be a convenient example and **military ranks** were chosen for further analysis because they form a **strictly and clearly defined non-branching hierarchy**. Although military ranks do not form a real taxonomy comparable with those in accounting, analysing their hierarchy cast light on their common features.

Grade	Army	Marines
E1	Private	Private
E2	Private	Private 1st Class
E3	Private 1st Class	Lance Corporal
E4	Corporal / Specialist 4	Corporal
E5	Sergeant	Sergeant
E6	Staff Sergeant	Staff Sergeant
E7	Sergeant 1st Class	Gunnery Sergeant
E8	1st/Master Sergeant	1st/Master Sergeant
E9	Sergeant Major	Sgt Major/Mgy Sergeant
W1	Warrant Officer	Warrant Officer
W234	Chief Warrant Officer	Chief Warrant Officer
O1	2nd Lieutenant	2nd Lieutenant
O2	1st Lieutenant	1st Lieutenant
O3	Captain	Captain
O4	Major	Major
O5	Lieutenant Colonel	Lieutenant Colonel
O6	Colonel	Colonel
O7	Brigadier General *	Brigadier General *
O8	Major General **	Major General **
O9	Lieutenant General ***	Lieutenant General ***
O10	General ****	General ****
O11	General of Army *****	n/a

Grade	Air Force	Navy
E1	Airman Basic	Seaman Recruit
E2	Airman	Seaman Apprentice
E3	Airman 1st Class	Seaman
E4	Senior Airman	Petty Officer 3rd Class
E5	Staff Sergeant	Petty Officer 2nd Class
E6	Technical Sergeant	Petty Officer 1st Class
E7	Master Sergeant	Chief Petty Officer
E8	Senior Master Sergeant	Sr Chief Petty Officer

Grade	Air Force	Navy
E9	Chief Master Sergeant	Master Chief Petty Officer
W1	Warrant Officer	Warrant Officer
W234	Chief Warrant Officer	Chief Warrant Officer
O1	2nd Lieutenant	Ensign
O2	1st Lieutenant	Lieutenant Jr. Grade
O3	Captain	Lieutenant
O4	Major	Lieutenant Commander
O5	Lieutenant Colonel	Commander
O6	Colonel	Captain
O7	Brigadier General *	Rear Admiral (Lower Half)*
O8	Major General **	Rear Admiral (Upper Half) **
O9	Lieutenant General ***	Vice Admiral ***
O10	General ****	Admiral ****
O11	General of the Air Force *****	Fleet Admiral *****

Figure 6.1. Military ranks for the Army, Navy, Air Force, and Marines in the US armed forces.

Source: MI Stupid.com, retrieved from [http://www.mistupid.com/military/] in August 2005, and D. Crystal (1995: 168).

The military ranks form a non-branching hierarchy; and although some nodes in taxonomy can be recognised as taxons to which several subordinate ranks belong, these ranks **do not really form sister categories** because they are not equal, i.e. they are not at the same level in the hierarchy. As two ranks cannot be identical, the directional vertical character of military hierarchy makes it distinct from the family-tree types of branching hierarchies known e.g. from biology. However, in order to compare two artificial lexical hierarchies necessitated by **the functioning of society** rather than by description of the objective reality, this system of ranks may be compared with accounting nomenclatures (*cf*. Chapter 4.4), and these two be contrasted with biological hierarchies.

As the military hierarchy is not branching, the data concerning the average number of subordinates in a class of taxons are not applicable; instead, an individual figure is always provided for each group of ranks (i.e. a part of the ranks). **The average number of ranks in such a group is about 6 (25/4 = 6.25).** This wholly corresponds to the ***Chart of Accounts*** **where the average number of subordinate members of classes at individual levels ranged from 4.6 (5.1) to 8,** the **average** calculated from **averages** for individual levels being 6.6 or 6.8 (after excluding *Class 7—Subledger accounts*, which is not broken down appropriately).

Table 6.1. Military ranks—number of members in groups and length of terms. (The groups here are **not** genuine superordinates and subordinates such as levels in a taxonomy, but sets of ranks defined directionally within each group.)

Group	Army			Navy		
	Name of group	Number of members	Words per term	Name of group	Number of members	Words per term
1	Commissioned officers	11	1.7	Commissioned officers	11	1.6
2	Warrant Officers	5*	2.8	Warrant Officers	5*	2.8
3	Non-Commissioned Officers	5 (6)**	2	Non-Commissioned Officers	5 (6)	3.8
4	Enlisted Personnel	4	1.5	Enlisted Personnel	4	2.3
Total		**25 (26)**	49/25 = **1.96 = 2**		**25 (26)**	60/25 = **2.4**

* Unlike the Air Force and the Marines, warrant officers in the Army and the Navy distinguish the 5th, topmost rank: *Master Warrant Officer* (not included in the tables above).

** Depending on whether *Corporal* is or is not regarded as a non-commissioned officer.

The total **sizes of hierarchy** (28 to 31.6 terms in accounting, 25 or 26 in military ranks), are also very similar, although the average **length of a term** is longer in accounting nomenclatures (3.3, compared with 2.0 in the US Army and 2.4 in the US Navy). In the ***Chart of Accounts*** (organised according to the Czech list of accounts termed *Účtová osnova*), only **4 levels** can be distinguished. A class of accounts (level 2) is divided into 7.1 groups on average, and the 57 groups have 264 accounts altogether, i.e. **4.6 accounts per group**. **3 levels** can be established in the **hierarchy of military ranks**, although it is qualitatively different from taxonomies. Neither the positions of groups at level 2, nor those of individual ranks which belong to them, are interchangeable; their order is fixed. However, the **average number of ranks in groups is about 6.5** and there are **4 groups** of ranks, which are figures quite similar to those presented above for the *Chart of Accounts* and the financial statements. Such low numbers of levels and their members seem to be typical of abstract-based hierarchies related to social sciences and needs, symptomatic of the dictum about natural (folk) taxonomies (cf. Chapter 2.1).

Military ranks are, nevertheless, quite similar to scientific biological and accounting hierarchies in that they are artificial, particularly at the superordinate levels. A problem arises in classifications of tangible man-made entities, referred to as **artefacts**. Semanticians and psychologists of language often mention some cognitive indeterminacy, the "fuzziness" of their superordinate levels (corresponding to the rank of "life forms". Wierzbicka asserts: "The 'fuzziness' of artefactual supercategories is explained, I believe, by the fact that they are not taxonomic. Biological supercategories such as *tree* or *bird* are not 'fuzzy' not because they imply some 'hidden nature' but because they stand for 'kinds of things' ('superkinds') rather than for heterogeneous collections, groups, and so on." (1996: 373)

As there exist "natural kind" terms (Lyons 1977: 76), Lyons coined the term "**cultural kind**" (ibid.: 94) for such artefacts. He admits that the meaning of both can

be derived from semantic prototypes. At the generic level, cultural kinds differ from folk genera of natural kind things which are thought to contain some "hidden nature" or an "underlying essence" that is in the minds of speakers and cannot be defined by a finite set of attributes (Wierzbicka 1996: 367). Quoting Berlin (1981: 96) and Hunn (1976: 518)[59], Wierzbicka uses description of folk genera as "holistic indefinable 'gestalts, whereas life forms can be defined by means of a few abstract features' " (1996: 367). She extends this holistic quality to life forms, implying thus global gestalts of a *tree*, a *bird*, etc. (ibid.: 366), but doubts if this can be applied to "cultural kind things".

Brown (1990: 38, quoted in Wierzbicka 1996: 366) claims that "we may well have unitary gestalts for 'cultural kinds' too, whether relatively simple ones such as *bottle* or *jug* or relatively complex ones such as *bicycle* or *car*". However, Wierzbicka refers to Lyons (1977), who stressed also the importance of the form, not only the function in defining artefacts such as a *bottle* or a *bicycle* (ibid.: 373), and adds: "It is only artefactual supercategories (such as *toy*, *weapon*, or *vehicle*) which are defined purely in terms of their functions—and these categories can indeed be 'fuzzy' (in their range of reference)." (Ibid.: 373)

Defining "cultural kind" concepts can thus be based on sets of discrete properties and absence of "hidden essences", but this book, except for this short remark concerning abstract social concepts, will not deal with hierarchies of artefacts.

6 | 2 Term-formation—its sources, means and processes

Hypothetically, **higher levels in taxonymies should be expected to make more frequent use of international roots and affixes**, as it may be assumed that such semantically superordinate lexical units were created later in the development of a language and, particularly in the English language, inspiration for the formation of more abstract terms by classical languages has always been strong. This also implies, conversely, that **lower levels, i.e. naming units for concrete (individual) items, must rely more on the domestic lexical material** and that their semantics is **more periphrastic and descriptive**, possibly using composition rather than derivation by mostly abstract affixes.

Another hypothesis which needs to be proven or rejected is that **meronymies tend to use opaque lexemes or compounds** consisting of opaque words, whereas **taxonymies are rather** made up of **derivations** revealing the relationships within lexical hierarchies through the use of **prefixes and suffixes**. This is easy to prove e.g. in botanical or zoological taxonomies, for whose levels specific suffixes have been standardised, but certainly more difficult in less systematically-built and/or naturally-evolved taxonomies in some other spheres, namely in social sciences.

Many lexical hierarchies of material world items, however, do not apply to the resources of a living or natural language; they sometimes resort to dead languages with

59 E.S. Hunn, Toward a Perceptual Model of Folk Biological Classification, *American Ethnologist*, *3*/3, 508–524.

rich morphology, such as Latin and classical Greek, and sometimes to purely **symbolic systems of letters, numbers and their combinations**. The reasons may be intentional efforts:

- to use **a system with no misleading connotations** of concepts found under the same or similar names in terminologies related to different areas, which would inevitably be the case if lexical units from natural languages were used or adapted (polysemy, meaning reflected from similar words, etc.);
- to create a system which is **used exclusively to name and classify concepts in a given field** of human activity or knowledge. This is connected with the freedom to choose or create arbitrarily such a classificatory system and terms which suit the conceptual needs in the given area, rather than adapting the objective relations in the given area to the capacities of a naming system;
- to create as **unambiguously hierarchised a system** as possible. Abstract symbolic systems allow the individual levels to be marked in a hierarchy more clearly and consistently than items adapted from natural language (although this effect can be achieved by systematic use of derivational prefixes or suffixes at some levels, such as in biological taxonomies). The particular drawback are hardly any links with a common language, which results in unintelligibility of the terms for non-specialists;
- to allow a truly **worldwide use of taxonomies** based on purely abstract symbolic systems or terminologies adapting the lexical and morphological stock of classical languages **and their intelligibility and reliability** within the relevant professional communities. Another important feature is openness to the necessary addition of new terms as knowledge advances; such systems are not rigid and respect for the rules of term-formation enables their consistent and transparent character to be maintained even though they may expand considerably.

An example of taxonomy using **purely symbolic systems** to show levels and properties of their items is the **taxonomy of supernovae** (abbreviated as SN).[60] The classification of supernovae into individual classes and types is based on their observed properties, and reference to scientific authorities who have classified them in the given way must be made, as well as alternative classifications or doubtful properties providing reasons for classifying the supernovae in another way.

A taxonomy flow chart uses the criterion of presence of hydrogen in the ejecta of supernovae, i.e., by using this criterion to make a broad division, SN I show no hydrogen lines in their early spectra, whereas SN II show hydrogen in their early spectra. Lower-case letters denote subclasses determined by spectral evidence, i.e. Ia, Ib, Ic, IIb, and IIn. Subclasses determined by certain properties of the (usually) *B* or *V* light curves are denoted by upper-case letters, such as IIP and IIL.

60 According to M. Montes, *A Supernovae Taxonomy Flow Chart*, available at [http://rsd-www.nrl.navy.mil/7212/montes/snetax.html].

Other differences relevant for classification, besides hydrogen present in the ejecta; are the amount of hydrogen present in the envelope of supernovae, spectroscopical difference, light curves (as opposed to spectra), radio emission as an indicator of the presence of circumstellar medium, and X-ray emission.

Supernovae are then classified by these criteria with the use of **upper- and lower-case letters and the year of detection** with another distinguishing letter, e.g. SNe 1978K, 1981K, 1986J. Examples of SN IIn are SNe 1988Z, 1994W, of IIL 1980K, 1979C, examples of the nearby objects detected in x-rays 1987A, 1993J, etc.

The various criteria applied to the classification of supernovae are often fuzzy, overlapping and based on hypotheses:

> Observations imply that SNe II, Ib, and Ic arise from stars that are young, and were initially very massive. These supernovae are believed to form when their core collapses, that is, when nuclear burning cannot produce any more energy. Spectra and numerical models of SNe Ib & SNe Ic imply they have have lost much or all of their hydrogen envelopes; SNe Ic may also have lost much of their helium envelopes.
> SNe Ia are believed to arise from accretion onto a white dwarf (a very old, dense, relatively low mass star that is not undergoing thermonuclear reactions in its core), although the exact population has yet to be identified. In this case, a detonation (supersonic burning front) or a deflagration (subsonic burning front) probably occurs when it has accreted enough matter (the exact amount depends on the particular situation).
>
> (M. Montes, *A Supernovae Taxonomy Flow Chart*)

The **overlapping criteria and unproven properties** lead to **frequent reclassifications** as the knowledge advances or as different approaches prevail:

> SN IIn were introduced in Schlegel (1990). Members of the class typically have absent (or weak) H-alpha absorption, and narrow H-alpha emission on a broad base. Several members of this class have been observed in radio and X-Ray. Some recent ideas on the diversity of SN IIn are presented in Cumming & Lundqvist (1997). Some supernova classified as Zwicky's SN III, IV, and V were probably IIn. Some IIn (SN 1986J, SN 1978K) have been called SN V in the past.
> For the curious, SN 1961I was listed as an SN III; SN 1961F is the prototype of Zwicky's SN IV; and SN 1961V was for quite some time the sole member of Zwicky's SN V (Zwicky 1964). (For a more recent discussion SN V, see Ball 1993.) SN V are a weird case, and many believe that SN 1961V was actually the outburst of a Luminous Blue Variable. For the latest on SN 1961V, see Stockdale et al (2001) and Filippenko et al (1995). SN III and SN IV have been reclassified as various SN IIpec (Doggett & Branch, 1985; Patat et al, 1993).
>
> (M. Montes, *A Supernovae Taxonomy Flow Chart*)

Another nomenclature using other means than live vernacular language can easily be found in natural sciences. A nomenclature based completely on the **word-stock of classical languages**, namely Latin, may be exemplified by the **taxonomy of *bacteria***. The following example includes the divison of bacteria into basic types (descriptive expressions

are used here), then the family *Enterobacteriaceae* belonging to one of the types is used as an example, one of its genera (mixing Latin descriptive names with terms named for renowned scientists) being the notorious *Salmonella*.

- Gram-positive
  - aerobic cocci
  - aerobic bacilli
- **Gram-negative**
  - aerobic cocci
  - **enteric bacteria (*Enterobacteriaceae*)**
  - gram(-) pleomorphic bacteria
  - miscellaneous gram(-) rods
  - non-fermenters
- Anaerobes
  - gram positive anaerobes
  - gram negative anaerobes

Enterobacteriaceae—their genera are:

- *Escherichia coli*
- *Shigella*
- *Edwardsiella*
- ***Salmonella***
- *Citrobacter*
- *Klebsiella*
- *Enterobacter*
- *Serratia*
- *Proteus*
- *Morganella*
- *Providencia*
- *Yersinia*

Figure 6.2. Taxonomy based purely on Latin (classical) word-stock: taxonomy of bacteria.

The genus of ***Salmonella*** bacteria itself has about 2,200 known species, classified according to their surface antigens. They are e.g. *Salmonella typhimurium, Salmonella enteritidis* (the two leading causes of salmonellosis), *Salmonella typhi* (the cause of typhoid fever (enteric fever)).

Apart from the above-presented extreme term-formation types in scientific nomenclatures, **formation of terms in English nomenclatures** relating to **hierarchies of concrete, physical entities**, i.e. those based on the material world, are characterised by applying several notable processes or techniques:

A. A **compound (solid, one-word) noun** is created by incorporating another noun or an adjective as its first element. There are two basic types:

A.a. An **identical initial base** of the compound leads to the formation of terms usually used for **unrelated entities**. The **head** base is the **final base** in the compound and this base mostly refers to what the entity is (although this can be quite a general word or a word used metaphorically). The initial base merely modifies it, refers to its specific feature, and distinguishes it from terms referring to similar entities. E.g. *bull* as the initial element may be part of the name of a fish, as well as of an amphibian, some species of birds, or a breed of dog:
bull-trout (pstruh obecný / pstruh lososový)
bullfrog (skokan volský / žába volská)
bullfinch (hýl obecný)
bull-of-the-bog (bukač)
bulldog (buldok)

A similar variety of denotates—plants, birds or insects—can be observed when the modifying component in a compound is an adjective of colour, e.g. *black*. The component denoting the type of organism is the final one. Because sometimes genera, rather than their individual species, are marked by a solid compound, the **formal distinction between the levels in taxonomies referred to by solid (one-word) and open (two-word) compounds is not at all clear-cut** (see below). In some cases the spelling norm allows both forms, and the issue is even more blurred by hyphenated compounds:
blackberry (ostružiník)
blackgrass (psárka polní)
blackthorn (trnka)
black-rot (černá hniloba)
blackbird (kos / AmE vlhovec červenokřídlý)
blackcap (černohlávek / pěnice černohlavá)
blackcock (tetřívek)
blackfish (kulohlavec černý)
blackfly (muchnička/mšice)
blackhead ((polák) kaholka)

The same metaphor or simile is often used for naming several species of the same type, unlike such bases as *black(-), red(-), blue(-), common, Japanese, sea, great* or *little*, which are (also) quite universal. All the following examples are herbs; the relatively specialised modifier *bishop-* refers to similarity in shape to some parts of a bishop's garment:
bishop-hat (škornice alpská)
bishop-leaves (krtičník křídlatý)
bishop's-cap (Mitella diphylla, a plant from the family Saxifragaceae (lomikamenovité))
bishop('s) weed (bršlice kozí noha)

A.b. An **identical final base** of the compound is mostly used in terminological units referring to **representatives of the same rank**, usually diferrent genera within the

same family. The final base mostly refers to what the entity is, using quite a general word. *E.g. -berry* is used for terminological units referring to different, related as well as unrelated, plants, bushes and trees, characterised by their small and round fruit, i.e. berries:
barberry (Berberis sp., dřišťál)
bilberry (Vaccinium myrtillus, borůvka)
blueberry (Vaccinium australe, brusnice/brusinka/borůvka)
blackberry (Rubus fruticosus, ostružiník keřovitý/obecný)
black raspberry (Rubus occidentalis)
(Rubus deliciosus, ostružiník chutný)
(Rubus spectabilis, ostružiník skvělý)
(Rubus odoratus, ostružiník vonný)
chinaberry / also China tree / bead tree / Persian lilac (Melia azedarach, melie šeříková)
creeping snowberry (Gaultheria sp., heath family)
cranberry (Vaccinium macrocarpon, klikva žoravina)
European blueberry (Vaccinium myrtillus, borůvka)
small-fruited/northern cranberry (Vaccinium oxycoccus, klikva obecná)
(American) cranberry (Vaccinium macrocarpon)
gooseberry (Grossularia or Ribes)
highbush blueberry (Vaccinium corymbosum)
loganberry/bramble (Rubus loganobaccus)
mulberry (Morus sp., morušovník)
pokeweed / pokeberry / poke (Phytolacca americana)
raspberry (Rubus idaeus)
silverberry / buffalo berry (Shepherdia argentea)
snowberry (Symphoricarpos albus, pámelník bílý)
strawberry (Fragaria x ananassa)
teaberry / checkerberry / wintergreen (Gaultheria procumbens)
whortleberry (Vaccinium myrtillus, borůvka)

However, not all terms ending in *-berry* refer to both plants and their fruit; some are only used for fruit of the berry type: the small bright red fruit of the *rowan* is called *rowanberry*; the *elderberry* tree or bush is sometimes referred to as *elder* only. Moreover, not all fruits called *berries* are true *berries*: aggregate fruits such as the *raspberry* and *blackberry* are composed of many small *drupes* clumped together. Similarly, not all fruit called *nuts* are true nuts—e.g. *coconut* and *walnut* are not nuts, they are drupes (i.e. like *peaches*, *cherries*, *olives*, etc.). What seems to be a nut is a pit or stone containing a seed, surrounded by a fleshy (e.g. in a *cherry*), tough (*almond*), or fibrous (*coconut*) middle layer, and an outer layer, the skin.

B. An **open (two-word) compound** is formed by combining an adjective or an adjunct noun in the initial position with the head noun which follows. The first word helps to distinguish between similar sorts (e.g. species, genera) of the entity. E.g. the adjective

black may be used to name species of insects, mammals, birds, fish, herbs, as well as trees, denoting some dark (not necessarily ´black´) property which distinguishes them from other species within their relevant genera:
black bean (Phaseolus sp.)
black cherry (černá třešeň srdcovka)
black currant (meruzalka černá / černý rybíz)
black heart/cherry ((brusnice) borůvka)
black locust (Robinia pseudoacacia, trnovník akát)
black spruce (Picea mariana, smrk černý)

black bear (Ursus americanus, medvěd černý)
black game / blackgame (tetřívek)
black kite (luňák hnědý)
black snake (any black snake, esp. Coluber constrictor)
black swan (labuť černá)
black tern (Chilidonias nigra L.)
black widow (Latrodectus mactans, černá vdova)

As mentioned previously, the second word in a terminological compound in English does not necessarily have to refer to the same genera, family, etc. The **term functions as a whole**, so the meaning is elicited by a combination of both bases—unlike in Czech and Latin, where the head noun (in the initial position) has a strictly generic meaning. Any naming in English motivated by physical similarity of taxons or by a more complicated metaphorical shift may then result in confusion if the head base is conceived too literally (see compounds including the words *cedar*, *pine*, *yew*, *ivy*, *oak*, etc. in Chapters 4.5.2 and 6.4.1), e.g.:
common elder (Sambucus nigra, bez černý)
American/sweet elder (*Sambucus canadensis*)
red elder (Sambucus racemosa, bez hroznatý)
but *boxelder (Acer negundo, javor jasanolistý)*

Lexical hierarchies of **military ranks** (see Fig. 5.1) consist of approximately two dozen expressions for ranks in each type of armed forces. Lexical items of three basic types can be distinguished:
A. One-word and unmotivated lexemes (at least in English): *Private* (*/ Airman / Seaman*), *Corporal, Sergeant, Lieutenant, Captain, Major, Colonel, General*. Such lexemes make up the core of the terminology of military ranks, they are the oldest expressions used in this field, and their relative position on the scale is obvious to anyone who is at least a little familiar with the army.
B. Two-word (usually) **combinations of** the above-quoted **core lexemes with**

B.a. cardinal or ordinal numerals: *Private 1st Class, Sergeant 1st Class, 2nd Lieutenant, 1st Lieutenant*. There is a substantial inconsistency which may confuse a language

user so far unfamilar with the positions of these ranks in the hierarchy: *Private 1st Class* and *Airman 1st Class* stand above *Private* and *Airman*, but *1st Lieutenant* is a higher rank than *2nd Lieutenant*. Analogy between "0" (class not expressed) and "1st" in the category of enlisted personnel cannot be applied to commissioned officers, where a higher number indicates a subordinated rank, not the contrary. On the other hand, warrant officers rise in the hierarchy the higher number they have: *Warrant Officer 1* is the lowest rank, *Warrant Officer 4* the second highest, the top rank being a three-word compound with a numeral: *Master Warrant Officer 5*.

B.b. adjectives or nouns expressing **subordination or superiority**: *Staff Sergeant* stands above *Sergeant* in the Army, *Chief Warrant Officer* is superior to *Warrant Officer*, and *Lieutenant Commander* in the Navy stands above *Lieutenant*, who stands above *Lieutenant Junior Grade*. This hierarchy becomes less transparent with the use of modifiers which do not directly express relative position: *Technical Sergeant* is situated between *Staff Sergeant* and *Master Sergeant* in the Air Force, but the attribute *Technical* does not necessarily suggest the position. Another problem arises when two words with a similar, e.g. superlative meaning are used as modifiers: *Master Chief Petty Officer* in the Navy stands above *Senior Chief Petty Officer*, which again is superior to *Chief Petty Officer*. *Master* and *Senior* do not imply their relative position well enough. Similarly, in the Air Force, *Master Sergeant* is subordinated to *Senior Master Sergeant*, who is subordinated to *Chief Master Sergeant*, all of them being different ranks of *First Sergeant*.

C. Two-word (usually) **combinations of the words referring to the existing core ranks:** *Lieutenant Colonel, Brigadier General, Major General, Lieutenant General*. Such combinations are less transparent than the preceding ones: why is *Lieutenant General* a higher rank than *Major General* when *Lieutenant* is a lower rank than *Major*? What indicates the ranking of *Brigadier General*? Is *Sergeant Major* a rank belonging to the class of *Major*s (analogously to *Major General* where the second noun refers to the category)? It is not, as *Sergeant Major* is a non-commissioned officer above *1st* or *Master Sergeant*, below *Warrant Officer*, whereas *Major* is a commissioned officer. The position of head nouns in such terms may be confusing if they are not used consistently.

6 | 3 Nomenclatures in the vertical perspective

English reveals a tendency to refer to the different levels by the same common noun, identical with the item chosen as the main representative. Czech and Latin may use the same name to form terms to refer to different levels but, for reasons of clarity, they are used just as **roots in derived or compounded terms** which are thus distinguished morphologically by relevant derivational suffixes: e.g. ***rose***—any of about 100 **species** in the **genus *Rosa*** (**family *Rosaceae***). The *Rosa* species are cultivated in hundreds of varieties and hybrids. The ***rose* family** contains about 3,000 species and accounts for 45% of the species in **the *rose* order** (***Rosales***). The *rose* family also includes other garden plants and ornamentals, which are named differently, and as a rule these are old naming units – some borrowed, some compounded from existing bases—but all coined before the genetical

relation of underlying taxons was identified and before they were classified in one family: *spirea, cinquefoil, hawthorn, mountain ash* and *flowering cherry*, and fruits: *apples, peaches, strawberries, pears, plums, apricots, almonds, quinces, blackberries* and *raspberries*.

If a lexical hierarchy contains words commonly used in general language (i.e. natural kind terms and generic level words, see. 3.2.2), existing in general use long before a hierarchy was formalised, there is normally little or no formal indication that certain terms belong to a certain level of the hierarchy or to the hierarchy at all. The terms are usually primary lexemes. **Naturally-grown** hierarchies, therefore, can be said to **consist of formally (morphologically) unrelated lexical items**—e.g. the taxonomic set of genera of plants included in the *rose* family (*Rosaceae*) (see above and in Fig. 3.10) or the meronomic set of parts of the human body (*head, neck, trunk, arm, hand, leg, foot*, etc.).

Contrary to this, lexical hierarchies which were compiled as a result of or for the purposes of scientific research are usually **artificially-formed**, i.e. the person who established the hierarchical relationship between certain properties or entities, had to choose or coin names for them.[61] Logically, the criterion on which such a classification was done is often reflected in the new terms, so that lexical items belonging to the same set or placed at the same level in a classificatory hierarchy can be **recognised by their formal (morphological) properties** (such names are motivated and periphrastic, typically being secondary lexemes). Such indication can be carried out in several ways:

A. The **word relating to the criterion** relevant to the classification **is incorporated in the newly-formed names** of taxons and it is semantically supplemented by combining it with other words. In this way (see above) the result is a **compound term**, usually consisting of two semantic bases: one of these bases may be shared by all taxons at the same level in hierarchy (or at least in a certain branch, at certain levels; this is considerably more frequent e.g. in Latin and Czech than in English).

61 These two different origins of nomenclatures apply even when an identical field of referents is being named: this principle underlies the structural difference in Czech and in English alike, depending on **whether the core or exotic, marginal, rare, numerous taxons are named**, and is the obvious reason for the general difference **between Latin and scientific Czech** nomenclatures on the one side **and the very diverse English** on the other.

Tvary listového okraje
- *peřeno**laločnatý***
- *dlanito**laločnatý***
- *peřeno**klaný***
- *dlanito**klaný***
- *peřeno**dílný***
- *dlanito**dílný***
- *znože**ný***
- *peřeno**sečný***
- *dlanito**sečný***
- *znožen**osečný***
- *lyro**vitý***
- *krac**ovitý***

Figure 6.3. Compound terms in the Czech botanical terminology. (There are a few exceptions which are not compounded, but derived. However, the compounds do not use one, but a small number of typical bases which combine in names of same-level items.)

Source: J. Jelínek & V. Zicháček, *Biologie pro gymnázia* (2004), 73.

Leaf shapes
- *simple*
  - *elliptic (eliptický)*
  - *digitate (dlanitě složený)*
  - *orbicular (okrouhlý)*
  - *panduriform*
  - *lanceolate (kopinatý)*
  - *obovate (obvejčitý)*
  - *rhomboid (kosníkovitý)*
  - *palmately lobed (dlanitě laločnatý)*
  - *deltoid (trojboký/deltovitý)*
  - *linear (trávovitý)*
- *compound*
  - *odd pinnate (lichozpeřený)*
  - *even pinnate (sudozpeřený)*
  - *digitate (dla nitě pětičetný)*
  - *bipinnate (dvakrát sudozpeřený)*
  - *biternate*
  - *trifoliate (trojčetný)*
  - *tripinnate (třikrát zpeřený)*

Figure 6.4. Mostly derived terms in the English botanical terminology (with some compounds based on adapted Latin terms).

Note: Compare the exclusively Czech origin of the terms in Fig. 6.3. above and the completely Latin (and Greek) source of the English terminology below.

Sources: *Visual Encyclopedia* (1996), *136–137*, J. Jelínek & V. Zicháček, *Biologie pro gymnázia* (2004), 73–74. Czech equivalents matched by RV.

Beside its popularity in artificial formation of terms, however, the method of composition has also been a frequent means of **natural, spontaneous word-formation** in general language, particularly in English and German: e.g. *strawberry* (*Fragaria*), *bighorn*

(*Ovis*), *crabgrass* (*Digitaria*), *sea cucumber* (class *Holothurioidea*), *grasshopper* (families *Acrididae* and *Tettigoniidae*), *lionfish* (*Pterois volitans*), etc.

One or both bases in a term may be **degraded semantically** to a mere suffix, which tends to happen to those bases that are repeated in compounds to express exactly the same meaning. These bases usually come from classical languages. The divide between compounds and derived expressions is then blurred (see the lexical suffixes in B.a. below)

Rostliny	– (by requirements of solar energy)	– *sluncobytné / helio**fyty***
		– *helioscio**fyty***
		– *stínobytné / scio**fyty***
	– (by adaptability to temperature)	– *termo**fyty** / teplo**bytné** r.*
		– *psychro**fyty** / chladno**bytné** r.*
		– *kryo**fyty***
	– (by requirement of humidity on location)	– *hydro**fyty***
		– *hygro**fyty***
		– *meso**fyty***
		– *xero**fyty***
	– (by requirements of soil)	– *psamo**fyty*** (growing on sand)
		– *chazmo**fyty***
	– (by requirements of pH of soil)	– *acido**fyty***
		– *neutro**fyty***
		– *alkalo**fyty***
	– (by sensitivity to salt)	– *halo**fyty***

Figure 6.5. The use of Greek- and Latin-based morphemes—words (or bases) degraded to derivational affixes—in the Czech botanical terminology.

Note: Other degraded words with the function of derivational prefixes:
eury- = adaptable to various (ecological) conditions (*eurytermní rostliny*)
steno- = not very adaptable to (ecological) conditions (*stenotermní rostliny*)

Source: J. Jelínek & V. Zicháček, *Biologie pro gymnázia* (2004), 64–66.

B. An **affix** may be used to **derive** the resulting term. The affix is either formal (with no autonomous meaning outside the nomenclature in question; not to be confused with grammatical affixes!), or lexical (semantic, with meaning in itself).

B.a. The **formal affixes** are mostly suffixes added to noun roots. Their semantic role is merely to indicate the level a taxon assumes in hierarchy. It is very useful and practical if a suffix is used consistently for the whole set of items at a certain level in a given nomenclature and, ideally, if the same suffix is not used in a different function in a different nomenclature. E.g. *-aceae* (*-ovité*) consistently indicates families in Latin (Czech) botanical terminologies, *-ales* (*-(o)tvaré*) is a suffix characteristic of orders, etc.

B.b. The **lexical affixes** are typically prefixes added before roots to indicate size, position, temporal properties, etc. of taxons by modification of their roots. Such prefixes have transferable semantic function, i.e. they would convey the same meaning in lexical hierarchies in different areas because their meaning is quite permanent and autonomous. The most frequent prefixes with transparent meaning are *pre-*, *post-*, *super-*, *sub-*, *hyper-*, *hypo-*, *multi-*, *uni-*, *di-*, *tri-*, *bi-*, *mezo-*, *hydro-*, *xero-*, *pseudo-*, *anti-*, etc.).

The **number of taxons within a set** is another criterion distinguishing naturally-grown from artificially-formed nomenclatures, as well as concrete-based from abstract-based ones. In botanical taxonomy, the number of members in individual classes is extremely variable.

One extreme is so-called monotypical classes, e.g. the *division* ***Ginkgophyta (ginkgos, jinany)*** is not branched, and it consists of the only order ***Ginkgoales***. The order has a single family, ***Ginkgoaceae (jinanovité)***, this family has a single genus ***Ginkgo***, and the genus has a single species—***maidenhair tree (jinan dvojlaločný, Gingko biloba)***. The species is then the only living representative of the gymnosperm division *Ginkgophyta.*

Ginkgo is an extreme case, a living relict of the Triassic period. However, are more similarly poor classes exist, e.g. the family *Platanaceae (platanovité)* in the order *Hamamelidales* consists of a sole genus *Platanus*, within which 10 species are recognised.

The opposite extreme are some very numerous classes, such as the *mahogany* family (*Maliaceae*) in the order *Sapindales*, which consists of 51 genera and 575 species, and a very large order *Rosales* with over 6,500 species, of which nearly a half belong to the family *Rosaceae* (about 3,000 species), and a single genus, *Rosa*, composed of about 100 species, and hundreds of varieties and hybrids. The genus *Quercus* (*oak*) in the *beech* family (*Fagaceae*, *bukovité*) of the order *Fagales* (*bukotvaré*) is rich in species, too—it consists of about 450 species. Naturally, the largest families in the kingdom *Plantae* may be found among herbs: the *composite* family (*Asteraceae*, about 25,000 species), *orchids* (*Orchidaceae*, 15–20,000 species in about 1,000 genera) and the legume family (*Fabaceae / Leguminosae*, over 18,000 species in about 650 genera).

Calculation of ratios between **numbers of members at individual levels** (such as I carried out in Chapter 4 for hierarchies in accounting), which would be based on a sample of botanical nomenclature, is virtually impossible, at least above and below a certain level.

A **higher level in a taxonomy** corresponds with **greater abstraction**, which is connected with a higher degree of **uncertainty about the classification** of individual taxons. Thus, e.g. *barberries* (family *Berberidaceae*) are sometimes classified as a member of the *buttercup* order (*Ranunculales*, *pryskyřníkotvaré*), and sometimes a self-standing *barberry* order (*Berberidales*, *dřišťálotvaré*). The count is possible within the well-defined genus *Berberis* (about 500 species), as well as within the family *Berberidaceae*, but not at higher levels because their extent is questionable.

Similar discrepancies, in this case between traditional and more recent classifications, occur at the lowest levels (i.e. levels of genera and species): as the **genus *Prunus*** in the *rose* family (*Rosaceae*) is extremely broad, it is often re-classified and divided into smaller specific genera—e.g. the **genus *Amygdalus*** (***almond***, *mandloň*), the **genus *Padus*** (*střemcha*), the **genus *Cerasus*** (*cherry, třešeň/višeň*), the **genus *Persica*** (***peach***, *broskvoň*), and the **genus *Armenica*** (***apricot***, *meruňka*). This results in—normally undesirable—synonymy among Latin botanical terms:

Prunus dulcis = Amygdalus communis (almond, mandloň obecná)
Prunus persica = Persica vulgaris (pear, broskvoň obecná)
Prunus armeniaca = Armenica vulgaris (apricot, meruňka obecná)
Prunus padus = Padus avium (bird cherry / Mayday tree, střemcha hroznovitá / střemcha obecná)

Analogously, ***apples*** were formerly classified as members of the **genus *Pirus*** (*pear*)—e.g. *Pirus malus*, but nowadays they are either classified as a segregate **genus *Malus*** (e.g. *Malus domestica, jabloň domácí*) in the family *Rosaceae (růžovité)* or in the segregate **family *Malaceae*** *(jabloňovité)*.

The now separate **genus *Sorbus* (*jeřáb*)** was earlier included in the genus *Pirus* (or *Pyrus*) as its mere species:

Sorbus aucuparia = Pirus/Pyrus aucuparia (rowan, jeřáb ptačí / jeřáb obecný)
Sorbus torminalis = Pirus/Pyrus torminalis (břek obecný / jeřáb břek)
(Aichele 1996: 124)

A similar reclassification has recently taken place one level higher, as the *rose* family, which includes garden plants and ornamentals, such as *spirea, cinquefoil, hawthorn, mountain ash*, and *flowering cherry*, and fruits, including *apples, peaches, strawberries, pears, plums, apricots, almonds, quinces, blackberries* and *raspberries*, is sometimes divided into **several families** (i.e. some genera are segregated and conceived as separate taxons at the family level: **family *Malaceae (jabloňovité),* family *Amygdalaceae (mandloňovité),* family *Spiraeaceae (tavolníkovité)***). The above-quoted taxonomic division of the genus *Prunus* and the re-classification of the genera *Malus* and *Amygdalus* and their separation as families are part of this process.

6 | 4 Principles of term-formation at the horizontal level

6 | 4 | 1 Co-hyponyms in biological taxonomies

In scientific taxonomies of biology, co-hyponymous terms tend to be formed in such a way that they include the name of the genus as the head noun in a compound, i.e. in a term of the binomial nomenclature. However, differences in preferred compound structure in the individual European languages lead to considerably **distinct types of compounds**. Thus, the typical structure used in English is {noun/adjective in the attributive position +

head noun, usually as two words, i.e. an open compound, in German it is {adjective + noun}, spelt as two words, or a solid compound composed of two nouns}, the second being the head base, and the Czech nomenclature requires the structure {head noun + adjectival attribute}, e.g. *javor jasanolistý*, or {head noun + noun in the attributive sense}, e.g. *javor mléč*.

A truly scientific terminology should always use the name of the genus to show the horizontal relatedness of co-hyponymous taxons, but sometimes this is not the case, for the following reasons:

A. Inconsistent or faulty classification

E.g. the deciduous species of the genus *Rhododendron* were classified by Linnaeus as a separate genus *Azalea.* Similarly, not all plants known under the name *ivy* are related: *common ivy (Hedera helix)* and *Persian ivy (Hedera colchica)* belong to the family *Aralaceae* (*aralkovité*), whereas *poison ivy* is either of two species of the *sumac*, or *cashew*, family (*Anacardiaceae, ledvinovníkovité*), native to North America. (*Encyclopedia Britannica*: 1478). Both the eastern (*Toxicodendron radicans*) and western North American species (*poison oak, Toxicodendron diversilobum*) are classified in either of two genera, *Toxicodendron* or *Rhus*. *Poison oak* is not a tree of the species *Quercus* (like *ivy*, *pine*, *cedar*, etc., *oak* is a word commonly used for different species).

When a plant was found in different regions of the world in distinct local varieties, some of such varieties were described as independent genera. Only later, after the taxons had been described and named, was the sameness revealed. So *bush cinquefoil* (syn. *shrubby cinquefoil, Potentilla fruticosa / Dasyphora fruticosa, mochnovec křovitý)*, a shrub whose habitat reaches from China to Europe to Northern America, was described as several separate genera, particularly *Potentilla* and *Dasyphora*.

Taxons found in remote parts of the world and similar to two or more well-known genera or species widely found in Europe or the Middle East were particularly prone to misclassification, since botanists classified them together with the most similar domestic genera or species even though the taxons may not fit fully in any of them. Sometimes, if some properties were found to be incompatible with the known species and none of the similarities were convincing enough to sustain such classification, a separate genera or family had to be established to classify the taxons more adequately. The *Japanese quince* (*Chaenomeles*, *kdoulovec*), a beautifully flowering shrub originally from China and Japan, was classified as *apple*, *pear* and *quince* in the past before it was described as a separate genus. (Vermeulen 2004: 123).

B. Respect to the historical and commonly used names in vernacular languages.

A difference from more consistent Latin terminology may appear here. E.g. the genus *Prunus (slivoňovité)* with several hundreds of species traditionally includes *cherries* (e.g.

Prunus avium, třešeň ptačí), *sour cherries* (*Prunus cerasus, višeň*), *peaches (Prunus persica, broskvoň obecná), apricots* (*Prunus armeniaca, meruňka obecná), almonds (Prunus amygdalus; Prunus dulcis, mandloň obecná*), *blackthorns* (*Prunus spinosa, trnka*), *bird cherries* or *Mayday trees* (*Prunus padus, střemcha obecná*), referred to by different names for the genus both in Czech and English, but by the same name, *Prunus*, in the more rigorous Latin terminology. Nevertheless, the broadly conceived genus has recently been reclassified and divided into smaller genera, thus introducing new and dissimilar Latin generic names: *Persica vulgaris* for common *peach*, *Armenica vulgaris* for *apricot*, *Amygdalus communis* for *almond*, *Padus avium* for *Mayday tree*. The attributive adjective (epithet) in the name of the commonest species of *Prunus* is used as a new head noun (having undergone the process of conversion or slight morphological adaptation), followed by a newly chosen adjectival attribute to mark the species.

A contrary situation with similar implications occurs if terminology in a vernacular language uses one term (modified for species) to refer to taxons as if they formed one genus, but the more explicit Latin taxonomy classifies the organisms as belonging to two or more different genera. Limited possibilities of observation and analysis in the past have led to organisms being classified which are similar not only in appearance, but also habitat, feeding habits, etc. as species of the same genus. E.g. *tern* (*rybák*, a small black and white sea bird that has long pointed wings and a divided tail) is used in English zoological terminology to refer both to the genera *Sterna* and *Chilidonias*.

common tern (Sterna hirunda L., rybák obecný)
little tern (Sterna Albifrons Pall*)*
whiskered tern (Chilidonias hybrida Pall*)*
black tern (Chilidonias Nigra L.*)*
Sandwich tern (Sterna Sandvicensis Lat*)*
Caspian tern (Sterna tschegrava L.*)*

In botanical terminology e.g. ***fir*** *(jedle)* does not only refer to some 40 species of coniferous trees that make up the genus *Abies*, in the *Pine* family, e.g. *balsam fir (Abies balsamea), silver fir (Abies alba, jedle bělokorá)*, etc. Many other evergreen conifers, e.g. *Douglas fir (Pseudotsuga menziesii, douglaska tisolistá), hemlock fir (Tsuga heterophylla, jedlovec západoamerický/západní), China fir* (*Cunninghamia lanceolata*), *Eastern hemlock (Tsuga canadensis, jedlovec kanadský / tsuga kanadská)* are also **commonly called *firs***.

Similarly, the noun ***pine*** does not only refer to the trees making up the genus *Pinus* in the *Pine* family, e.g.

pine tree (borovice halabská, Pinus halepensis)
(borovice kanárská, Pinus canariensis)
(borovice černá, Pinus nigra)
Scots pine (borovice lesní / sosna, Pinus sylvestris)
(borovice hvězdovitá, Pinus pinaster)

eastern white pine (borovice vejmutovka/hedvábná, Pinus strobus)
(borovice rumelská, Pinus peuce)
Ponderosa pine (borovice žlutá/těžká, Pinus ponderosa)
(borovice drobnokvětá, Pinus parviflora)
(borovice limba, Pinus cembra)
(borovice himalájská, Pinus wallichiana/chylla/excelsa/griffithii)
(borovice mexická, Pinus ayacahuite)
(borovice čínská, Pinus tabuliformis)
(borovice ohebná, Pinus flexilis)
(borovice pokroucená, Pinus contorta)
(borovice kleč / kosodřevina, Pinus mugo)
(borovice zakrslá, Pinus pumila)
Bishop pine (Pinus muricata)
red pine (Pinus resinosa)
Jack pine (Pinus banksiana)
pitch pine (Pinus rigida)
umbrella pine (Sciadopitys verticillata)

but also to similar coniferous trees **not belonging to the *pine* family** (*Pinaceae*), such as

Dammar pine (*Agathis australis*), *Chile pine* (*Araucaria araucana*), *Norfolk Island pine* (*Araucaria excelsa*), *Parana pine* (*Araucaria angustifolia*), *Bunya pine* (*Araucaria bidwillii*)—all members of the **family *Araucariaceae***;
black cypress pine (*Callitria endlicheri*), *Port Macquarie pine / stringybark* (*Callitris macleayana*), *Murray River pine / white cypress pine* (*Callitris columellaris*), *common cypress pine* (*Callitris preissii*), *Oyster Bay pine* (*Callitris rhomboidea*) - all members of the genus *Callitris* or *cypress pine* in the ***cypress* family** (*Cupressaceae*);
ginger pine / Lawson cypress / Port Orford cedar[62] (*Chamaecyparis lawsoniana, cypřišek Lawsonův*) in the genus *Chamaecyparis* or *false cypress* in the ***cypress* family** (*Cupressaceae*);
peacock pine / Japanese redwood (*Cryptomeria japonica, kryptomerie japonská*) in the genus *Cryptomeria* in the ***cypress* family** (*Cupressaceae*);
Huon pine / Macquarie (*Dacrydium franklinii*) and *New Zealand red pine / Imou pine* (*Dacrydium cupressinum*) in the genus *Dacrydium* in the **family *Podocarpaceae***;
brown pine / plum pine / yellow pine (*Podocarpus elatus*), *black pine / Matai* (*Podocarpus spicatus*), and *white pine / kahikatea* (*Podocarpus dacrydioides*) in the genus *Podocarpus* or *yellowwood* in the **family *Podocarpaceae***;
celery-top pine / Adventure Bay pine (*Phyllocladus asplenifolius*) in the genus *Phyllocladus* in the family *Podocarpaceae*;
umbrella pine (*Sciadopitys verticillata*).

62 Note the confusing effect of synonymy: reference to three distinct type genera or families—*pine*, *cypress* and *cedar*—is used alternatively for the same taxon!

Yews are not only members of the gymnosperm *yew* family (*Taxaceae, tisovité)*, namely the eight species of the genus *Taxus*, e.g. *(English) yew (Taxus baccata, tis obecný červený)*, *(Taxus cuspidata, tis japonský)*, *(Taxus celebica, tis čínský)*, etc., but also trees called *yew* which belong to other families: the *plum-yew* (family *Cephalotaxaceae*), *Prince Albert yew* and *plum-fir yew / plum-fruited yew* (family *Podocarpaceae*). (*Concise Encyclopedia Britannica* 2002: 2047)

Chestnuts are named after their specific nuts; the individual species are distinguished by premodifying adjectives, but what is concealed in their form is the fact that *chestnuts* are taxons belonging to two distinct and unrelated branches in taxonomy: *sweet* or *European chestnut* (*Castanea sativa, kaštanovník jedlý*), *American chestnut* (*Castanea dentata*), *Chinese chestnut* (*Castanea mollissima*) and *Japanese chestnut* (*Castanea crenata*) belong to the genus *Castanea* in the *beech family* (*Fagaceae*), in the order *Fagales* (subclass *Hammamelididae*), whereas the *common* or *European horse chestnut* (*Aesculus hippocastanum, jírovec maďal* or *"koňský" kaštan*) is a member of the *horse-chestnut* family (*Hippocastanaceae, jírovcovité*), in the order *Sapindales* (superorder *Rutanae*, subclass *Rosidae*).

Like in the other instances quoted here, open compounds in English cannot be understood as equivalents of Latin and Czech terms consisting of two names, a generic and a specific one. The single lexeme (made up of the words) *horse chestnut*, as well as e.g. *false cypress, Parana pine* or *white pine*, refers to the taxons at **either generic or specific level**, but always **as a whole**. This means that it makes little sense to classify them by analysing out the words *chestnut*, *cypress*, or *pine*, since they refer to different taxons when used in isolation.

To provide the last botanical example, ***elder*** is not always a shrub of the genus *Sambucus*, such as the *common elder (Sambucus nigra, bez černý)*, *American/sweet elder* (*Sambucus canadensis*), and *red elder (Sambucus racemosa, bez hroznatý)*. The compound word *boxelder* which includes the component *-elder (Acer negundo, javor jasanolistý)* refers to a species of *maple*.

C. Existence of alternative words, i.e. synonyms, figurative or descriptive namings, etc.

Despite the theoretical assumption that no true and well-built scientific terminology should contain synonyms, i.e. two or more scientific names that are spelled differently but refer to the same organism, instances of synonymous terms are not rare. They may even be found in the Latin scientific nomenclature. E.g. *Apiomorpha nux* Fuller (1896) and *Apiomorpha pharetrata* Scharder (1863) are terms used for the same species of eriococcid, i.e. they are synonymous. An ornamental species of pine originally found in Afghanistan and Himalaya has four (!) synonymous Latin terminological names: *Pinus wallichiana / Pinus chylla / Pinus excelsa / Pinus griffithii*, and two in Czech: *borovice himalájská* and *borovice ztepilá*.

One of the conifers originally from north-eastern Asia even has three Latin synonymous terms: *Thuja orientalis / Platycladus orientalis / Biota orientalis (zeravec východní)*. Four English synonyms are even used to refer to a tree from the *mahogany* family (*Meliaceae*): *China tree / chinaberry / bead tree / Persian lilac (Melia azedarach, melie šeříková / "indický šeřík" / "perský šeřík")*.

Tormentil from the *rose* family has as many as seven Latin synonyms, classifying the herb into three different genera and alternating several epithets: *Potentilla erecta / Potentilla tormentilla / Potentilla officinalis / Potentilla tetrapetala / Tormentilla erecta / Tormentilla officinalis / Fragaria tormentilla (mochna nátržník)*.[63]

The property reflected in the adjective "thorny" denoting a species in the Czech scientific term *slivoň trnitá (blackthorn, Prunus spinosa)* was preferred in popular terminology, so the synonym *trnka obecná* exists alongside the former one in Czech botanical terminology.

Japanese flowering cherry (Cerasus serrulata) is known under its name based on Japanese among Czech non-botanists, *sakura*, rather than by its synonym, *višeň pilovitá*. (It is interesting that two of its varieties, i.e. mutations of the same species, have different classificatory names in German: *Tibet-Kirsche* and *Japanische Blütenkirsche* for the variety 'Kanzan', as well as in Czech). The terminological confusion is caused by classification of the pink-blossoming Japanese members of the genus *Prunus* into different species, once referring to them by the common generic name *Prunus* (*Prunus serrulata, sakura ozdobná*), and once listing them with *sour cherries* (*Cerasus serrulata, višeň pilovitá*) or with *bird cherries* (*Padus serrulata, střemcha ozdobná*). (In Vermeulen 2004: 96–97, *Prunus serrulata* is used as a synonym to *Padus serrulata*, and the terms *střemcha ozdobná* and *sakura ozdobná* are used with identical denotation likewise.)

The same species may also be known under several distinct names not resulting from synonymy but from the fact that **a distinguishing varietal word is incorporated** in the one-word or two-word term. Thus, despite being the same species of *maple*, most varieties of *Norway maple (javor mléč)* are known under different names in German (sharing just the generic final element *-ahorn*), unlike Czech and English, where the variety is marked by the third word, added to a two-word botanical term consisting of a generic and specific name. Thus, the German terms are:

Spitzahorn for *Norway maple* in general *(Acer platanoides* L., *javor mléč),*
Säulenahorn for *Norway maple* var. Columnare *(Acer platanoides* 'Columnare', *javor mléč),*
Blutahorn for *Norway maple* var. Crimson King *(Acer platanoides* 'Crimson King', *javor mléč),*
Weissbunter Ahorn for *Norway maple* var. Drummondii *(Acer platanoides* 'Drummondii', *javor mléč),*

63 Hladký (1996: 37–38) even quotes instances when 31 and 34 synonyms, respectively, may be found for a single species of mushroom.

Rotblättriger Spitzahorn for *Norway maple* var. Faassen's Black *(Acer platanoides* 'Faassen's Black'*, javor mléč),*
Kugelahorn for *Norway maple* var. Globosum *(Acer platanoides* 'Globosum'*, javor mléč),* and *Hellroter Spitzahorn* for *Norway maple* var. Schwedleri *(Acer platanoides* 'Schwedleri'*, javor mléč)*.

This terminological situation has several implications, which are virtually dependent on one another: firstly, the distinction between the taxons in German is realised at a more detailed level than in Latin, Czech and English. The **level of variety within a species**, which is indicated as something subsidiary, additional to the standard two-word terms in terminologies of the above-quoted three languages, is lifted to **greater importance in German**, as it is reflected in the name of the species as such.

The second implication is that if such a subtle variation is expressed at a higher level, i.e. the level of species, users of the language will be more aware of the existence of such different items, and many of them will probably even be able to **recognise** their referents. This is certainly facilitated by the **descriptive character** of the initial elements in such German terms, referring to the colour or specific shape of the taxons. On the other hand, how many Czech users would be able to recognise or distinguish betweeen *javor babyka*, *javor klen* and *javor mléč* if they were to see these trees in a park? They have definitely come across the terms, but they do not know exactly what they denote. Moreover, the distinction is of no practical importance to the general public, and the attributes *babyka*, *klen* and *mléč* do not help much, since they do not convey any obvious descriptive information (although they are Czech words).

The third implication is a negative one, namely that **the real link** between the members of one species, *Spitzahorn*, **is not reflected in terminology** and therefore linguistically lost in such terms which do not contain the word *Spitzahorn* (i.e. *Blutahorn*, *Kugelahorn*, *Weissbunter Ahorn*, *Säulenahorn*), contrary to Czech, English and Latin, where the link is maintained explicitly. As discussed above, reliance on a notional link which most or all users would be familiar with cannot be taken for granted.

Table 6.2. Latin, English, German and Czech botanical terms including the distinction of horticultural variety—genus *Acer*.

Latin	English	German	Czech
Acer campestre L.	common maple	Feldahorn	javor babyka
Acer circinatum PURSCH	vine maple	Wein-Ahorn	javor okrouhlolistý
Acer ginnala MAXIM.	Amur maple	Feuerahorn	javor amurský
Acer griseum (FRANCH.) PAX	paperbark maple	Zimt-Ahorn	javor šedý
Acer japonicum 'Aconitifolium'		Japanischer Ahorn	javor japonský
Acer negundo L.	boxelder	Eschenahorn	javor jasanolistý
Acer negundo ´Aureo-Variegatum´	boxelder	Goldbunter Eschenahorn	javor jasanolistý
Acer negundo ´Flamingo´	boxelder	Rosa-bunter Eschenahorn	javor jasanolistý

Latin	English	German	Czech
Acer negundo ´Variegatum´	boxelder	Silberbunter Eschenahorn	javor jasanolistý
Acer palmatum THUNB.	Japanese maple	Fächerahorn	javor dlanitolistý
Acer palmatum 'Atropurpureum'	Japanese maple	Rother Fächerahorn	javor dlanitolistý
Acer palmatum 'Dissectum'	Japanese maple	Japanischer Schlitzahorn	javor dlanitolistý
Acer palmatum 'Dissectum Ornatum'	Japanese maple	Japanischer Schlitzahorn	javor dlanitolistý
Acer palmatum 'Dissectum Viridis'	Japanese maple	Japanischer Schlitzahorn	javor dlanitolistý
Acer platanoides L.	Norway maple	Spitzahorn	javor mléč
Acer platanoides 'Columnare'	Norway maple	Säulenahorn	javor mléč
Acer platanoides 'Crimson King'	Norway maple	Blutahorn	javor mléč
Acer platanoides 'Drummondii'	Norway maple	Weissbunter Ahorn	javor mléč
Acer platanoides 'Faassen's Black'	Norway maple	Rotblättriger Spitzahorn	javor mléč
Acer platanoides 'Globosum'	Norway maple	Kugelahorn	javor mléč
Acer platanoides 'Schwedleri'	Norway maple	Hellroter Spitzahorn	javor mléč
Acer pseudoplatanus L.	sycamore maple	Bergahorn	javor klen
Acer pseudoplatanus ´Brilliantissimum´	sycamore maple	Kleinkronige Bergahorn	javor klen
Acer pseudoplatanus ´Negenia´	sycamore maple	Kegelförmige Bergahorn	javor klen
Acer pseudoplatanus ´Worleei´	sycamore maple	Gelblaubiger Bergahorn	javor klen
Acer rubrum	red maple	Rotahorn	javor červený
Acer saccharinum L.	silver maple,	Silberahorn	javor stříbrný
Acer saccharum MARSH.	Sugar maple	Zuckerahorn	javor cukrový
Acer tataricum	Tatarian maple	Steppenahorn	javor tatarský

6 | 4 | 2 Co-hyponyms in the lexical hierarchies of accounting and finance

A terminology concerning **types of tax** has been chosen to exemplify how **sister terms** are created in the economic terminology. This nomenclature is especially suitable because the most frequently used head noun, *tax* (as well as *daň* in Czech), allows **modification by attributes from both sides**, i.e. from the left, as well as from the right. The relationships between the individual equivalent terms can thus be studied more objectively since a possible distortion caused by exclusive use of one or the other type of modification is avoided. Similarly suitable material for study is also provided by compound terms including the words *cost(s)*, *price*, etc.:
Adj+Nhead: *direct cost, přímé náklady*;
N_{Attr}+Nhead: *labour cost, pracovní náklady* / N+N(Attr): *náklady práce*;
Nhead+$(Prep+N)_{Attr}$: *cost of sales, náklady (vynaložené) na prodej*.

The nomenclature below is certainly not complete, as many other types of tax exist in different tax legislations; however, containing the main British and American types of tax, it is at least representative of the main compound types. Alternatively-formed terms may be added, either more condensed or more periphrastic, but the ratio of the basic types would hopefully remain roughly the same.

Table 6.3. Formation of sister terms in the economic terminology: compounds using *tax* as the head.

English	Czech	Structure in English	Structure in Czech
tax deducted at source	daň srážená u zdroje	Nhead+(Adj+(Prep+N))	Nhead+(Adj+(Prep+N))
tax due	splatná daň	Nhead+Adj	Adj+Nhead
tax in kind	daň v naturáliích / naturální daň	Nhead+(Prep+N)	Nhead+(Prep+N) / Adj+Nhead
tax on bonuses	daň z tantiém	Nhead+(Prep+N)	Nhead+(Prep+N)
tax on capital	daň z (výnosu) kapitálu	Nhead+(Prep+N)	Nhead+(Prep+(N)+N)
tax on capital yields	daň z kapitálových výnosů	Nhead+(Prep+(N+N))	Nhead+(Prep+(Adj+N))
tax on consumption / consumption tax	daň ze spotřeby	Nhead+(Prep+N) / N+Nhead	Nhead+(Prep+N)
tax on exchange dealings	daň z burzovního obratu	Nhead+(Prep+(N+N))	Nhead+(Prep+(Adj+N))
tax on fuel oil	spotřební daň z topných olejů	Nhead+(Prep+(N+N))	Adj+Nhead+(Prep+(Adj+N))
tax on hydrocarbon fuels and lubricants	daň z uhlovodíkových paliv a maziv	Nhead+(Prep+(N+(N+Conj+N)))	Nhead+(Prep+(Adj+(N+Conj+N)))
tax on imports	daň z dovozu	Nhead+(Prep+N)	Nhead+(Prep+N)
tax on interest	daň z úroků	Nhead+(Prep+N)	Nhead+(Prep+N)
tax on property / property tax	daň z majetku / majetková daň	Nhead+(Prep+N) / N+Nhead	Nhead+(Prep+N) / Adj+Nhead
tax on wages	odvod z mezd	Nhead+(Prep+N)	Nhead+(Prep+N)
tax on wine	daň z vína	Nhead+(Prep+N)	Nhead+(Prep+N)
tax overdue	prodlení v placení daní	Nhead+Adj	Nhead+(Prep+(N+N))
tax overpaid	přeplatek daně	Nhead+Adj	Nhead+N
capital gains tax	daň z kapitálových zisků	(N+N)+Nhead	Nhead+(Prep+(Adj+N))
capital transfer tax (UK, 1975-1986)	pozůstalostní daň / daň z převodu majetku	(N+N)+Nhead	Adj+Nhead / Nhead+(Prep+(N+N))
corporation tax (UK)	daň ze zisků/příjmů společnosti / daň z příjmů právnických osob	N+Nhead	Nhead+(Prep+(N+N)) / Nhead+(Prep+(N+(Adj+N)))
direct tax	přímá daň	Adj+Nhead	Adj+Nhead
estate tax (US)	daň z pozůstalosti / dědická daň	N+Nhead	Nhead+(Prep+N) / Adj+Nhead
excise duty/tax	spotřební daň / akcíza	N+Nhead	Adj+Nhead / Nhead
income tax	daň z příjmu / důchodová daň	N+Nhead	Nhead+(Prep+N) / Adj+Nhead
individual income tax (US)	daň z příjmu fyzických osob	(Adj+N)+Nhead	Nhead+(Prep+(N+(Adj+N)))
corporate income tax (US)	daň z příjmu právnických osob	(Adj+N)+Nhead	Nhead+(Prep+(N+(Adj+N)))
indirect tax	nepřímá daň	Adj+Nhead	Adj+Nhead
inheritance tax	dědická daň	N+Nhead	Adj+Nhead
progressive tax	progresivní daň	Adj+Nhead	Adj+Nhead

English	Czech	Structure in English	Structure in Czech
property tax	majetková daň / daň z nemovitostí	N+Nhead	Adj+Nhead / Nhead+(Prep+N)
regressive tax	degresivní daň	Adj+Nhead	Adj+Nhead
real estate tax	daň z nemovitostí	(Adj+N)+Nhead	Nhead+(Prep+N)
sales tax	daň z obratu / prodejní daň	N+Nhead	Nhead+(Prep+N) / Adj+Nhead
value-added tax	daň z přidané hodnoty	Adj+Nhead	Nhead+(Prep+(Adj+N))
wealth tax	daň z bohatství	N+Nhead	Nhead+(Prep+N)
withholding tax	srážková daň / daň vybíraná srážkou	Adj+Nhead	Adj+Nhead / Nhead+(Adj+N)

Sources: M. Straková, J. Bürger & M. Hrdý, *Anglicko-český hospodářský slovník* (2000), 641–642; R. Vogel, J. Mužíková & J. Zákostelská, *Glosář k učebnici English for Business Studies* (2003), 78–79.

Table 6.4. Compounds using *tax* as the head: comparison of occurrences of individual term structures in the English and Czech nomenclatures and their identity.

Structure	English	Czech	Identical structure
Nhead	0	1	0
Adj+Nhead	6	15	5
N+Nhead	10	0	0
(Adj+N)+Nhead	3	0	0
(N+N)+Nhead	2	0	0
Nhead+Adj	3	0	0
Nhead+N	0	1	0
Nhead+(Adj+N)	0	1	0
Nhead+(Prep+N)	9	15	9
Nhead+(Prep+(Adj+N))	0	4	0
Adj+Nhead+(Prep+(Adj+N))	0	1	0
Nhead+(Prep+(N+N))	3	3	0
Nhead+(Prep+(N+(Adj+N)))	0	3	0
Nhead+(Prep+(Adj+(N+Conj+N)))	0	1	0
Nhead+(Prep+(N+(N+Conj+N)))	1	0	0
Nhead+(Adj+(Prep+N))	1	1	1
Total	**38**	**46**	**15**
left modification only	21	15	L:L fully[64] 6, alternatively 7
right modification only	17	29	R:R fully 13, alternatively 4
modification on both sides	0	1	NA

64 The adverb "fully" refers to the full congruence of the left (or right) modification, i.e. premodification (or postmodification) in the English and Czech terminologies, e.g. *inheritance tax* and *dědická daň*. The word "alternatively" means that the number of occurrences refers to the congruent alternatives existing alongside incongruent ones, e.g. *property tax* and *majetková daň*, used beside the incongruent alternative *daň z majetku/nemovitostí*.

The most typical constructions in the **English** nomenclature including the word *tax* as the head of terms, are **N+Nhead** (about a quarter of the terms), followed narrowly by a more periphrastic **Nhead+(Prep+N)** (slightly less than a quarter), whereas in **Czech** the two dominant types of structure are equally frequent **Adj+Nhead** and **Nhead+(Prep+N)**, together making up nearly two thirds of all constructions.[65] The latter type, where the head noun ***tax* is modified on the right** (by prepositional attributes), occurs more often in Czech (in nearly two thirds of the terms). Two types of modification of the head (**on the right and on the left**) are **almost equally distributed in English** (the left one prevails slightly here), particularly thanks to the nominal attribute(s) used before head nouns, being an alternative to adjectival premodification. The N+Nhead, (Adj+N)+Nhead, (N+N)+N-head terms are impossible in Czech. Similarly, complex periphrastic postmodification, such as Nhead+(Prep+(Adj+N)) and Nhead+(Prep+(N+(Adj+N))), is rare in English (7 examples found here in Czech, none in English), as the **English terminology prefers semantic condensation, and hence premodification**. 15 noun-premodified terms out of the total of 38 (39.5%) can be found in the English part of the nomenclature above, compared with none in Czech (instead of N+Nhead, (Adj+N)+Nhead, (N+N)+Nhead the construction Adj+Nhead is characteristic in Czech).

Exact identity between the English and Czech terms concerning types of tax can only be found among periphrastic terms of the type Nhead+(Prep+N): all such English terms may be expressed by an analogously-formed Czech term (along with occasional alternatives). Partial congruence can also be found in the Adj+Nhead type, generally more frequent in Czech. **Modification on the left (of any type) seems to be less congruent when compared in the two languages than that on the right.** There were 6 occurrences of fully congruent premodified terms in the two languages, out of 21 English and 15 Czech instances of premodification. 7 more were possible as alternatives. 13 terms were modified only on the right in both languages, out of 17 in English and 29 in Czech; 4 were used as alternatives in one of the languages. Modification on the left corresponded to modification on the right solely in 6 cases, including alternatives in 9 other instances. To conclude, postmodified (i.e. periphrastic) English and Czech terms seem to correspond to each other on the formal side more frequently than premodified terms; formally asymmetric correspondence is more or less as frequent as premodification alone.

65 Smutný, who compared English compound nouns excerpted from British and American fiction and referring to 27 semantic areas with their Czech translation equivalents, found a much higher representation of the N+N type (75%), followed by the V-ing+N type (8%); the solid Adj+N compounds accounted only for 3% out of 3,102 items (2009: 14, 180, 183).

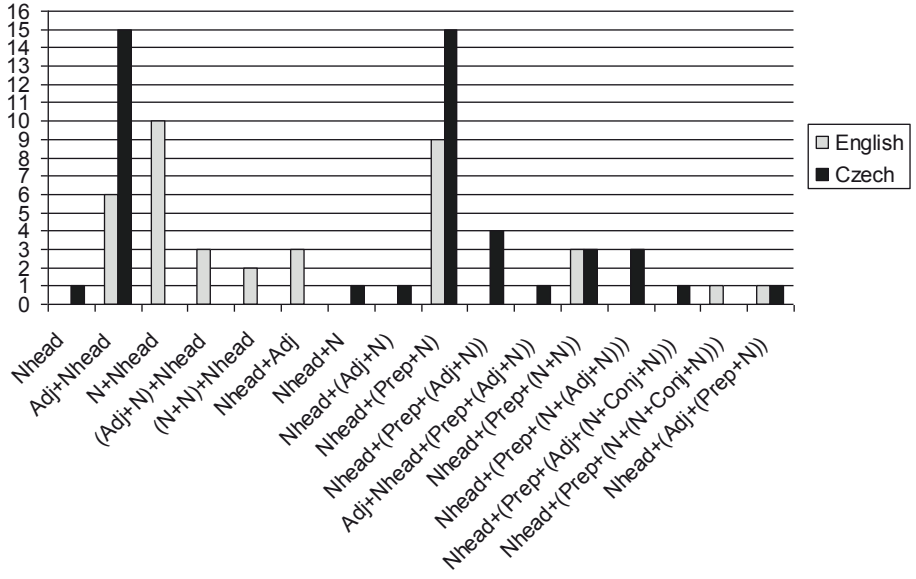


Figure 6.6. Compounds using *daň (tax)* as the head: distribution of individual term-formation structures in the English and Czech nomenclatures by type.

Table 6.5. Formation of sister terms: *Balance sheet / Rozvaha*. (Higher levels are marked by capitalisation and bold print, in conformity with the source specimen document in the *Dictionary of Accounting* (Collin & Joliffe 1992).)

English	Czech	Structure in English	Structure in Czech
BALANCE SHEET	**ROZVAHA**	N+Nhead	Nhead
FIXED ASSETS	**STÁLÁ AKTIVA / DLOUHODOBÝ MAJETEK**	Adj+Nhead	Adj+Nhead / Adj+Nhead
Intangible assets	**Nehmotný (dlouhodobý) majetek**	Adj+Nhead	Adj+(Adj+)Nhead
Development costs	Náklady na vývoj	N+Nhead	Nhead+(Prep+N)
Goodwill	Hodnota podniku	Nhead	Nhead+N
Tangible assets	**Hmotný (dlouhodobý) majetek**	Adj+Nhead	Adj+(Adj+)Nhead
Land and buildings	Pozemky a budovy	N+Conj+N	N+Conj+N
Plant and machinery	Technická zařízení a stroje	N+Conj+N	(Adj+N)+Conj+N

English	Czech	Structure in English	Structure in Czech
Fixtures and fittings	Imobilní a mobilní inventář	N+Conj+N	(Adj+Conj+Adj)+Nhead
Investments	**Finanční investice**	Nhead	Adj+Nhead
CURRENT ASSETS	**OBĚŽNÁ AKTIVA / KRÁTKODOBÝ MAJETEK**	Adj+Nhead	Adj+Nhead / Adj+Nhead
Stocks	**Zásoby**	Nhead	Nhead
Debtors	**Pohledávky**	Nhead	Nhead
Investments	**Finanční majetek**	Nhead	Adj+Nhead
Cash at bank (and in hand)	**Finanční (a pokladní) hotovost**	Nhead+(Prep+N) (+Conj+(Prep+N)	Adj(+Conj+Adj)+Nhead
CREDITORS: Amounts falling due within one year	**KRÁTKODOBÉ ZÁVAZKY (částky splatné do 1 roku)**	N1head: N2head+((Vpart.+Adj)+ Prep+(Num+N))	Adj+Nhead: (Nhead+Adj+Prep+ (Num+N))
Bank loans	Běžné bankovní úvěry	N+Nhead	Adj+(Adj+Nhead))
Trade creditors	Závazky z obchodního styku	N+Nhead	Nhead+(Prep+(Adj+N))
Accruals	Výdaje příštích období	Nhead	Nhead+(Adj+N)
NET CURRENT ASSETS	**ČISTÁ OBĚŽNÁ AKTIVA**	Adj+(Adj+Nhead)	Adj+(Adj+Nhead)
TOTAL ASSETS LESS CURRENT LIABILITIES	**AKTIVA CELKEM MINUS BĚŽNÁ PASIVA**	(Adj+N1head)+Adv+ (Adj+N2head)	(N1head+Adv)+Prep+(Adj+ N2head)
CREDITORS: AMOUNTS FALLING DUE AFTER MORE THAN ONE YEAR	**DLOUHODOBÉ ZÁVAZKY (částky se splatností delší než 1 rok)**	N1head: N2head+((Vpart.+ Adj)+Prep+Adv+Adv+ (Num+N))	Adj+N1head: N2head+(Prep+((N+Adj)+ Prep+(Num+N)))
Debenture loans	Emitované dluhopisy	N+Nhead	Adj+Nhead
Finance leases	Finanční (pro)nájem	N+Nhead	Adj+Nhead
Bank and other loans	Bankovní úvěry	(N+Conj+Adj)+N head	Adj+Nhead
PROVISIONS FOR LIABILITIES AND CHARGES	**REZERVY**	Nhead+Prep+(N+Conj+N)	Nhead
Taxation including deferred taxation	Daňové závazky včetně odložených daňových závazků	N1head+Prep+(Adj+N2head)	(Adj+N1head)+Prep+ (Adj+(Adj+N2head))
Other provisions	Ostatní rezervy	Adj+Nhead	Adj+Nhead
CAPITAL AND RESERVES	**VLASTNÍ JMĚNÍ**	N+Conj+N	Adj+Nhead

English	Czech	Structure in English	Structure in Czech
Called-up share capital	**Upsané/ý základní jmění/kapitál**	Adj+(N+Nhead)	Adj+(Adj+Nhead)
Share premium account	**Emisní ažio**	(N+N1head)+N2head	Adj+Nhead
Revaluation reserve	**Přecenění majetku**	N+Nhead	Nhead+N
Other reserves	**Ostatní rezervní fondy**	Adj+Nhead	Adj+(Adj+Nhead)
PROFIT AND LOSS ACCOUNT	**HOSPODÁŘSKÝ VÝSLEDEK (výsledek výkazu zisku a ztrát)**	(N+Conj+N)+Nhead	Adj+Nhead

Sources: P. A. Collin & A. Joliffe, *Dictionary of Accounting* (1992);
M. Straková, J. Bürger & M. Hrdý, *Anglicko-český slovník hospodářský* (2000), 727–729.

Table 6.6. Terms included in the balance sheet (UK) and *rozvaha* (Czech): comparison of occurrences of individual term structures in the English and Czech hierarchies and their identity.

Structure	English	Czech	Identitical structure
Nhead	6 (+2)	4	2
Adj+Nhead	6	13 (+2)	5
N+Nhead	7	0	0
Adj+(Adj+Nhead)	1	4 (+2)	1
Adj+(N+Nhead)	1	0	0
(N+N)+Nhead	1	0	0
(N+Conj+N)+Nhead	1	0	0
(Adj+Conj+Adj)+Nhead	1	2	0
(Adj+N1head)+Prep+ (Adj+(Adj+N2head))	0	1	0
(Adj+N1head)+Adv+ (Adj+N2head)	1	0	1
Adj+Nhead: (Nhead+Adj+Prep+(Num+N)) or N2head+(Prep+ ((N+Adj)+Prep+(Num+N)))	0	2	0
Nhead+Adj	0	0	0
Nhead+N	0	2	0
Nhead+(Adj+N)	0	1	0
Nhead+(Prep+N)	1 (+modif.)	1	0
N1head: N2head+((Vpart.+Adj)+Prep+(Num+N)) or N2head+((Vpart.+Adj) +Prep+Adv+Adv+ (Num+N))	2	0	0
N1head+Prep+(Adj+N2head)	1	0	0
Nhead+Prep+(N+Conj+N)	1	0	0
(N1head+Adv)+Prep+(Adj+N2head)	0	1	0
N+Conj+N	4	1	1

Structure	English	Czech	Identitical structure
(Adj+N)+Conj+N	0	1	0
Total	**33**	**33**	
no modification (i.e. one word)	6 (+2)	4	
left modification only	19	24 (+2)	
right modification only	3 (+2)	5 (+2)	
pure coordination	4	1	

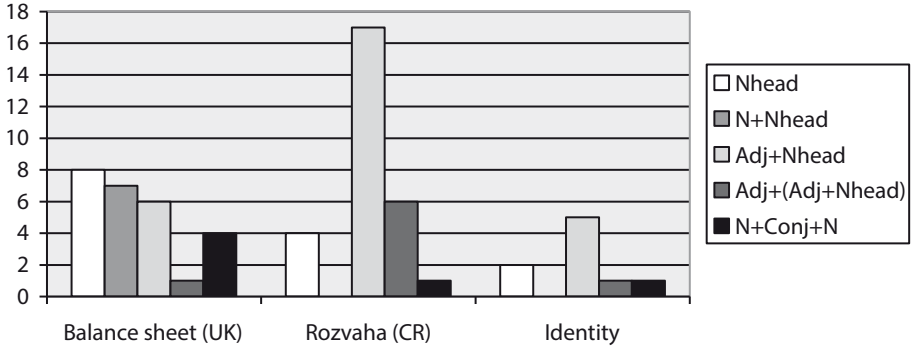


Figure 6.7. Terms included in the *balance sheet* (UK) and *rozvaha* (Czech): occurrences of the main types of term structures and their identity in the E/Cz nomenclatures (from Tabs 6.5 and 6.6).

Apart from demonstrating the obvious, i.e. that the terms consisting of a premodifying adjective or adjectives followed by a noun (Adj+Nhead or Adj+(Adj+Nhead)) are considerably more frequent in Czech, and that terms pre-modified by a noun (N+Nhead) are only used in English, the comparison of the English and Czech **balance sheets** also shows a certain **tendency towards coordination in English terminology** (4:1 compared with Czech), as well as **towards univerbisation** (6:4 or 8:4). Unlike the above-presented nomenclature of tax, the hierarchical lexical system of the balance sheet reveals a slightly higher number of Czech terms modified on the left than English ones, along with a much smaller occurrence of terms where the head noun is only modified on the right (although they were the prevailing type of Czech terms including the head noun *tax*). The highest degree of formal identity between English and Czech terms was found in the type Adj+Nhead (5 instances).

7 | Properties of lexical hierarchies in biology and in economics: synthesis and conclusions

Chapters 4-6 (completely taken from my dissertation thesis *Lexical Hierarchies in the Scientific Terminology*, Vogel 2006) provided numerous comparisons, analogies, analyses and illustrations of English, Latin and Czech lexical hierarchies and their components—terms—used in the discourse of science. This chapter synthesises this selective evidence and attempts to draw conclusions about the differences and shared features of concrete- and abstract-based lexical hierarchies, nomenclatures typical of natural sciences and those typical of social sciences, naturally-grown and artificially formed lexical hierarchies, meronomies and taxonomies, superordinate and subordinate terms, etc.

It is certain that a large degree of generalisation is necessary, therefore the generalising conclusions are only tentative. However, the quantitative data from samples frequently prove the deductions made and the suggested interpretations of facts. We must also take into account the impossibility of exact calculations in such a vast (almost infinite) and changing area as biological taxonomies (in fact, merely two kingdoms of the taxonomical system of organisms were examined here, no other hierarchies), as well as the arbitrariness of holding botany and accounting as the appropriate and true representatives of the natural and social sciences, respectively. Compared with biological taxonomies, the numbers of terms in individual lexical hierarchies of economic disciplines are not so high, but they are very diverse and heterogeneous. A virtually limitless number of classifications can be formed here, based on different combinations of concepts and considered aspects.

The observations, findings and conclusions may be formulated as follows:

1. **Meronomies** use **opaque lexemes or compounds** formed out of opaque words (i.e. natural kind terms and primary lexemes) in common-core, non-specialised areas, just as much as **taxonomies**, mostly at the **generic** level (e.g. names of common animals or plants). More **specialised contexts** require **neoclassical derivations**, **loans from classical languages**, **descriptive compounds** (i.e. secondary lexemes) and **semantic neologisms**. The same applies to **higher levels** in taxonomies, depending on the principles established in particular nomenclatures. This study proved this for biological taxonomies where the more general and higher-placed terms usually rely on Latin terms or neoclassical derivations. The taxo- and meronymies

of accounting and finance use similar types of multi-word terms at all levels, manifesting the relative homogeneity of their origins and formation.

2. Lexical hierarchies based on **material entities (concrete-based hierarchies)** generally consist of **more levels** than those based on **immaterial concepts (abstract-based hierarchies)** if they are built as scientific taxonomies (10–12 levels in botany vs. approximately 4 levels in accounting). **Concrete-based** hierarchies, as well as **abstract-based hierarchies** combine **meronomic and taxonomic** features. Classes taken as entities suggest the relation of meronymy (i.e they are holonyms) towards their hyponyms (i.e. meronyms); whereas individual taxons at the superordinate level, being more abstract and general, are hypernyms in a taxonomy for the subordinate taxons.
3. Purer, more transparent and morphologically marked taxonomies can be rather found in taxonomies of natural sciences. The level of consistency and formal transparency of terminological hierarchies varies from science to science and from language to language, in English being substantially lower than in Czech and in the highly-systematic Latin. It needs to be stressed, however, that comparison with Latin nomenclatures is possible only in biological disciplines, not e.g. in economics.
4. Lexical hierarchies in **natural sciences** are indeed **more complex and well-structured**; hierarchies of **social sciences** are rather simpler, with fewer levels, and their structure tends to be vaguer and less objectively-based. The biological taxonomies include hundreds of thousands of individual taxons at the lowest levels (species, or subspecies, varieties, etc.). The same applies to nomenclatures of cosmic bodies, minerals, etc. On the other hand, the numbers of items in nomenclatures of social sciences are quite limited, obviously for the reasons of **fragmentation or high specialisation** of social sciences, the **practical application** of their terminologies (contrasted with the classificatory, descriptive and scientific character of taxonomies in natural sciences), and the **absence of** such **all-inclusive taxonomic classificatory systems** as in (some) natural sciences. Terminologies of many sciences and fields of activity might be extensive, but they were only transformed into systems with a clear internal structure (i.e. classificatory hierarchies such as taxonomies or nomenclatures) in some natural sciences.
5. Terms at **lower levels** largely use domestic word-stock in both Czech and English biological nomenclatures. This is particularly characteristic of the generic level, where the names of taxons are most identical with the ordinary names in everyday use. English terms are typically compounds, whereas Czech terms are derivations following the established patterns. **Higher or purely scientific taxons in biology** both in Czech and English are **of Latin origin or** established **directly in Latin**.
6. The **terminology of accounting** is closer to the **lexicon of ordinary language in both English and Czech**. It especially uses ordinary, domestic words; the higher percentage of Romance words in English only reflects their dominant occurrence in specialised and abstract contexts. Hypernymous or more abstract taxons, i.e.

those at higher levels in the hierarchy, do not reveal significant formal differences from their subordinate taxons in the financial and accounting lexical hierarchies.

7. The hypothesis that **meronomies** (tied more closely with the reality) generally consist of **fewer levels**, whereas (more abstract) **taxonomies** consist of **more levels** was proven on the taxonomies in natural sciences. Pure meronomies (such as parts of the body) were not analysed. It is likely that there would be more analysable levels in meronomies of complex entities if segmental (e.g. digits, muscles, bones) and systemic parts (e.g. nerves, vessels) were counted together. As they are not mixed and as the highest taxons in meronomies tend to be cohesive entities of the roughly same type (i.e. not their sets or classes), meronomies are quite separate from each other, hierarchically flat and homogeneous as for the nature of their items.
8. Although **taxonomies** in sciences are constantly being supplied with new taxons and amended to incorporate new discoveries or approaches, there is still a certain degree of **inconsistency and tentativeness** in their structure, as well as **synonymy and polysemy** in their lexicon. Lexical hierarchies are a collective effort, incorporating the already existing structures and serving various purposes, which makes them looser than they should be ideally. They are also a construct of natural languages, with all their irregularities and imperfections. Among the main causes of synonymy and polysemy are different geographical and temporal origins of terms, different motivations of word-formation, influences of other languages and borrowing from them, differences in style, and efforts to make terms and their systems more explicit, coherent and transparent.
9. **English terms** tend to be **more condensed** than Czech ones, rather combining the meanings of several words than deriving new words from existing ones by affixes. There is a clear preference for **English terms** to use the combination of **a noun preceded by a premodifying adjunct noun** (or nouns) (NAttr+Nhead), used as an attribute. **Czech terms** use the combination of an **adjectival attribute and a noun** (in a reversed order in the Czech and Latin biological nomenclatures, i.e. Adj+N and N+Adj, respectively) and the **periphrastic prepositional construction** Nhead+(Prep+N) more frequently than English ones. Both of these two patterns are also common in English. The congruence in form between the two languages in accounting terminology typically emerges in the latter type, i.e. the periphrastic prepositional construction, or—in other words—in terms with modification on the right of the head noun. There is also a certain share of English and Czech terms which are both modified on the left of the head, but the formal analogy is imperfect, as the Czech Adj+Nhead construction frequently corresponds to the English NAttr+Nhead.
10. Several types of terms may be identified where the word denoting **a hypernym is incorporated in the naming of its hyponyms**. Apart from levels **above and below the generic levels** in biological scientific taxonomies, these are also **analogues** in proportional series (so that differentiation is made between sister nodes, e.g. *fox cub*, *lion cub*, *wolf cub*, *bear cub*, etc.), **non-taxonomic hyponyms** (i.e. periphrastic

nominal kind terms) and **meronyms**, whether for the purposes of distinguishing from analogues in other meronomies (e.g. *treetop*, *brain cell*) or when their functional domain is restricted (e.g. *eyeball*, *eyelashes*, *eyebrows*).

11. It is evident that **accounting hierarchies** and the lexical hierarchies of individual **financial statements**, combining meronomy and taxonomy, have considerably **fewer levels** (i.e. vertically), as well as **fewer members (branches) at these levels** (i.e. horizontally), than **biological** (namely botanical) **taxonomies**. Reflection of an extremely large number of taxons in the nature systems and the complex relations between them in the biological classificatory systems may be suggested as a plausible explanation, as well as a relatively limited number of taxons in artificially formed systems in social sciences, which is probably dictated by practical considerations.
12. The terms in the **botanical and zoological nomenclatures are formed more regularly** than terms in the nomenclatures of economics and accounting. This regularity is even more evident in the highly systematic Czech and Latin nomenclatures. Several basic types are frequent in the English biological nomenclatures, although the lexical stock and term-formation means show a wide diversity. However, this diversity is dwarfed by **the variation of term lengths, term-formation processes, word origins and semantic inconsistency** in the lexical hierarchies of economics, namely of **finance and accounting**. The gradual growth from multiple sources of the vocabulary used in the given fields might be the reason, unlike the relatively fast creation of the scientific biological nomenclature, mainly for classificatory purposes, by several authoritative scholars.

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Summary

The monograph *Terminologies, Lexical Hierarchies and other Configurations* is devoted to hierarchical systems of lexical items, particularly in scientific terminologies. It includes research from the dissertation thesis *Lexical Hierarchies in the Scientific Terminology* (Vogel 2006), supplemented with an extensive introduction to the typology of lexical and semantic relations, branching and non-branching hierarchies, proportional series and other types of lexical configurations. It analyses the principles of formation of terminological classificatory hierarchies and identifies sense relations between items at superordinate and subordinate levels, as well as between those at the same level.

The comparison focuses on analogous English, Czech and Latin hierarchies, as despite a virtually identical objective reality underlying terminological hierarchies, specific morphological and onomatological properties of different languages influence the consistency and transparency of lexical hierarchies. The main differences are drawn between formation of terms in English and in Czech, taxonomies and meronomies, superordinate and subordinate taxonomic levels, and hierarchies in natural and social sciences.

The premise is that the internal structure of some domains is sometimes obvious, and so experience and analogy with such organised systems facilitate their understanding. On the other hand, atomism, implicitness and non-transparence hinder proper understanding, whether they are caused by inappropriate reflection of domains, complexity of concepts, incompatibility of classification criteria or incompetence of language users.

English financial and accounting terminology serves as a representation of conceptual and lexical hierarchies in social sciences, and it is compared with systematic terminological hierarchies of botany and, marginally, also zoology. These represent natural sciences, but also hierarchies denoting material entities and, linguistically, artificially formed nomenclatures (although Latin and Czech are strikingly different from English in this respect).

Chapter 1 introduces the properties of the language of science. It describes the main types of formation of terms. Chapter 2 outlines the basic types of lexical hierarchies, especially taxonomies and meronomies, which are relevant to scientific terminologies. This part owes the classification of hierarchies, chains, and series to D. A. Cruse's crucial work *Lexical Semantics* (1986). Relations between items in hierarchies, especially hyponymy, oppositeness, polysemy and synonymy, are covered in Chapter 3. Different perspectives on sense relations, entailment, inclusion, semantic encapsulation, predication calculus and markedness draw on the work of F. R. Palmer (1976) and Th. R. Hofmann (1993).

Chapters 4 and 5 incorporate research into taxonomic systems of biology and economics from the dissertation thesis *Lexical Hierarchies in the Scientific Terminology* (Vogel 2006). Chapter 4 looks into the taxonomic nomenclature of botany, and partly zoology. It stresses the formal and semantic differences between the terms in English, Latin and Czech. Terminological synonyms are discussed as a characteristic inconsistency. Chapter 5 analyses the less formalised terminology of finance and accounting. The relations between financial terms are analogous to those found in biological classifications, including frequent synonymy and polysemy.

Chapters 6 and 7 (taken from Vogel 2006) synthesise the comparison of biological and economic lexical hierarchies and draw conclusions about terminologies in natural and social sciences which they represent. They contrast term formation in meronomic and taxonomic hierarchies, at superordinate and subordinate levels, in naturally grown and in artificially formed hierarchies, identifying the following properties and tendencies.

Meronomies as well as taxonomies (mostly at the generic level) use opaque lexemes or compounds formed out of opaque words (i.e. natural kind terms and primary lexemes) in common-core, non-specialised areas. Specialised contexts and higher taxonomic levels utilise neoclassical derivations or loans, descriptive compounds and semantic neologisms. The more general and superordinate terms in biological taxonomies usually rely on Latin terms or neoclassical derivations, but the taxo- and meronomies of accounting and finance manifest the relative homogeneity of (multi-word) terms at all levels.

Hierarchies based on material entities (concrete-based h.) generally consist of more levels than scientific taxonomies based on immaterial concepts (abstract-based h.). Accounting mero-taxonomies have considerably fewer vertical levels, as well as fewer branches in them, than biological (namely botanical) taxonomies. Terms at lower levels largely use domestic word-stock in both Czech and English biological nomenclatures, particularly at the generic level. English terms are typically compounds, whereas Czech ones are derivations.

Lexical hierarchies in natural sciences are more complex and well-structured; those in social sciences are rather simpler, vaguer and with fewer levels. Meronomies consist of fewer levels, unlike the more abstract taxonomies. The level of consistency and formal transparency of terminological hierarchies in English is substantially lower than in Czech and in the systematic Latin. Due to diverse authorship, irregularities of natural languages, different geographical and temporal origins of terms, influences of other languages, etc. the taxonomies in sciences are marked with a certain degree of inconsistency and tentativeness in their structure, as well as synonymy and polysemy in their lexicon.

The nomenclature of accounting is closer to the lexicon of ordinary language in both English and Czech. It especially uses ordinary, domestic words, or common lexis of Romance origin in the case of English. English terms tend to be more condensed and less affixed than Czech ones. English terms typically combine a head noun with a preceding attributive noun (or nouns). Czech terms use an adjectival attribute and a head noun or a prepositional construction Nhead+(Prep+N) more frequently than English ones.

The terms in the botanical and zoological nomenclatures are formed more regularly than those in economics and accounting, particularly in Czech and Latin nomenclatures. The heterogeneity in the hierarchies of economics stems from their gradual growth from multiple sources. Words denoting a hypernym are incorporated in the naming of its hyponyms above and below the generic levels in biological taxonomies, analogues in proportional series and in non-taxonomic, periphrastic hyponyms.

The main aim of the study has been to reveal general rules, rather descriptive and explanatory than predictive, which would be relevant to most lexical hierarchies and which could be applied to a certain type of hierarchy, regardless of its semantic domain. Due to the impossibility of exact calculations in such vast terminological areas, constant development, as well as arbitrariness of using botany and accounting as the appropriate representatives of natural and social sciences, exact rules cannot be formulated. However, the contrast between different disciplines and types of hierarchy highlight at least their characteristic tendencies.

Zusammenfassung

Die Monographie *Terminologies, Lexical Hierarchies and other Configurations* widmet sich den hierarchisch organisierten Systemen, die lexikalische Einheiten bilden, namentlich in den verschiedenen Fachterminologien der Wissenschaft. Sie umfasst die Untersuchungen aus der Dissertation *Lexical Hierarchies in the Scientific Terminology* (Vogel 2006), ergänzt durch eine umfangreiche Einleitung in die Typologie von lexikalischen und semantischen Beziehungen, verzweigenden und unverzweigenden Hierarchien, proportionellen Serien und anderen Typen von lexikalischen Konfigurationen. Die Monographie analysiert die Prinzipien, nach denen terminologische Klassifizierungen gebildet werden, und identifiziert die relevanten Bedeutungsrelationen zwischen Elementen der übergeordneten und Elementen der untergeordneten Ebene bzw. auch zwischen Elementen derselben Ebene.

Verglichen werden analoge Hierarchien in der englischen, tschechischen und lateinischen Terminologie, weil die spezifischen morfologischen und onomasiologischen Eigenschaften der jeweiligen Sprache die Konsistenz und Transparenz der lexikalischen Hierarchien beeinflussen, und es dadurch zu Unterschieden in den terminologischen Systemen verschiedenen Sprachen kommen kann, auch wenn die hinter diesen Systemen stehende objektive Realität praktisch identisch ist. Grundsätzliche Unterschiede findet man zwischen der englischen und der tschechischen Terminologie, zwischen Taxonomien und Meronomien, zwischen übergeordneten und untergeordneten taxonomischen Ebenen, und zwischen den Hierarchien in den Naturwissenchaften und den Geisteswissenchaften.

Der Prämisse der vorliegenden Monographie ist, dass die interne Struktur einiger Domänen stellenweise intuitiv klar ist und dann Erfahrung und Analogie das Verständnis der so organisierten Systeme erleichtert. Auf der anderen Seite verhindern Atomismus, Implizitheit und Undurchsichtigkeit das richtige Verständnis von terminologischen Systemen, ob sie nun auf die falsche Abbildung der Domänen, die Komplexität der erfassten Konzepte, die Unvereinbarkeit der Klassifikationskriterien oder die Inkompetenz der jeweiligen Sprachbenutzer zurückgehen.

Als repräsentatives Beispiel für begriffliche und lexikalische Hierarchien in den Sozialwissenschaften wurde die englische Finanz- und Rechnungsterminologie ausgewählt. Diese Hierarchie wird mit der systematischen terminologischen Hierarchien in der Botanik und teilweise auch der Zoologie verglichen. Die beiden letztgenannten Hierarchien repräsentieren dabei die Begriffsbildung in den Naturwissenschaften, aber gleichzeitig auch allgemein begriffliche Hierarchien, die sich auf materielle Objekte beziehen und vom sprachwissenschaftlichen Standpunkt künstlich geschaffene Nomenklaturen darstellen (auch wenn sich das Tschechische und das Lateinische in dieser Hinsicht stark von Englisch unterscheiden).

Kapitel 1 leitet in die Sprache der Wissenschaft mit ihrem typischen Lexikon, ihrer typischen Syntax und ihren typischen Formalia ein. Das Kapitel beschreibt die wichtigste Typen der Herausbildung von wissenschaftlichen Termini. Kapitel 2 bietet eine Übersicht über die Grundtypen von lexikalischen Hierarchien, besonders über Taxonomien und Meronomien, die besonders relevant für die wissenschaftliche Fachterminologie sind. Dieser Abschnitt der Monographie stützt sich in hohem Maße auf die Klassifikation von verschiedenen Hierarchien, Ketten, Serien

und deren Eigenschaften, wie sie in der grundlegenden Arbeit von D. A. Cruse *Lexical Semantics* (1986) vorgenommen wurde.

Kapitel 3 beschäftigt sich im Detail mit den Beziehungen zwischen Elementen in Hierarchien, besonders mit Hyponymie, Antonymie, Polysemie und Synonymie. Die folgende Darstellung verschiedener Perspektiven auf semantische Verhältnisse wie *Entailment*, Inklusion, semantische *Encapsulation* oder auf das Prädikatenkalkül und die Markiertheitstheorie gehen von F. R. Palmer (1976) und Th. R. Hofmann (1993) aus.

Kapitel 4 und 5 fassen Untersuchungen zu den taxonomischen Systemen der Biologie und Wirtschaftslehre aus der Dissertation *Lexical Hierarchies in the Scientific Terminology* (Vogel 2006) zusammen. Daneben widmet sich Kapitel 4 den taxonomischen Nomenklaturen der Botanik und teilweise auch der Zoologie. Es hebt die formalen und semantischen Unterschiede in der Terminologie des Englischen, Lateinischen und Tschechischen hervor. Terminologische Synonymen werden als ein typisch unsystematisches Phänomen diskutiert.

Kapitel 5 analysiert die weniger regelmäßige Terminologie des Finanz- und Rechnungswesens. Die Beziehungen zwischen den Elementen dieser terminologischen Systeme sind analog zu denen, die man in biologischen Klassifikationssystemen findet, einschliesslich häufiger Synonymie und Polysemie.

Kapitel 6 und 7 (übernommen aus Vogel 2006) verbinden den Vergleich von biologischen und ökonomischen lexikalischen Hierarchien und ziehen Schlüsse hinsichtlich der Terminologie in Naturwissenschaften und Sozialwissenschaften, die die beiden ausgewählten Bereiche repräsentieren. Kontrastiert wird die Schaffung von Termini in meronomischen und taxonomischen Hierarchien, genauso wie die Schaffung von Termini auf übergeordneter und untergeordneter Ebene und in natürlich gewachsenen und künstlich geschaffenen Hierarchien. Das Ergebnis der Diskussion ist die Identifizierung der Eigenschaften und Tendenzen, die in den folgenden Abschnitten näher beschriebenen werden.

Sowohl die Meronomien als auch die Taxonomien benutzen (meistens auf generischem Ebene) in allgemeinen, nicht-spezialisierten Bereichen opaque Lexeme oder Komposita, die aus opaquen Bestandteilen bestehen (d. h. Termini des sog. natürlichen Typs, *natural kind terms*, und primäre Lexeme). In stärker spezialisierten Kontexten und auf höheren taxonomischen Ebenen werden neoklassizistische Derivate oder Lehnwörter, sprechende Komposita und semantische Neologismen verwendet. Die allgemeinsten und hierarchisch am höchsten rangierenden Termini in biologischen Taxonomien stützen sich gewöhnlich auf die lateinische Terminologie oder werden durch neoklassizistische Ableitungen gebildet. Dagegen weist die (mehrwortige) Terminologie in den Taxo- und Meronomien des Finanz- und Rechnungswesens eine relativ große Homogenität auf allen Ebenen auf.

Hierarchien, die durch materielle Objekte begründet sind, (sog. konkrete Hierarchien) bestehen im Allgemeinen aus mehr Ebenen als die wissenschaftlichen Taxonomien, die auf immateriellen Begriffen aufbauen (und damit abstrakte Hierarchien sind). Die Mero-Taxonomien des Rechnungwesens haben bedeutend weniger vertikale Ebenen und weisen eine geringere Verzweigung auf als biologische (besonders botanische) Taxonomien. Die Termini in tschechischen und auch in englischen biologischen Hierarchien stützen sich auf den niedrigeren Ebenen häufig auf den heimischen Wortschatz, besonders auf der generischen Ebene. Englische Termini sind dabei gewöhnlich Komposita, tschechische dagegen Ableitungen.

Die lexikalischen Hierarchien in den Naturwissenschaften sind komplizierter und feiner strukturiert; die Hierarchien in den Geisteswissenschaften sind dagegen eher einfach, vager und umfassen weniger Ebenen. Die Meronomien umfassen weniger Ebenen, im Unterschied zu den abstrakteren Taxonomien. Die Konsistenz und die formale Durchsichtigkeit der englischen

terminologischen Hierarchien sind deutlich niedriger als die der tschechischen und der sehr systematischen lateinischen Hierarchien. Wegen der Vielfalt bei der Autorenschaft, den Unregelmässigkeiten der natürlichen Sprachen, der verschiedenen geographischen und zeitlichen Herkunft der Termini, den Einflüssen von anderen Sprachen u. s. w. weisen die Taxonomien in den Naturwissenschaften einen gewissen Grad an struktureller Unsystematizität, Inkonsistenz und Vorläufigkeit auf und enthalten Synonyme und polyseme Lexeme.

Die Nomenklatur des Rechnungswesens steht sowohl im Englischen als auch im Tschechischen dem Lexikon der allgemeinen Sprache näher. Sie rekurriert gewöhnlich auf den heimischen Wortschatz oder nutzt (im Falle des Englischen) den allgemeinen Wortschatz romanischer Herkunft. Englische Termini sind normalerweise stärker verdichtet und enthalten weniger Affixe als ihre tschechischen Gegenstücke. Typischerweise kombinieren sie ein Kopfnomen mit einem vorangestellten attributiven Substantiv (oder mehreren Substantiven). Tschechische Termini bauen dagegen häufig auf der Kombination eines adjektivischen Attributs mit einem Substantiv oder auf präpositionalen Konstruktionen vom Typ NKopf+(Präp+N) auf.

Die Termine in botanischen und zoologischen Nomenklaturen sind regelmässiger geformt als die in der Wirtschaft und im Rechnungswesen, was sich besonders anhand der tschechischen und lateinsischen Nomenklatur beobachten lässt. Die Heterogenität in den terminologischen Hierarchien der Wirtschaft rührt von deren stufenweisen Entwicklung unter Verwendung von Material aus verschiedenartigen Quellen her. Wörter, die ein Hyperonym bezeichnen, sind manchmal in die Benennung der entsprechenden Hyponyme integriert, v. a. in der Taxonomie der Biologie und hier v. a. auf den Ebenen unter- und oberhalb der generischen Ebene, in den Analogien innerhalb von proportionalen Serien und bei nicht-taxologischen, rein deskriptiven Hyponymen.

Der Hauptzweck der hier vorliegenden Studie ist das Aufdecken der generellen Prinzipien (wobei "Prinzip" hier eher deskriptiv und erklärend als prädiktiv gemeint ist), die für die meistenen lexikalischen Hierarchien relevant sind und die – ungeachtet der jeweiligen semantischen Domäne – die Organisation von Hierarchien eines bestimmten Typs regeln. Wegen der Unmöglichkeit der genauen Kalkulation in einem solch umfangreichen Gebiet, der ständingen Weiterentwicklung sowie der recht arbiträren Auswahl von Botanik und Rechnungswesen als Repräsentanten für die Natur- und Geisteswissenschaften lassen sich keine präzisen Regeln formulieren. Nichtdestoweniger kann gezeigt werden, dass im Bereich der Terminologie zwischen verschiedenen Disziplinen und Hierachietypen deutliche Unterschiede bestehen und dass es zumindest als charakteristisch zu bezeichnende Tendenzen gibt.

Shrnutí

Monografie *Terminologies, Lexical Hierarchies and other Configurations* (Terminologie, lexikální hierarchie a další konfigurace) se zabývá hierarchickými systémy lexikálních jednotek, zejména ve vědeckých terminologiích. Zahrnuje výzkum z disertační práce *Lexical Hierarchies in the Scientific Terminology* (Vogel 2006), doplněný o rozsáhlý úvod do typologie lexikálních a sémantických vztahů, větvených i nevětvených hierarchií, paradigmatických řad a dalších typů lexikálních konfigurací. Analyzuje principy vytváření terminologických klasifikačních hierarchií a určuje významové vztahy mezi jednotkami nadřazenými a podřazenými, stejně jako mezi těmi na stejné úrovni (t.j. kohyponymy).

Práce srovnává analogické hierarchie v anglických, českých a latinských terminologiích, protože navzdory v podstatě identické objektivní realitě, již terminologie odrážejí, specifické morfologické a onomatologické vlastnosti různých jazyků mají vliv na soustavnost a transparentnost lexikálních hierarchií. Hlavní rozdíly se jeví mezi tvorbou termínů v angličtině a v češtině, taxonomiemi a meronomiemi, nadřazenými a podřazenými taxonomickými úrovněmi, a mezi hierarchiemi v přírodních a společenských vědách.

Premisou práce je, že interní struktura některých domén je zřejmá a jejich snazší pochopení tak umožňuje zkušenost a analogie s takto organizovanými systémy lexika. Naopak atomismus, implicitnost a netransparentnost jsou překážkou správnému porozumění, ať už jejich příčinou je nesprávná reflexe domén, složitost popisovaných konceptů, neslučitelnost klasifikačních kritérií nebo nekompetentnost uživatelů daného jazyka.

Jako zástupce pojmových a lexikálních hierarchií ve společenskách vědách byla zvolena anglická finanční a účetní terminologie, která je srovnávána se systematickými terminologickými hierarchiemi botaniky a okrajově i zoologie. Ty reprezentují přírodní vědy, ale také hierarchie denotující materiální objekty, a z lingvistického hlediska též hierachie uměle tvořené (ač čeština a latina se v tomto ohledu od angličtiny výrazně liší).

Kapitola 1 uvádí do vlastností jazyka vědy. Popisuje hlavní typy tvorby termínů. Kapitola 2 podává přehled základních typů lexikálních hierarchií, zvláště taxonomií a meronomií, které jsou relevantní pro vědecké terminologie. Tato část vděčí za klasifikaci hierarchií, řetězců a řad a jejich vlastností zásadní práci D. A. Cruse *Lexical Semantics* (1986). Vztahy mezi prvky v hierarchiích, zvláště hyponymii, opozitnost, polysémii a synonymii, zpracovává kapitola 3. Různé pohledy na významové vztahy, zahrnování (*inclusion*), implikaci (*entailment*), sémantické zapouzdření (*encapsulation*), sylogismy (*predication calculus*) a příznakovost vycházejí z F. R. Palmera (1976) a Th. R. Hofmanna (1993).

Kapitoly 4 a 5 zahrnují výzkum taxonomických systémů biologie a ekonomie z disertační práce *Lexical Hierarchies in the Scientific Terminology* (Vogel 2006). Kapitola 4 je věnována taxonomickým názvoslovím botaniky a částečně zoologie. Zdůrazňuje formální a významové rozdíly mezi termíny v angličtině, latině a češtině. Jako typicky nekonzistentním prvkem se zabývá terminologickou synonymií. Kapitola 5 analyzuje méně formálně jednotnou terminologii financí a účetnictví. Vztahy mezi finančními termíny jsou analogické vztahům nalezeným v biologických hierarchiích, včetně časté synonymie a polysémie.

Kapitoly 6 a 7 (také převzaté z Vogela 2006) syntetizují srovnání lexikálních hierarchií v biologii a ekonomii a vyvozují závěry pro terminologie v přírodních a společenských vědách, jež zastupují. Hlavní rozdíl lze spatřit mezi termíny v meronomických a taxonomických hierarchiích, nadřazenými a podřazenými úrovněmi, a mezi přirozeně rostlými a umělými hierarchiemi. Výsledkem jsou následující tendence a vlastnosti.

Meronomie i taxonomie (většinou na generické úrovni) užívají nemotivované lexémy či kompozita tvořená z takových slov (tj. přirozené (*natural kind*) termíny a primární lexémy) v obecných, nespecializovaných částech nomenklatur. Specializovanější kontexty a vyšší taxonomické úrovně preferují odvozeniny s morfémy z klasických jazyků nebo výpůjčky, popisné složeniny a sémantické neologismy. Obecnější a hierarchicky vyšší termíny v biologických taxonomiích většinou v angličtině spoléhají na latinské termíny nebo odvozeniny z klasických jazyků, avšak taxo- a meronomie účetnictví a financí vykazují relativní tvaroslovnou stejnorodost (víceslovných) termínů na všech úrovních.

Hierarchie hmotných objektů (tzv. konkrétní hierarchie) se obecně skládají z více úrovní než vědecké taxonomie nemateriálních entit (tzv. abstraktní hierarchie). Účetní mero-taxonomie obsahují výrazně méně vertikálních úrovní, stejně tak méně větví (horizontálně) než biologické (jmenovitě botanické) taxonomie. Termíny na nižších úrovních v českých i anglických biologických hierarchiích hojně užívají domácí slovní zásobu, a to zejména na generické úrovni. Anglické termíny jsou typicky složeniny, zatímco české odvozeniny.

Lexikální hierarchie v přírodních vědách jsou složitější a strukturovanější; ty ve společenských vědách jsou spíše jednodušší, vágnější a s méně úrovněmi. Meronomie se skládají z méně úrovní, na rozdíl od abstraktnějších taxonomií. Míra konzistentnosti a formální transparentnost terminologických hierarchií v angličtině je podstatně nižší než v češtině a v systematické latině. Vlivem pluralitního autorství, nepravidelnosti přirozených jazyků, různého geografického původu či doby vzniku termínů, vlivu jiných jazyků apod. se vědecké taxonomie vyznačují jistou mírou nekonzistentnosti a strukturní nepravidelnosti, jakož i synonymičností a víceznačností lexika.

Nomenklatura účetnictví je v angličtině i češtině bližší běžnému lexiku. Užívá zvláště obyčejná, domácí slova a v angličtině též běžná slova s románským základem (zde nepovažovaná za příznaková). Anglické termíny mají tendenci k větší kondenzovanosti a menšímu využití derivačních afixů než termíny české. Anglické termíny jsou typicky spojením řídícího substantiva s předcházejícím modifikujícím substantivem (či substantivy). České termíny užívají častěji než anglické adjektivní atribut s podstatným jménem nebo opisnou předložkovou konstrukci (Prep+N) za řídícím podstatným jménem.

Termíny v nomenklaturách botaniky a zoologie jsou tvořeny pravidelněji než v ekonomii a účetnictví, což lze sledovat zejména v názvoslovích českém a latinském. Heterogenita hierarchií ekonomie je důsledkem jejich postupného růstu z různých zdrojů. Slova označující hyperonymum jsou zahrnuta do pojmenování hyponym hlavně v biologických taxonomiích na úrovních nad a pod generickou, v analogismech v paradigmatických řadách (*proportional series*) a v netaxonomických opisných hyponymech.

Hlavním cílem této studie bylo nalézt obecná pravidla, spíše popisná a vysvětlující než prediktivní, jež by byla relevantní pro většinu lexikálních hierarchií a platila by v určitém typu hierarchie bez ohledu na významovou doménu. Vzhledem k nemožnosti přesného výpočtu v tak rozsáhlých oblastech terminologie, stálému vývoji i arbitrárnosti volby botaniky a účetnictví jako modelů přírodních a společenských věd se přesná pravidla nedají formulovat. Kontrast rozdílných disciplín a typů hierarchií nicméně dokáže zvýraznit alespoň jejich charakteristické tendence.

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Terminologies, Lexical Hierarchies and other Configurations

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What types of hierarchies can be identified in terminologies? Do all hierarchies branch? Does the form of sister terms follow a similar pattern? Are terms in natural sciences formed differently from those in social sciences? Do lexical hierarchies based on classes and members have a different size from those based on whole-part relations? Do individual languages prefer different morphological structures of scientific terms? At which level are Latin and Greek components more frequent, at the superordinate or the subordinate? Do English and Czech differ substantially in this respect? Are they more similar structurally in biological or in economic terminology? Can a terminological level of a taxon be guessed from the morphological form of its name? Do alternative terms exist for one concept? Do some terms have several meanings? Do all terms have clear equivalents in other languages? Why do irregularities and gaps occur in naming in one language and between languages? What semantic relations do modifiers express towards heads in compound terms? Is the meaning of such components explicit or implicit?

These and similar questions might be asked when dealing with terminologies of scientific disciplines. With the help of numerous examples, tables and extensive reference to lexico-semantic theories, the book *Terminologies, Lexical Hierarchies and other Configurations* attempts to answer such questions or at least shed more light onto the vast and varied area of scientific terminologies. It is certain, however, that many new questions and potential explanations will arise in the minds of its readers.

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