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Analyzability and semantic associations in referring expressions : a study in comparative lexicology

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Chapter 3
The Analytic Framework of this Study

3.1. INTRODUCTION

In chapter 1, the term lexical motivation was introduced as a cover term to characterize morphologically complex and polysemous lexical items. Further, the potential results that can be expected from a systematic cross-linguistic comparison of the lexicon of the world's languages were sketched. Chapter 2 has demonstrated the role cross-linguistic aspects of lexical motivation have played in many intellectual currents in the past.

This chapter defines lexical motivation in more detail and introduces the particular fashion in which the concept is approached from a cross-linguistic perspective. In addition, the peculiar methodological challenges that accompany such a task are discussed. § 3.2. introduces how the notion of lexical motivation is operationalized so as to make its particular aspects cross-linguistically comparable; more specifically, the approach based on a list of meanings is described. § 3.3. describes the sampling procedure of the present study, § 3.4. makes explicit some general assumptions about the nature of the lexicon adopted, and § 3.5. defines the notion of lexical motivation, which has already been informally introduced in chapter 1. § 3.6. forms the heart of this chapter. It describes in detail the typological grid of form-meaning pairings that will serve as the background for subsequent typological comparison, and it describes the heuristic procedures used to classify a particular lexical item in a particular language in this grid. In addition, some serious theoretical problems of semantic analysis that are related to this endeavor are discussed, as well as the ways they are dealt with in the present study. § 3.7. moves to the more practical side of things in that it lists a number of further analytical decisions that had to be made; these relate mainly to the particular way the data were generated for the present study.

3.2. ESTABLISHING COMPARANDA

3.2.1. The meaning list

Chapter 2 demonstrated that differences in the quantity of motivated terms were noted early on, and it was pointed out that these differences played a certain role in structuralist thinking. Ullmann (1962) commented on difficulties in quantifying intuitions about these differences across languages, but later on (Ullmann 1966: 223) suggested that "it might be

possible to devise some statistical test for these relative frequencies. Such a test might be based on samples from dictionaries, on a representative selection of texts, or on both." Dictionary samples would indeed be a possible starting point to get a first impression of the behavior of different languages, but it is hard to arrive at a principled way of carrying out this kind of sampling and to systematize the results. One option would be to select every x^{th} page of a dictionary and to analyze the vocabulary items found there. This was done by Nettle (1995) and Pawley (2006) for different purposes. This approach, however, can yield an at best impressionistic overview, as Pawley himself notes. Analysis of texts, as suggested by Ullmann, would be very interesting as well. However, the texts to be analyzed would require to be glossed throughout to assess the degree of lexical motivation by morphological complexity, and such materials are not readily available for many languages, in spite of the growing number of corpora. Even more importantly, analysis of lexical items that occur in textual contexts make it intricately hard to quantify the degree of lexical motivation by lexically entrenched polysemy, because the embeddedness of lexical items in context typically selects only one of the possible readings that a lexical item might assume when it occurs in a different context (compare Cruse's 1986 discussion of contextual sense modulation). Texts were analyzed, however, for a much smaller set of languages (English, Latin, Spanish, Tuscarora) for which high quality textual data was available in addition to a fixed wordlist in Urban (2008), and it was found that there was a strong correlation between the two types of data for any of these languages.

Given that neither dictionary samples nor text analyses seem feasible, this study aims at quantifying the degree of lexical motivation in different languages utilizing a relatively small fixed wordlist of 160 meanings. The meanings are provided in English, but it should be stressed that the list is not to be thought of as a list of English words, but as a list of meanings. Most of the meanings under investigation are also found in the World Loanword Database (Haspelmath and Tadmor 2009c), and their semantics are elaborated in this publication by providing short sentences for a typical context in which they might naturally occur or by providing a definition.[1] These clues to the semantics of the items on the word list were adopted for the present study, and they served as guidelines for deciding whether a given lexical item in a particular language was to be considered semantically equivalent (see Haspelmath and Tadmor 2009b: 8). In some cases, it was necessary to narrow down intended meanings beyond Haspelmath and Tadmor. A fine example is the meaning 'flower,' for which no meaning description or typical context is given in the World Loanword Database. However, English *flower* is ambiguous and can either refer to the reproductive structures of plants (this reading is near-synonymous with *bloom* and *blossom*) or to a small plant with a decorative flower in the first sense (the meanings are treated distinctly for instance in German, which has *Blüte* and *Blume*). Presently, the first ('Blüte') sense of *flower* is targeted, since it is this sense for which it can be assumed that there is a conventionalized term in many languages. Furthermore, Buck (1949) was used as a guideline when it came to accepting or rejecting near-synonymous meanings as semantic proxies for the target meaning.

[1] This list is in turn based on Buck (1949).

The data acquisition process allowed for the relationship of meanings and lexical items to be many-to-many: rather than trying to pick the "best" equivalent for a given meaning in a target language, all lexical items listed under the respective headword in the consulted sources were taken into consideration and copied to the database for this study. Conversely, a single lexical item may correspond to two or even more meanings on the wordlist.

The 160 meanings belong to four semantic domains: topological and nature-related terms, artifacts, body-part terms, and finally, terms for phases of the day and a small number of miscellanea. In the following, each semantic domain, the individual meanings subsumed under it, and the reasons for its investigation with respect to lexical motivation are briefly described.

3.2.1.1. Topological and nature-related terms

1. animal
2. ashes
3. bark
4. bay
5. beak
6. bird
7. bloom (blossom, flower)
8. branch
9. bud
10. cave
11. clearing
12. cloud
13. coal
14. coast
15. dew
16. dust
17. eclipse
18. egg
19. embers
20. estuary
21. feather
22. flame
23. flood
24. foam
25. fog/mist
26. forest
27. gold
28. grass
29. headland
30. honey
31. horizon
37. Milky Way
38. moon
39. mountain
40. mushroom (fungus)
41. nest
42. plant
43. puddle
44. rain
45. rainbow
46. resin
47. river/stream
48. river bed
49. root
50. seed
51. shadow
52. sky
53. smoke
54. soil
55. spark
56. spring/well
57. star
58. steam
59. straw
60. sun
61. swamp
62. tail
63. thorn
64. thunder
65. tree
66. valley
67. volcano

32. horn
33. lagoon
34. lake
35. lightning
36. meteoroid (shooting/shining star)
68. waterfall
69. wave
70. wax
71. whirlpool

As Mark and Turk (2003a) point out, "[t]he landscape, a place to stand, places to live and find resources, is ... absolutely essential to human existence," and this putative basicness of landscape and natural phenomena to human experience is what makes them interesting semantic fields for the present study (see also Levinson 2008: 257). However, it would be a premature conclusion to believe that this basicness automatically entails that languages respond to the stimuli provided by the environment in uniform ways. Smith and Mark (2001) report relatively uniform responses in tests in which college students in the United States were asked to name "kinds of geographic features." The most frequent answers were items such as *mountain, river, lake, ocean, valley*, and so forth. As "preliminary data from parallel experiments carried out in Finland, Croatia, and the United Kingdom produced very similar trends" (2001: 610), Smith and Mark suggested that the domain of geographical features form a "coherent knowledge domain" with fairly uniform structure cross-linguistically. Mark and Turk (2003b: 39), however, in a study of landscape categories in Yindjibarndi, a Pama-Nyungan language of Australia, later found that "at the basic level of category terms, the Yindjibarndi landscape vocabulary is completely different from the terms covering the equivalent domain in English." The authors therefore suggested the initiation of a new research field of *ethnophysiography*, devoted to describing differences in the conceptual organization of landscape categories in different communities. Subsequently published data on a variety of languages in Burenhult (2008a), in particular Levinson (2008), have reinforced the need for the recognition of differences between individual languages. For instance, in Yélî Dnye, *mbu*, which can be used to refer to a 'mountain,' "is unspecified as to size, being applicable to features of varying magnitude (mountains, hills and even crab mounds on the beach), and only encodes that the feature has a conical shape" (Burenhult and Levinson 2008: 141). Perhaps more importantly, Levinson (2008) argues that categorization of the landscape domain need not be driven by perceptual salience of the environment's features. Instead, categorization is said to be often governed by human affordance (a term coined by Gibson 1977, 1979 to describe the latent possibilities for action the environment offers) and culture-specific models. On the other hand, in Jahai, as described by Burenhult (2008b: 185), *tɔm* 'water' "is generally applicable to units, courses and bodies of water of all kinds and sizes." This effectively means that there are no words in Jahai that directly correspond to words like *river, creek, stream, lake* etc., although the language does allow to form complex terms on the basis of *tɔm* involving body-part metaphors to refer to specific aspects of *tɔm*s. What is important for the purpose of the present study is that, while there is not necessarily a set of lexical items whose semantics corresponds to, say, English words such as *mountain, river*, etc., there are lexical items that allow to *refer* to these configurations in the landscape, and it is not least the variation in the other semantic areas covered by the respective expressions that are an important aspect of the present study. In other words, cross-linguistic

comparison as carried out in the present study is necessarily based on extensional rather than intensional criteria (see Goddard and Wierzbicka 2010 for an overview of different approaches and the problems associated with them; one of the drawbacks of extensional analysis they mention is the difficulty of applying them to abstract semantic domains which are not investigated presently).

Note also that the above list does not exclusively feature meanings related to landscape, but also an array of other nature-related items. Many of the landscape terms and many of the other nature-related terms have a quite different ontological status. Some have relatively clear-cut boundaries (what Mark et al. 1999: 286 call 'bona-fide boundaries,' which "correspond to physical discontinuities in the world"), others don't. Related to this, some of them are attached and some are detached objects in terms of Gibson's (1979) ecological psychology: detached objects are wholes with clear-cut boundaries separating them from their respective environment and they can be grasped and moved by humans (this is also true of artifacts). The ontology of attached objects, on the other hand, is such that they do not have clear boundaries that would unambiguously delimitate them from their environment: they cannot be separated from the place where they are found, which, according to Smith and Mark (2003) is the case for landforms such as 'mountains' and 'valleys.' Generally, their conclusion is that "the pertinent basic level categories in this geographic domain of primary theory are precisely entities such as mountain, hill, island, lake, and so forth," which is one of the reasons why a number of them figure on the wordlist.

Other meanings on the wordlist, like 'wax,' denote masses, others, like 'nest,' denote individualized entities in the world. Some of the latter have component parts that themselves have lexical labels, others do not.[2] Some, like 'tree,' 'bird,' 'animal,' and 'plant,' participate in broader lexical taxonomies (in these particular cases, the life-form and unique beginner ranks as recognized in ethnobiology), while others do not seem to be embedded in taxonomic hierarchies at all, or at least not in a straightforward way. All these distinctions will allow for more fine-grained observations as to potential differences how these objects are treated linguistically in different languages.

It is clear that the environments of the speakers of the languages of the present study can differ quite drastically. While certainly the 'sun,' the 'moon,' and 'clouds' are experienced in all conceivable environments, maritime and hydrological concepts such as 'waterfall' and 'bay,' and possibly even 'rain' or 'river' are not necessarily. Thus terms denoting these entities may not be part of the vocabulary of, say, speakers of Ngaanyatjarra, who traditionally live in the Western Desert area of Australia. This statements probably also extends to concepts such as 'forest' or 'cave.' Similarly, New

[2] Compare the distinction between parts and pieces in Hayes (1985) and Cruse (1986: 157-60). "Parts" in this sense have "non-arbitrary boundaries and determinate function with respect to the whole" (Cruse 1986: 158-159; this notion draws close to the more traditional term of meronymy). "Pieces," in contrast are not characterized by these properties. For instance, the type bars and keys are parts of a typewriter but not pieces; when a typewriter is cut into several arbitrary portions by a hacksaw these are instances of pieces, but not of parts (example from Cruse 1986).

Guinea and Australia did not host any horned animals prior to their introduction by Europeans, which leads Laycock (1970: 1150) to state that this concept is "totally unsuitable for New Guinea" for elicitation. The non-universality of some of the concept on the meaning list is acknowledged.

3.2.1.2. Artifacts

1. airplane
2. ball
3. bed
4. belt
5. boat
6. car
7. chair
8. clock
9. glasses
10. house
11. key
12. knife
13. ladder
14. mirror
15. needle
16. paper
17. pen
18. rope
19. scissors
20. shoe
21. road/street/way
22. table
23. toilet
24. train
25. weapon
26. window

Artifacts on this list fall roughly into two categories: those that will be relatively recent arrivals in many areas of the world, introduced in the process of acculturation to (mostly) western-based societies, and those that are relatively basic tools (such as 'knife' and 'rope') that can be expected to have been present in most societies for a very considerable time span. There is thus a twofold division in the items in this semantic domain, and the purpose of this division is also twofold: first, it allows to investigate systematically whether there are differences with respect to motivation in languages with respect to the "old" artifacts and the newly acquired ones (it also allows to investigate related questions, such as whether lexically motivated terms for "old" artifacts entail a motivated lexicon for the recent cultural additions, etc.). More importantly, this list of artifacts allows to expand Brown's (1999) study on lexical acculturation in languages of the Americas, which reveals striking uniformities in the denomination strategies chosen, and thus will allow to answer the question as to whether these commonalities are peculiar to the Americas or are indeed recurrent on a global scale.

3.2.1.3. Body parts and body fluids

1. Adam's Apple
2. ankle
3. beard
4. bladder
5. blood
6. bone
7. brain
8. breast
20. rib
21. saliva/spittle
22. scar
23. skin
24. snot
25. sperm
26. stomach/belly
27. sweat

9. buttocks
10. calf
11. cheek
12. chin
13. eyeball
14. eyebrow
15. eyelash
16. nipple
17. nostrils
18. pupil
19. pus
28. tear
29. tendon/sinew
30. testicle
31. tongue
32. tooth
33. urine
34. uvula
35. vein
36. womb
37. wrinkle

Body-part terminology is the *locus classicus* of comparative lexicological and semantic research, and a huge amount of literature has amassed which explores the realm of body-parts cross-linguistically. The reasons for this are obvious: since everybody has a body (but not every language has a word for body, Wilkins 1996), this is indeed a semantic domain that is universal to human experience, and mereological divisions of some sort within this domain will be found in all languages. In addition, the human body is commonly assumed to be a fine example of the role that perceivable discontinuities play for the division of a whole into parts (see Enfield et al. 2006 for critical evaluation). Given the relatively large amount of research that has already accumulated on cross-linguistic categorization of the body (though not all claims that have been made are uncontroversial), the present study focuses on parts of the body that have received relatively little to no attention. Thus, 'eye' and 'nose,' for instance, are not included in the list above, although even these concepts would have had the potential to reveal interesting cross-linguistic facts, because they are - contrary to intuition - not always expressed by morphologically simplex items.[3] What is more, the present study extends the discussion to the somewhat more sensitive domain of terms for body-fluids, a semantic area where little is known about cross-linguistic denomination strategies.

[3] For instance, in the Polynesian outlier language Kapingamarangi 'eye' is *godo-mada* 'thing-see' (Lieber and Dikepa 1974, for diachronic data from other languages that are indicative of erstwhile morphological complexity see also Eilers 1973a).

3.2.1.4. Phases of the day and miscellanea

1. dawn
2. day
3. dusk
4. night
5. noon
6. sunrise
7. sunset
8. man (human being)
9. Saturday
10. virgin
11. widow

There is every reason to believe that humans in all parts of the world are aware of the interplay of day and night, and the transition phases between them. However, it is in fact an open question in how far this likely universality is reflected lexically. Also, although the phenomena in 1-7 of this list are clearly perceivable, they are, unlike most meanings in the semantic domains discussed so far, not tangible and do not have the typical "thinginess" associated with phenomenologically and temporally stable entities in the extralinguistic world. Insofar, this section of the wordlist is more experimental (and hence also much shorter) when compared with the other parts. The same is true of the miscellaneous meanings in 8-11.

3.2.2. HOW CAN COMPARABILITY BE ENSURED?

Meaningful cross-linguistic comparison presupposes that comparanda are kept constant on the level of the signified. If one looks up a particular word in dictionaries of two languages, how can one be sure that the translational equivalents found actually "mean the same thing"? Take, for example, the Greek word *límni* and Blackfoot *ómahksíkimi,* which both are glossed as 'lake.' How can one be justified in saying that Greek utilizes a simplex lexical item to denote 'lake,' whereas Blackfoot has a complex expression that consists of words meaning 'large' and 'water'? Translational equivalence does not automatically entail semantic equivalence (Behrens 2000). In spite of the strong intuition that when words in different languages are translational equivalents of each other, they share at least some common semantics, it would be quite naïve to assume a priori that this need always be the case for all investigated meanings. This is clearly articulated by Buck (1929: 216):

> Whoever deals with 'synonyms' has to face the fact that these are generally only roughly synonymous. Words from different languages do not often coincide in all their applications, they rarely cover quite the same ground. To treat every application separately, comparing words only in specific fully equivalent phrases, is a counsel of perfection which would so complicate matters as to wreck any comprehensive project.

In order to provisionally deal with this issue, and to avoid the worst undesired effects of the problem of cross-linguistic semantic comparison hinted at by Buck, the present study - as discussed earlier - is restricted to low-level referring expressions (what Lyons 1977 calls "first-order entities") on the assumption that expressions that refer to some entity in the real world are better suited for comparison than are terms denoting actions and events ("verbs"). First, the semantic properties of these referring expressions seem to be relatively stable and resistant to contextual modulation: Cruse (1986: 152) states that "[i]t appears to be a property of predicative terms such as verbs and adjectives that their meanings are context-dependent to a much greater extent than those of nouns." Note also Foley's (1997: 35) discussion of 'rock':

> *Rock* is a noun and describes, as nouns prototypically do, an object locatable in the physical world, in this case a hard, solid mineral object of the natural world. As rocks are concrete objects, they are freely apprehensible by our senses; we can see them, touch them, and, if they are small enough, manipulate them with our hands. Further, they are susceptible to changes in state: they can be moved, broken, crushed or thrown. Finally, the boundaries of what is a rock and what is not are fairly sharp, both from the surrounding space and from other objects. As we can manipulate a rock, we can determine its boundaries in space, and, by noting the features of this object bound in space in this way, we are able to sort rocks from trees or mothers. Given all these properties of the objects called rocks and human perceptual and cognitive mechanisms, it seems warranted to hypothesize that a noun corresponding to *rock* is rather a predetermined category in the vocabularies of all languages. This would not exclude further nouns in a language to refer to types of rocks such as *boulder*, *pebble*, and *stone*. These may or may not be found, but all languages would have the core term *rock*.

Foley goes on to contrast verbal meanings with those of prototypical nouns and notes that they are in many ways just the opposite: they do not have sharp boundaries that set them out perceptually against other entities in the world, etc.[4] Indeed, it is for instance hard to believe that the semantics of terms for 'sun' listed in dictionaries are semantically so incompatible to each other that cross-linguistic comparison would be rendered unjustifiable. Put differently, it is assumed that the core of the investigated meanings are, as elements of the phenomenological world, input to the human perceptual apparatus (see Quine 1973: 23 for similar argumentation in philosophy).[5] Semantically, they are assumed to be what Goddard (2001: 18) calls "approximate universals," that is, meanings that can be

[4] Note also that most of the meanings on the wordlist have the property of being relatively stable in time, a criterion used by Givón (1979, 1984) for the identification of nouns cross-linguistically.

[5] See Immler (1991: 40) for an earlier strong claim that certain meanings need to be expressed by languages of all human societies derived from "extrapolation from our implicit knowledge about our own language."

expressed in the majority of the world's languages. This does not presuppose or entail that there is a monosemous term exclusively devoted to any of the meanings, but rather, that there is some way in which languages allow to refer to those meanings, i.e. that there is an overlap in the extensional range encompassed by the lexical semantics of the compared lexical items.[6] In other words, as already alluded to above, the underlying conception of semantics is necessarily extensionalist rather than intensionalist. The variability that one can expect to find does not hinder investigation, but is rather among the research goals of the present study.

Further, anticipating some results of the present investigation, there is at the very least circumstantial *a posteriori* evidence justifying the assumption of cross-linguistic comparability of the investigated meanings. As will be seen later, the preferred way for languages to form complex terms for 'flame' is to conceive of them as being similar to a 'tongue' (Appendix E, 22), and, arguably, this points to a common perceptually-driven conception of 'flame.' Likewise, it is hard to believe that both Mali and Fijian should conceptualize 'flood' with reference to 'scraping,' if they did not share an essentially similar notion of 'flood.' This is circumstantial evidence only, and it cannot go full way in justifying the working hypothesis of at least rough semantic comparability, but it is reason for confidence that a comparative work such as the present one is not entirely misguided. Still, the general issue of semantic comparability and the justification for semantic analyses of the obtained data remains in spite of this first provisional measure. A more complete exposition of the issue and possible approaches to minimize problems caused by it follows in § 3.6.3.

3.2.3. THE WORDLIST AND THE NOUN/VERB-DISTINCTION

For the purpose of this study, nominal vocabulary is delimitated by the ability of the members of this class to refer (Searle 1969/1980, Lyons 1977). Nominals, in this sense, single out perceivable stimuli in the phenomenological world about which something can then be predicated. This study thus does something that is abhorred in grammatical descriptions of parts-of-speech systems in individual languages: it defines "nominal" vocabulary notionally, i.e. on semantic and pragmatic grounds, rather than on

[6] Compare Haspelmath (2007: 127): "Notice that for the purposes of typological comparison we do not need identity of strictly linguistic meanings. All we need is some level of meaning at which meanings must be commensurable." See, in addition, Kibrik (1986) for similar remarks, and Rijkhoff (2009) for critique.

morphosyntactic and distributional criteria (Schachter 1985).[7] This does of course not entail the suggestion to abandon the primacy of grammatical over semantic criteria in analysis of parts-of-speech systems. Rather, the present study investigated semantic configurations that are, on the conceptual level, *construed* as nominals (as "things" in Langacker's 1987a terminology) in the sense of Cognitive Linguistics (Langacker 1987b, Talmy 1988/2006) and that are therefore, at the linguistic level realized in the majority of languages by nouns (defined on language-specific criteria) rather than verbs. This is not always the case. To adduce an example from the database, the Oneida word for 'airplane,' *teka·tʌ́he?*, is, like other referring expressions in Oneida (Michelson 1990, Abbott 2000, see also § 4.6.4.3.2.), a straightforward verb on morphological grounds: it consists of the verb root *-tʌ-* 'to fly,' and the prefixes *te-* (called 'dualic' by Iroquoianists and having a variety of functions), *ka-* 'neuter agent' (the vowel of which is lengthened in the surface representation due to a phonological rule), and the habitual aspect suffix *-he?*. There is no nominalizing morphology whatsoever, and all bound morphemes occurring in the term are typically associated with verbs only. Thus, *teka·tʌ́he?* literally means 'it flies habitually,' and could probably be interpreted just in this way, i.e. predicatively, in an appropriate context (see Michelson 1990 specifically for these aspects of the lexicon of Oneida). Such phenomena are not restricted to North America, however. An even more extreme example from a different area of the world mentioned by Brugmann (1900/1981: 157) is Sanskrit *ki-vadanti* 'rumor,' which is literally translated 'what do they say?' In fact, it is a full-fledged sentence, with a finite verb form, and yet clearly capable of referring (compare also French *on-dit* 'rumor' from *on dit* 'one says).

For the context of the present study, it would make little sense to exclude terms like Oneida *teka·tʌ́he?* from the analysis on grounds of their formal realization as verbs. In fact, interesting cross-linguistic aspects of the lexical organization of the nominal domain would likely be lost by such a decision. In short, for the present study, it does not matter in practical terms whether the equivalent given for one of the meanings on the wordlist was stated in the consulted sources to be either noun or verb (or something else) in morphosyntactic terms.

3.2.4. THE WORDLIST AND THE NOTION OF BASIC VOCABULARY

Basic vocabulary has been defined along a variety of parameters, such as assumed cultural neutrality (Swadesh 1971), frequency of use (McCarthy 1999), resistance to borrowing and

[7] Note also that not all approaches to lexical and/or syntactic categories are willing to accept this fully and suggest instead to make use of semantic criteria, at least to some extent, in their delimitation, see e.g., from different perspectives, Lyons (1966) and Anderson (1991, 2011a: 66-67; 98-105).

morphological simplicity (Tadmor 2009, Tadmor et al. 2010), and others (see e.g. Huttar's 2003 discussion of the different points of time of emergence for certain meanings in the process of creolization and its relation to the notion of basic vocabulary). Strictly speaking, the present list cannot be claimed to be made up of vocabulary items that conform to any of these definitions. Many artifacts are certainly not culturally neutral (but, as noted above, they can be assumed to be familiar in most parts of the world by today, and the linguistic response in different parts of the world to these stimuli is the principal reason for their inclusion). Also, as already discussed, there are some topological concepts on the list that will probably not be familiar in some parts of the world. Likewise, some of the meanings will probably figure prominently in discourse across cultures, while others almost certainly won't. Finally, morphological complexity in the investigated items is the very notion that is to be determined in the present study, and therefore cross-linguistic realization by simplex terms would have been a poor candidate to serve as a guideline for the selection of meanings to begin with. However, there is a fair degree of overlap between the presently used wordlist and the nominal vocabulary in the Swadesh list and the Leipzig-Jakarta list established in Tadmor (2009) and Tadmor et al. (2010). Further, many researchers will have more intuition-based conceptions of what is and what is not basic vocabulary, and some of the concepts on the present list will not conform with intuitive judgments as to basicness. The present word-list is not intended to serve any other purpose than to be used for the present study. It is therefore best thought of simply as a list of meanings with some internal semantic diversification that seem worth investigating (some of which are basic in the sense that they figure on the pertinent lists) and for which, despite their referents' absence in some areas of the world, the majority of dictionaries can be expected to list equivalents.

3.3. SAMPLING

Cross-linguistic studies require some sort of language sample. To decide on the precise makeup of the sample is not an easy task. On the one hand, temporal and bibliographical restrictions need to be taken into account, on the other hand, the quality and validity of the generalizations that will be arrived at by evaluation of the sample data are a direct function of the soundness of the sample design.

The topic of the present work has never been studied in any systematic fashion from an explicitly cross-linguistic point of view, and it is not at all clear just what relevant factors might be at play in shaping the behavior of individual languages with respect to motivation in the nominal vocabulary. Of the several types of language sampling procedures available (see e.g. Rijkhoff and Bakker 1998, Bakker 2010 for an overview),

construction of a variety sample, as developed by Rijkhoff et al. (1993) and Rijkhoff and Bakker (1998), seems to be the most appropriate sampling procedure. This type of sample is designed specifically for use in exploratory studies where little is known in advance about the investigated variables, and it is known to produce highly reliable results (Widmann and Bakker 2006). A variety sample is constructed by measuring the internal diversity of language families in the language classification chosen to be underlying the sample. This is done by means of a fixed computational method called the Diversity Value technique. The Diversity Value is used to determine how many languages per family are to be included in the sample, given a predetermined desired sample size. Since it is impossible to sample fractions of languages, the smallest possible diversity sample logically must comprise at least one language per highest-order grouping (family) recognized in the underlying classification, with isolates and pidgin and creole languages each treated as one pseudo-family; the remaining number of languages are distributed over families as determined by the Diversity Value algorithm.

Having decided on the sample procedure, the underlying language classification and the desired sample size need to be decided on. Unfortunately, most extant word-wide classifications have their problems. Ruhlen (1991) operates with the assumption of a small number of macrofamilies largely determined by the contentious technique of mass lexical comparison. Voegelin and Voegelin (1977) are not always unambiguous in assigning a particular language to a particular family, and the Ethnologue's classification (Lewis 2009 and previous editions), while undisputedly the most inclusive of all available classifications in terms of the sheer number of languages, has the drawback that it is not at all made explicit how decisions as to subgrouping have been made, nor who made them. An alternative is Dryer (2005a), the classification employed in the World Atlas of Language Structures (Haspelmath et al. 2005). It is based on the Ethnologue's classification, but was revised in some places, and it is the work of a clearly identifiable author responsible for decisions. A further advantage of Dryer's classification is the relatively high number of families recognized in the Americas compared with other proposals, since the structural diversity of the linguistic situation in the Americas is argued to have not been sufficiently captured in previous typological studies by Dahl (2008). Dryer (2005a) was used as the classification to be used for the present study, although it has the drawback that it is relatively new and therefore the relevant sampling literature supplies no information as to precisely how remaining languages should be distributed over families. [8] Dryer (2005a)

[8] Note that the classification has been altered slightly in the subsequent online version of the World Atlas of Language Structures (Haspelmath et al. 2008) and may be subject to further refinements in the future. Here, the original classification as of 2005 if used. Further, it should be made explicit that choosing a particular classification

recognizes 93 highest-order groupings that contain more than one language, i.e. there is a minimum of 95 languages (plus one isolate and one pidgin or creole language) to be in principle included in the sample. This figure is already fairly close to Perkins's (1989: 312) recommendation of "[u]sing around a hundred languages for most linguistic samples to balance the requirements for representativeness and independence in samples." Unfortunately, as will be discussed later in greater detail, there is of course the well-known problem of bibliographical restrictions that prevent every single one of the 95 families from being represented in the sample, and the sample size would eventually drop significantly below the number of 95. Therefore, more than one language was included for some larger families, as when applying a Diversity Value algorithm like in the originally proposed design for a variety sample. Given that, as mentioned earlier, Dryer's (2005a) classification is fairly recent and could therefore be not considered in the original literature that developed the sampling technique to construct variety samples, it was necessary to devise an ad-hoc procedure to accommodate this sampling technique to Dryer's classification. One additional language was included in the sample for every 10th genus, which is a subordinate genealogical unit in Dryer (2005a), examples of which would be Romance or Germanic within Indo-European, that the family hosts. Thus Uralic, which has three distinct genera in Dryer (2005a), is represented in the sample by one language (namely Kildin Saami), Sino-Tibetan, having 14 distinct genera, is represented by two languages (namely Mandarin Chinese and Bwe Karen) and the large Niger-Congo family of Africa with as many as 25 separate genera is represented by the three languages Buli, Efik, and Mbum. Admittedly, this is a rather coarse mechanism, whereas the original method to compute Diversity Values and to determine how many languages to include per family is mathematically in contrast quite sophisticated. However, as a look at the appendices in Rijkhoff and Bakker (1998) reveals, the true virtue of the Diversity Value calculation plays out most strongly with very large samples, whereas in samples that are not significantly larger than the minimum sample size imposed by the classification used, the outcome is usually that one or two extra languages are added to the large families. Therefore, it is appropriate to be confident that the sample resulting from the admittedly coarse sampling method presently employed does not diverge drastically from one that would be constructed by thorough application of the Diversity Value technique, provided that, to repeat, sample size is rather small.

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to stratify the sample does not necessarily entail that the typologist (nor of course, any of the authors of descriptive material used in his/her study) agrees with the classification in all cases.

On the basis of this technique, a genealogically balanced sample comprising 109 languages was arrived at, for which published materials were sought. Since the topic of this work is concerned with the lexicon, dictionaries were the prime target of this search, and indeed, availability of a dictionary was the principal guide when it came to the question as to which language(s) of the family were to be selected to represent it in the sample. In many cases, i.e. when lexical sources were readily available only for one language per family, this already determined unequivocally which language was to be selected for the sample. When several languages fulfilled this criterion, which is obviously the case for instance for the majority of Indo-European languages, but also for some minor families, for instance the Iroquoian languages, several of which come with excellent and detailed dictionaries, a language was chosen at random.[9] In addition, relevant grammatical information for the chosen languages was assembled either from the grammar sketch often provided in dictionaries themselves or, where this was not or not satisfactorily possible, additional sources for grammatical structure were consulted.

The aim of this study is (at least) two-pronged: while investigation of the quantitative aspect of lexical motivation is certainly a very important goal, qualitative semantic analyses as to recurrent conceptualization strategies and cross-linguistic differences in them are at least as relevant. However, the different questions pose different demands on the data: quantitative analysis requires a robust data representation for individual languages so the analysis can be considered meaningful. If only terms for a small fraction of the 160 concepts selected for investigation can be gathered from published sources, serious doubts arise as to whether they can be indicative for the language's profile with respect to lexical motivation. This is for instance the case for Rao of the Lower Sepik Ramu family of New Guinea, for which a mere 44 of the 160 concepts could be extracted from the consulted source. This is clearly insufficient for arriving at any conclusions beyond speculation as to the lexical profile with respect to motivation in Rao. On the other hand, the overall scarce representational score for Rao makes it no less interesting that the Rao word for 'cloud,' *grača*, apparently contains the word for 'sun,' *gra*, just like *núnik kás* 'cloud' in the much better documented Rama language of Nicaragua, contains *núnik* 'sun, day.' Given the different purposes that the sample needs to fulfill, it seemed appropriate to adopt the policy to use as much data as possible from different families for the qualitatively oriented part of this work in order to maximize the linguistic diversity the sample captures (after all, this is what it was designed to do!), but to introduce a threshold of 104, or 65 per cent, of meanings that need to be represented in the database so that a given language can be

[9] More precisely, a random number was generated at www.random.org and the language whose position in an alphabetical list of the languages in the family corresponded with the generated random number was chosen.

said to be represented adequately to give a reasonable picture of its behavior with respect to motivation in the nominal vocabulary. Consequently, the sample is split for the different purposes. Languages with more than 65 per cent of lexical items represented are grouped in what will be called the CORE SAMPLE. This sample comprises 94 languages. Since statistical analysis, which will be carried out throughout in the search for typological correlations, requires datapoints (in this case: languages) to be independent of one another, there is a restricted STATISTICS sample of 78 languages which features only one language per family recognized in Dryer (2005a). At times, statistics will also be performed on a more extensive sample, with appropriate counter-measures taken to ensure validity of the performed tests. Unless specifically indicated, all statistics is carried out on the basis of the statistics sample (moreover, there is the STATISTICS VALIDATION SAMPLE, the purpose of which is described in § 5.4.1.). Together with the 18 languages that did not fulfill the 65 per cent criterion, the core sample constitutes the EXTENDED SAMPLE 1 (EXT-1 for short). This sample still has the property of being genealogically balanced. In addition, in the course of preparation, in some cases materials for additional languages were gathered, for a variety of reasons. First, it was sometimes the case that on the basis of the originally chosen language the 65 per cent threshold could, contrary to what was expected from the general appearance of the source, not be attained. If another language from the same family had a dictionary available, data was gathered for that language, and quite often, more data could be found and this language could be included in the core sample. Second, in the course of the work a number of sampled languages chosen behaved contrary to what was expected in one aspect or another. Of course, these languages were not removed from the sample (this would be deliberate manipulation), but in some of these cases an additional dataset was, where easily available, gathered for a closely related language to be able to ascertain whether there is reason to believe that the first language was simply aberrant in its behavior. Thirdly, publication of the World Loanword Database (Haspelmath and Tadmor 2009c) made available a set of high quality vocabularies that have the particular advantage that they explicitly include information about the morphological analyzability of the vocabulary items listed, which is an invaluable asset for a study such as the present one. Unfortunately, the World Loanword Database was published only when the database for the present project was already in a fairly advanced state, so that not all potentially relevant data could be featured in the core sample. Still, this opportunity was taken to augment the sample further at relatively little cost by including data from six languages in addition to those that are already featured in the core sample. Together with the EXTENDED SAMPLE 1, the abovementioned data constitute the EXTENDED SAMPLE 2 (EXT-2 for short), which comprises data for a total of 148 languages. This sample is not genealogically balanced, and must be considered a mere convenience sample in terms of Rijkhoff and Bakker (1998). The EXT-2

sample is used as the basis for the extensive list of recurrent lexico-semantic associations found in Appendix E and for many evaluations with regard to semantic associations in chapter 6. A list of all sampled languages and consulted sources is in Appendix A. Figure 1 is a map of the world showing the location and sample affinity of all languages investigated.

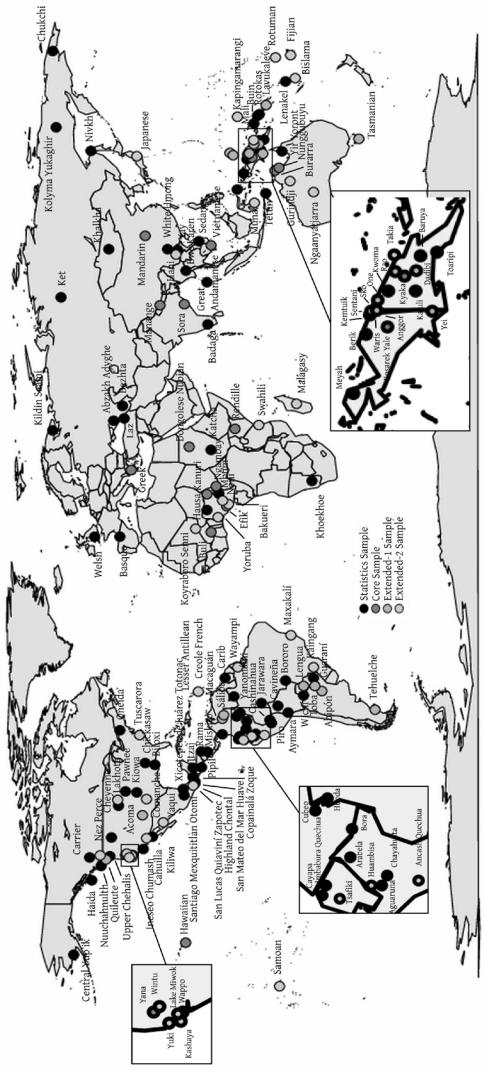

fig. 1: languages in the different samples and their location

3.4. SOME BASIC ASSUMPTONS AND THEORETICALPREREQUISITES

3.4.1. WHAT'S IN THE LEXICON?[10]

Central to a study in lexicology is to make clear from the outset the underlying conception of the lexicon. According to a very widespread view that has a long tradition in linguistics, the lexicon is the "locus of unpredictability of form-meaning associations" (Anderson 1985: 4). This view has received backup from early cognitive studies on the storage capacity of the human brain. In line with the then prevailing mind-as-machine-metaphor (see Daugham 2001 for review), the human brain seeks to maximize storage efficiency: therefore, only idiomatic expressions (simplex lexical items which are by definition idiomatic because of the arbitrariness of the relation of meaning and form, idiomatic compounds and idioms themselves) are assumed to be represented by an entry in the lexicon of their own, whereas all non-idiomatic expressions do not have an entry, because their meaning can be derived by productive rules. As DiScullio and Williams (1987: 3) famously summarize, "[t]he lexicon is like a prison - it contains only the lawless, and the only thing that its inmates have in common is lawlessness." However, conceptions of the lexicon differ quite radically depending on the point of view and purpose of the analyst. Pawley (1996a) and Himmelmann (2004) distinguish between the "grammarian's lexicon" and the "lexicographer's lexicon" and show that assumptions about what "is in the lexicon" differ quite radically in the conceptions of the two research traditions. In the words of Pawley (1996a: 189):

> Whereas a lexicographer's lexicon is essentially about conventional expressions for conventional concepts, a grammarian's lexicon treats exceptions to well-formedness constraints in grammars. There is a common membership in the ideal lexicons of lexicographer and grammarian, namely, the form-meaning units that are either unanalyseable or irregularly formed. Where their memberships diverge is in the treatment of complex expressions that are both well-formed and more or less conventional. In the languages that I am familiar with, the class of such expressions (derived and compound words, catch phrases, speech formulas, etc.) is indefinitely large. ... But it is probably safe to say that, for a given language, the sort of minimalist lexicon posited as the ideal in certain grammarians' models will contain less than ten percent of the lexemes that might be included in a lexicographer's ideal comprehensive dictionary.

For the present work, the lexicon of languages is the topic of investigation in its entirety. This entails that it is taken to be the repository for any conventional form-meaning

[10] The title of this section owes its wording to Jackendoff (2002).

pairings that are memorized by speakers as the normal way to refer to a certain extra-linguistic entity (see also Schultze-Berndt 2000 for a similar position and Bybee 1995 for arguments from the perspective of word frequency). These include morphologically simplex items, compounds, derivatives, phrasal lexemes, idioms, etc. Conventionality, however hard to pin down in a theoretically principled fashion (see Pawley 1986 for some proposals), rather than theoretical considerations from the point of view of a particular linguistic theory, are the characteristic taken to be defining feature of whether a unit is in the lexicon or not.

3.4.2. COMPOSITIONALITY OF MEANING

Closely connected to the conception of the lexicon is the question if, and if yes to what degree, one accepts the existence of the principle of compositionality of meaning, which states, roughly, that the meaning of a complex expression is the sum of the meaning of its parts and the combinatorial principles that link the parts together. Frege (1892) introduced this principle initially with reference to sentences, but its scope was later expanded to the word-level as well. Thus, it is said that compounds such as *kitchen knife* are amenable to an interpretation in line with the principle of compositionality of meaning (a 'kitchen knife' is a 'knife' that has got something to do with the 'kitchen,' and is most likely used for preparing food). Other types of compounds, such as *hot dog*, along with phrasal idioms such as *kick the bucket*, are said to be not analyzable compositionally: a 'hot dog' has got nothing to do with 'dogs,' and 'to die,' the meaning of *to kick the bucket,* has got nothing to do with either 'kicking' or 'buckets' altogether. These cases appear straightforward, but often it proves to be much more difficult to arrive at a well-founded statement whether a given lexeme or construction is interpretable compositionally. Here, the precise delimitation of what an interpretation in line with the principle of compositionality is becomes intuitively less clear. Often the criterion of purported additional semantic features is invoked to argue that a given lexeme is non-compositional semantically and must therefore be assumed to be stored in the lexicon. For instance, the addition of a semantic feature of 'professionally' or 'habitually' is taken to be evidence to show that the English agent noun *teacher* is not, or not fully, interpretable compositionally: a 'teacher' typically is not anybody who happens to teach, but someone who does it professionally in a school or in another educational institution (Kastovsky 1982). This criterion is, though, vague in that "it is not clear what the 'addition of semantic information' should be taken to include" (Bauer 1983: 57). Intuitively, one would be inclined to say that *teacher* is more readily interpretable compositionally than classic instances of idioms such as *to kick the bucket*, and indeed, compositionality of meaning is probably best seen as a scalar phenomenon rather than an absolute dichotomy. As summarized by Hoeksema (2000: 856), "[t]here is a gliding scale from fully compositional

(or motivated) to fully idiomatic (or conventional)," and the principle of compositionality is thus "not an empirical constraint on possible interpretations, because it may be violated, as it is in the case of idioms." Blank (2001) goes one step further by arguing that *any* morphologically complex lexeme can be said to be non-compositional semantically and that, once a neologism becomes established as the current name of an entity, there are always slight but notable deviations from the compositionality principle.

The principle of compositionality has played a central role in many approaches to the lexicon: if a given unit is not amenable to compositional interpretation, it is said to be 'lexicalized,' in line with the grammarian's conception of the lexicon as a storage of units with arbitrary form-meaning association. This class then comprises simplex terms (which are idiomatic by the very nature of the arbitrariness of the linguistic sign) and non-compositional complex expressions (Herbermann 2002). However, the principle of compositionality is not universally accepted, at least in its strong form, by researchers in all approaches to semantics and lexicology. General critique on its validity comes, in addition to the problems mentioned above, from a variety of approaches. Cognitive Linguists, for instance, have argued forcefully against the cognitive reality of the principle of compositionality. For example, Taylor (2002: 550) states that in actual utterances rather than in the semantics of isolated words "[s]trict compositionality is rarely, if ever, encountered." Likewise, Kövecses (2006: 325) suggests "that idiomaticity (as opposed to regularity and predictability) is the default feature of natural languages."

What is more, while the principle of compositionality may be a useful heuristic for a semantic classification of complex expressions, recent psycholinguistic research on compound processing casts doubt on its psychological reality as well. Libben (2003) reports priming effects for both members of semantically opaque (i.e. non-compositional) compounds, and Semenza and Mendini (2006) show that decomposition in lexical processing occurs irrespective of whether they would be classified as compositional or non-compositional. According to Libben (2006: 6), "[i]f a compound word has been presented often enough so that it can be lexicalized, it is stored as a representation that can be retrieved as a whole. This, however, does not shut down the process of morphological decomposition for that word, nor does it sever links between the whole compound word and its constituent morphemes." In other words, so-called idiomatic compounds are not, as one might assume, simply stored as holistic units disregarding their morphological make-ups.

The conclusion is that compounds, and presumably also other complex expressions, are not necessarily either stored in the lexicon or derived productively, but that it is possible for them to be stored in the lexicon as a whole and *at the same time* to be decomposable in their constituents. Further, Weldon (1991) presents evidence that

processing a compound facilitates subsequent recognition of one of its constituents and Inhoff et al. (1996) also find evidence for the opposite direction. Both results support a view of a mental representation of complex expressions that is linked to their constituent parts. Similar views seem to trickle down to more progressively-minded circles in Generative Linguistics: Jackendoff (2002: 30) says that "there is no reason to believe that the brain stores information without redundancy" and allows, in his theory, "the possibility of stored words with regular morphology, which, since they can be generated by free combination, are totally redundant" (2002: 44). This view is in line with Cognitive Grammar (see e.g. Langacker 1987a: 28).

Summarizing, recent research at least opens up the possibility that compositionality of meaning, at least when applied to the word-level, is an artifact that is constructed theoretically and *a posteriori* from a cognitively and psycholinguistically already preexisting word meaning rather than an actually meaningful characteristic of linguistic units. These doubts are another reason for not operating with a conception of the lexicon that regards it as a redundancy-free storage of units with unpredictable form-meaning pairings, and any purely semantically grounded distinction between compositional and non-compositional complex words will play no role in the further discussion. Instead, the lexicon is understood as the sum of conventionalized expressions that are available to speakers to say something about entities and events in the extralinguistic world, regardless of whether these are interpretable compositionally (by any definition) or not.

3.5. LEXICAL MOTIVATION DEFINED

As alluded to in chapter 1, where the topics under investigation were introduced, as far as the semantic side of lexical motivation is concerned, there is evidence that complex terms cannot fruitfully be separated from and studied without also considering semantic patterns that do not involve morphological complexity. Consider the following terms for 'tree bark' from Bezhta and Mbum.

(1.) a. Bezhta *beš* 'skin, bark'
b. Mbum *ŋgàŋ-kpù* 'skin-trunk/tree' ='bark'

In both cases, a presumably identical or at the very least highly similar process is taking place which links the meanings 'skin' and 'bark' in some as yet to be established fashion. From a semantic point of view, this is the important commonality between the terms in the two languages. The difference lies in the formal realization: in Bezhta no overt sign of the relationship on the level of the signifier is present (*beš* can refer to both 'skin' and 'bark'),

whereas in Mbum, the meaning 'bark' is realized by a morphologically complex term. But, to reiterate, the semantic pattern is fundamentally the same. Ungerer (2007: 652) correctly points out that "[j]ust like additional meanings of simplex lexical items, word-formation items can be understood as encoding extensions. ... The only difference between simplex and word-formation items is that in the latter, additional meaningful components, both lexical items and affixes, are added" (see also Apresjan 1974: 17, Willems 1983: 426, Evans 1992: 478).[11] Then, the question arises whether it is appropriate to view (1b.) as interesting because of its morphological complexity and dismiss structures such as the one in Bezhta from consideration of semantic comparison. The point of view adopted here is that this would be not only implausible from a semantic point of view, but that it would also potentially distort the results that would be obtained from a study such as the present one. After all, it is possible that (1a.) is a pattern favored by some languages while (1b.), involving overt marking, is a pattern preferred by others, and potentially interesting typological observations could be obtained from a systematic evaluation of such differences. Examples like those in (1.) could be multiplied almost ad infinitum on the basis of the collected data:

(2.) a. Oneida *onékliʔ* 'grass, hay, straw'
b. Hawaiian *mauʻu maloʻo* 'grass dry' = 'hay, straw'

(3.) a. Hausa *ido* 'eye, spring of water'
b. Meyah *mei eitéij* 'water eye' = 'spring'

(4.) a. Upper Chehalis *páxʷ-* 'smoke, steam'
b. Highland Chontal *liguxís gajah* /liguxís lajah/ 'smoke water' = 'steam'

(5.) a. Ngaanyatjarra *kantja* 'chin, beard'
b. Bwe Karen *khɛ ʃʊ* 'chin hair' = 'beard'

Drawing a strong line between realization of a given lexico-semantic association by "polysemy" and by morphologically complex items therefore is somewhat reminiscent of drawing an arbitrary line in the sand. It also does not make sense in the light of the

[11] Colman and Anderson (2004) also recognize this relationship, and moreover argue that metonymies, because of being systematic in some instances (for instance the regular pattern of using the name of a garment to refer to the person wearing that garment) ought to be treated on a par with conversion, traditionally conceived of as derivation (and hence word-formation).

frequently encountered flux between complex terms and polysemy by redundant marking (Koch 2008: 125-127), as when the Maxakalí word *gõy* ranges semantically over 'smoke,' 'cloud,' and 'fog' and there are compounds with *hãm* (reduced from *hahãm* 'land') and *tex* (reduced from *tehex* 'rain') to single out the meaning 'fog' specifically (see Urban 2011 for a diachronic interpretation of such seemingly redundant marking). The close ties between formal realization by analyzable terms and by "polysemous" terms has been recognized in the framework developed by Koch (2001), which is applied for instance in Blank (2003) to diachronic questions and which is elaborated on in Koch and Marzo (2007). It is the most systematized framework to the present date to describe lexico-semantic relations, and the approach will therefore be discussed in some greater detail, as it constitutes the baseline against which the present account will be developed. From now on, this framework will be referred to as the "Koch approach" for convenience. It operates with a redefined definition of motivation, a term popularized by Saussure (1916/1967). In the Koch approach, lexical motivation, which in this narrow sense excludes onomatopoeia as a motivating device, is defined as follows, and essentially this is also the definition adopted here, albeit, as will become clear shortly, its elaboration differs somewhat:

> A lexical item L_1 is motivated with respect to a lexical item L_2, if there is a cognitively relevant relation between the concept C_1 expressed by L_1 and the concept C_2 expressed by L_2 and if this cognitive relation is paralleled by a perceptible formal relation between the signifiers of L_1 and L_2 (Koch and Marzo 2007: 263).

This is a rather technical definition, and it is therefore instructive to provide a diagrammatic representation of the underlying idea. This can be done by means of a "motivational square" (Koch and Marzo 2007: 264). The general schema is seen in figure 2.

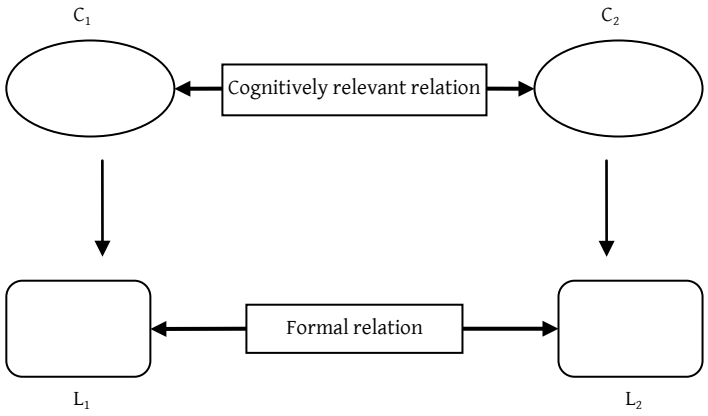

fig. 2: motivational square, redrawn from Koch and Marzo (2007: 264)

Different subtypes of formal and semantic relations (these are generally called "cognitive relations" in the Koch approach; here, it is preferred to use "cognitive" somewhat more cautiously) can be shown diagrammatically by specifying the formal and semantic relations that hold in a particular lexical item. Koch and Marzo (2007) use the concept 'pear tree' as a general example. In French, the word for 'pear tree' is *poirier*, which is formed by suffixation of *-ier* to *poire* 'pear,' shown diagrammatically in figure 3.

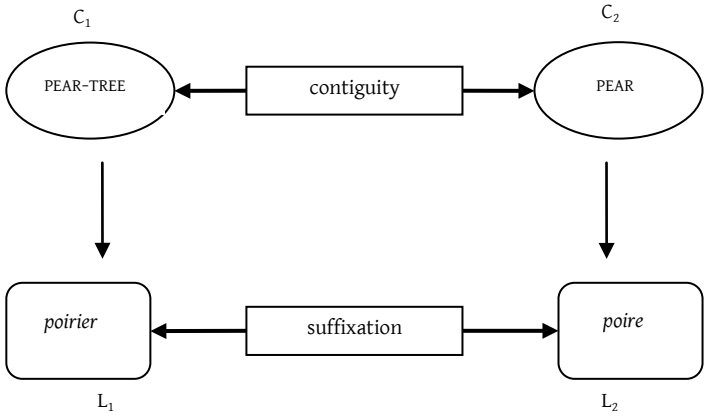

fig. 3: motivational square for a derived term, redrawn from Koch and Marzo (2007: 264)

In Hungarian, the word for 'pear tree,' *körtefa*, is a compound, consisting of *körte* 'pear' and *fa* 'tree.' For such cases, the Koch approach proposes a quite complex modification of the motivational square that seeks to account for both members of the compound, see figure 4. Essentially, this diagram is to be read as proposing a semantic relationship of taxonomic subordination between the concepts 'pear tree' and 'tree' on the one hand (a 'pear tree' is a kind of 'tree'), and a semantic relation of contiguity between 'pear' and 'pear tree' on the other hand. These semantic relations are mirrored by the formal make-up of Hungarian *körtefa*. It is at least questionable whether such a complex account is really necessary, for both theoretical and practical reasons, and it is here that the present approach will depart most pronouncedly from the Koch approach. The cognitive relation that is said to hold between the concepts 'pear' and 'pear tree' is that of contiguity, "the fundamental connection underlying all kinds of frames, scenarios, scripts etc. and including part-whole relations" (Koch and Marzo 2007: 262, for the related notion of "engynomy," see Koch 2001: 1144-1145).

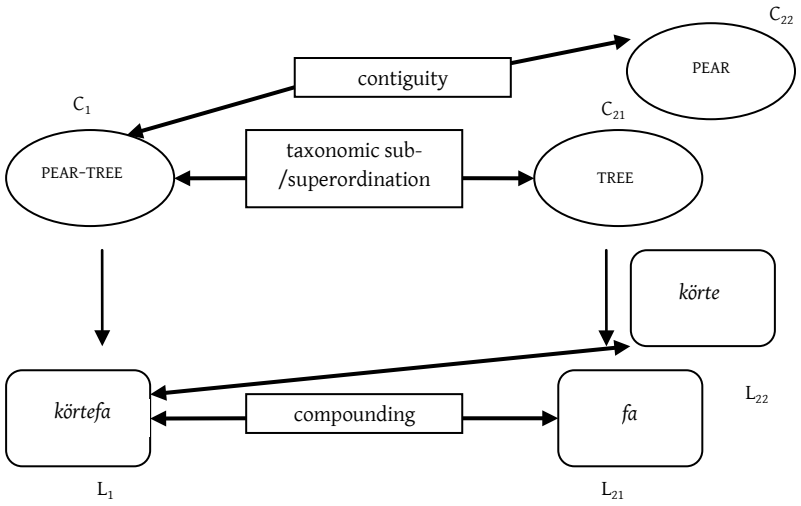

fig. 4: motivational square for a compound, redrawn from Koch and Marzo (2007: 266)

The same semantic relation is also present in Russian, which expresses both 'pear' and 'pear tree' by means of a single lexical item, *gruša*, according to Koch and Marzo (2007).[12]

[12] Note, though, that some native speakers of Russian are unwilling to accept this, preferring the complex structure *gruševoe derevo* for 'pear tree.'

Thus, the relevant formal relation is simply formal identity, yielding a reduced "motivational triangle" (figure 5).

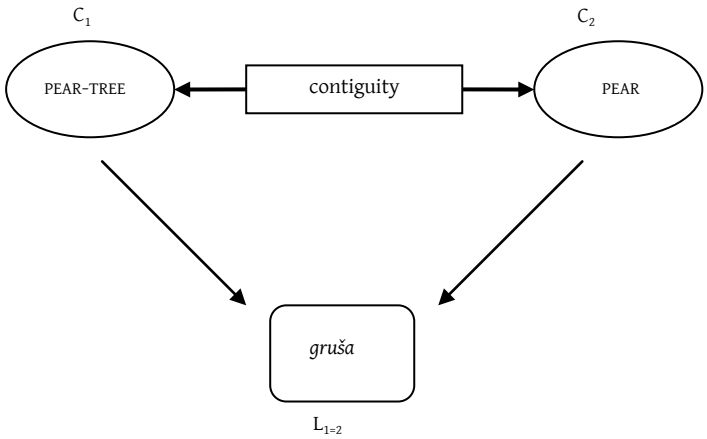

fig. 5: reduced motivational square for a polysemous term, redrawn from Koch and Marzo (2007: 265)

Finally, it is often the case that there is a semantic relationship between two concepts but no formal relation or vice versa (compare Anderson 2011b: 282 from the perspective of Notional Grammar). These are by definition not cases of lexical motivation in the sense used here, as for this to be diagnosed, crucially, both need to be present. Indeed, to use examples from Koch and Marzo (2007), it is intuitively clear that there is a semantic relationship between 'vines' and 'grapes' (one of "contiguity"), but in French, the two concepts are expressed by formally completely unrelated lexical items, *vigne* and *raisin* respectively. On the other hand, there can be a clear formal relation on the level of the linguistic item, but no clear semantic relation. If this formal relation is formal identity, this is the situation commonly known as homonymy.[13]

[13] Koch and Marzo (2007) apply this classificatory grid to the 500 most frequent lexical items of French, arriving at the conclusion that 65% of items in this set are motivated in their sense. Two thirds of these cases are due to polysemy; Koch and Marzo (2007: 278) attribute this to the typical situation of high-frequency vocabulary being highly polysemous. They suggest that such high rates would drop if less frequent and more specialized vocabulary items were to be analyzed, while cases of overt motivation would increase. Thus, the inclusion of polysemy (which is laden with the intricate problems of identifying the direction of semantic extension and highly specific secondary meanings, which are dealt with in a rather arbitrary fashion by Koch and Marzo 2007: 281-282) significantly

While in the Koch approach, the inventory of formal relations is sensibly open to be able to account for the different devices of word-formation that are found cross-linguistically, it is proposed that there is a "universal, closed inventory of seven cognitive relations" (Koch and Marzo 2007: 269). These are conceptual identity, contiguity, metaphorical similarity, co-taxonomic similarity, taxonomic superordination, taxonomic subordination, and conceptual contrast. In fact, Koch and Marzo (2007: 273) make quite strong claims about the nature of semantic relations: "The inventory of cognitive relations is universal and language-independent. As shown by phenomenological and gestalt psychological research as well as by historical semantics and as corroborated by empirical studies ..., there simply exist no other relations to connect conceptual contents." This view can be challenged (for instance, neither Gentner 1993 nor Levinson 1994 rely on the notion of metaphor), and Chaffin (1992: 254) points out that "[t]he widespread use of relations to explain other phenomena has often led theorists to treat semantic relations as if they were thoroughly understood. This is not the case." Although the notions of metaphor and metonymy figure in the present framework (albeit in a modified version), no claim shall be made that the inventory of semantic relations to be developed is universal, nor that it is exhaustive, nor even that it is indeed the best possible inventory. The only claim made is that the inventory of relations is a workable one from a cross-linguistic point of view.

Another question is whether it is justified or indeed feasible to take an reductionist approach to semantic relations postulating a closed set of cognitive principles in the light of highly culture-dependent patterns of semantic associations. Therefore, the present inventory, characterized by a fundamental distinction between contiguity and similarity, is merely meant to offer a useful categorization on some level of semantic detail – more coarse-grained in the case of this fundamental distinction, more fine-grained in the case of the subtypes to be distinguished. It would of course be possible to make even more-fine grained distinctions here, potentially ad infinitum, until every relationship between the senses of a given word or constituents of a complex term is assigned its own type of semantic relation.

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contributes to the overall outcome of their investigation. As for the semantic dimension, they report that in 57.6% of the cases the relation is one of contiguity, 18.6% are characterized by metaphorical similarity, and about 10% are diagnosed as taxonomic in nature.

3.6. A TYPOLOGY OF FORM-MEANING-PAIRINGS

Lexical motivation as outlined above is a cover term for morphologically complex and polysemous lexical items, whose structure on the level of the linguistic sign is mirrored by corresponding semantic transfers. The goal of this section is to develop a typological grid for the classification of form-meaning pairings that can occur in motivated linguistic items. According to common lore, linguistic signs, like signs in any other semiotic system, are (at least) two-sided entities: they consist of a string of sounds and a meaning, typically arbitrarily, associated with it. Therefore, a classification of form-meaning pairings will necessarily involve a classification of the formal properties of the signifiers as well as a system of describing the semantic relations that hold between the constituent parts of a complex expression or the different meanings associated with a single polysemous lexeme (as recognized in the definition of lexical motivation in the Koch approach). It is the interplay of these factors which promises to yield interesting typological generalizations.

3.6.1. A CLASSIFICATION OF FORMAL RELATIONS

To simplify the discussion of formal relations, it is helpful to keep the semantics and the semantic processes (which will be dealt with later) of compared terms constant as far as possible. Consider the terms for 'flame' in (6.), some of which are characterized by some sort of lexical connection of 'flame' with 'tongue':

(6.) a. Hausa *harshe* 'tongue, flame'
b. Khoekhoe *ǂnora-b* 'flame-3SG.MASC
c. Lenakel *nam-nam-* 'tongue-RED-'[14]
d. San Mateo del Mar Huave *netitit* /ne-atitit/ 'NMLZ-to.flame.much'
e. Toaripi *a-uri* 'fire-tongue'
f. Kildin Saami *tōlnjūxxčem'* /tōl-ɲūxxčem'/ 'fire\GEN.SG-tongue'
g. Swahili *ulimi wa moto* 'tongue of fire'
h. Fijian *yame(yame) ni buka* 'tongue(-RED) POSS fire'
i. Rama *abúng ngárkali ~ abúng ngarkalima* 'fire flame'

Example (6a.), from Hausa, cannot be broken down into meaningful parts, i.e. morphemes. However, its semantic structure is such that there are two meanings, 'tongue' and 'flame,' associated with it.[15] Such a situation is commonly referred to as POLYSEMY, that is, one

[14] Considered "possible" in the consulted source.

[15] It may seem odd that a classification of formal properties of linguistic items should make reference to semantic properties. But, as Wälchli (2005: 136) observes, "since semantic classifications concern linguistic entities that have

lexical item with two or more related but distinct senses. Examples like (6a.) will be said, following François (2008), to be instances of COLEXIFICATION of two different senses which are expressed by the same lexeme; discussion as to why to avoid the more traditional notion of polysemy will follow.[16] Colexification as a technical term includes the special case of heterosemy (Lichtenberk 1991, Enfield 2006), in which "the different but related meanings of a given morpheme are associated with distinct grammatical contexts" (Enfield 2006: 297), and no attempt is made to distinguish heterosemy as a special subtype in the analysis. Examples (6b. – 6i.), in contrast, are morphologically complex or ANALYZABLE. ANALYZABILITY will be used as a cover term to characterize morphologically complex expressions formed by any language-specific syntactic or morphological process of word-formation. Analyzable term (or analyzable lexeme, lexical item, word) therefore will be used interchangeably with morphologically complex term (lexeme, lexical item, word) throughout the following chapters. This term is chosen to reflect that it is the result of the linguist's analysis of the data, and TRANSPARENCY will occasionally be used to refer to the ability of a speaker, when contemplating a particular linguistic item in an act of meta-linguistic reflection, to decompose it and identify its meaningful parts. The two notions will not always, perhaps in a considerable number of cases, coincide: as any field linguist will have experienced, the morphological make-up of a complex term, whose constituents may be perfectly clear to a linguist even at first sight, may not actually be perceived by speakers in the same way.[17] For instance, Kashaya *hasime* 'beard' is readily analyzable by the linguist as consisting underlyingly of *ʔaha* 'mouth' and *sime* 'fur' (the former shortened by the regular and frequent phonological process of aphesis, Oswalt 1961), but when asked, a consultant was entirely unaware of the morphological structure. Clearly, as suggested by Ullmann (1962: 93), transparency as opposed to analyzability would be an appropriate, or perhaps even more appropriate, level of analysis as well, but it is hard to operationalize in a consistent manner, and too time consuming to allow large-scale cross-linguistic investigations. As a further complication, even complex terms formed by synchronically non-productive patterns of word-formation may occasionally be transparent in this sense to speakers,

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both semantic and formal components, semantic classifications of linguistic phenomena are never purely semantic. Thus, a classification of compounds cannot do without the notions of parts and wholes of compounds, which remain basically formal notions, even if only their meanings are considered."

[16] Compare also Gil's (2004) notion of macrofunctionality.

[17] As Rice (2012: 70) puts it, "post-hoc analyzability by the linguist does not always spell automatic conceptual recognition on the part of native speakers ..."

while perfectly regular complex expressions formed according to synchronically productive rules may not be (see Wilbur and Menn 1975 for discussion).

The Lenakel term for 'flame' in (1c.) is analyzable in the sense just outlined. More precisely, it is formed from *nam-* 'tongue' by means of reduplication. This is a case of DERIVATION, a process of word-formation that creates new lexemes by means of the application of some morphological operation to a lexical root, in this case reduplication. Characteristic for derivation, then, is one lexical element and one non-lexical derivational element. At least for the present study, complex terms formed on the basis of a lexical root by addition of a nominal classifier in languages that feature them (such as Bora, where the word for 'cave,' *ííñuhéju*, consists of lexical root *íñu* 'earth' and the classifier for hole-like objects, *-héju*), are subsumed under the label derivation. Consequently, (6c.) is called DERIVED.

Example (6d.) from San Mateo del Mar Huave is morphologically complex by virtue of being derived from a verb with a nominalizing suffix. Such processes serve to convert a lexical root from one lexical category to another, without adding anything to the semantic content of the lexical root (obviously, this statement pertains exclusively to nominalizers such as that in 6d. and not, for instance, to locative and instrument nominalizations). Examples such as these are clearly derived, but of a particular type that will be called PLAIN to highlight the semantic neutrality of the process in question. Plain derivatives cannot, according to the definition, be called motivated in the same sense as other derivatives can, since they are semantically neutral and do not establish lexical connections in the same way as other complex lexical items do. Consequently, lexical items of this type are not taken into account when the amount of motivated terms in each language is assessed quantitatively.

(6e. - 6i.) are examples of languages in which the term for 'flame' contains two morphemes with LEXICAL meaning: 'fire' and 'tongue' in (6e. - 6h.), and 'flame' and 'fire' in (6i.). Further subclassification, at least theoretically, is possible into COMPOUNDS and PHRASAL LEXEMES (which, as discussed above, should be allowed as inhabitants of the lexicon in the present approach): compounds would be complex lexemes formed according to morphological rules of word-formation by the combination of two preexisting lexemes (see Bauer 2009 for a concise overview of properties of compounds in a variety of languages), while phrasal lexemes, although conventionalized expressions with a fixed meaning in the respective language, follow the respective rules of syntax. Gravelle (1998: 569-570) makes clear that noun-noun combinations in Meyah obey morphological rules and can be identified by certain typical properties. Unfortunately, however, such explicit statements on the status of complex terms are not available for the majority of the sample languages, with the result that it is often impossible to distinguish the two types based on the

literature. (6e.), from Toaripi, looks at first glance like a typical compound: the term consists of two lexical morphemes with no additional morphology that links the two morphemes in any way. In contrast, (6f. - 6h.) might be hypothesized to be phrasal units, on grounds of the presence of typically phrasal morphology: in (6f.), from Kildin Saami, the dependent *tōl* appears in genitive case ("internal inflection" in terms of Bauer 2009: 346-7), and in (6g.) and (6h.) there is a free-standing morpheme that links together the two lexical elements of the form. Unfortunately, to say on the basis of these observations that (6e.) is a compound and (6f. - 6h.) are phrasal lexemes is based on mere eyeballing, does not rely on clear-cut criteria, and is therefore not legitimate.

There are several criteria available to distinguish between compounds and phrasal units that must, however, be applied carefully on a language-specific level (Aikhenvald 2007: 24-28). One is the criterion of separability: phrases, as syntactic units, are expected to be separable straightforwardly by additional modifying elements such as adjectives, whereas compounds are not. Haspelmath (2002: 158) mentions that in Hausa, compounds "clearly resemble possessive constructions in that they show head-dependent order and a relation marker" and that "[t]here are no phonological or morphological properties that would distinguish such compounds from possessive phrases..." Clearly, the Hausa evidence presented by Haspelmath militates once more against making any judgements based on superficial inspection. Haspelmath goes on to state that when adjectives are inserted to modify the respective constructions, "it becomes clear that the compound is inseperable, whereas the phrase is seperable" by an intruding adjective. This is a consistent and applicable criterion for Hausa, but it is a comparably subtle one. Also, it is certainly not applicable for all languages, for which different criteria must be invoked (see Matthews 1974: 94-100 for discussion of the situation in English). But even when applied on a language-specific level, criteria often fail to establish a waterproof distinction. For instance, Schütz (1985: 37) refers to complex Fijian lexemes with the structure root *ni* root as in (6h.) as compounds. Confusingly, though, he calls the sequence of *ni* and the second root "the *ni* phrase" and subsequent discussion (1985: 451-455) makes clear that indeed *ni* is best considered a preposition that projects a prepositional phrase indicating a general meaning of possession or association, in other words, that structures as (6h.) indeed can be considered phrasal. Schütz (1985: 38) also notes that "[f]or Fijian, there are no phonological clues to distinguish between a phrase and a word." Further, for Toaripi, Brown (1972: 206) notes that "[i]n compound forms, i.e. words composed of only free forms, the closeness of the juncture varies," which raises at least doubts about the status of so-called compounds in Toaripi. Summing up, distinguishing between compounds and conventionalized phrasal units is a matter of careful language-specific analysis and cannot be made on the basis of cursory inspection. Therefore compounds and phrasal units are not distinguished here, and

LEXICAL ANALYZABLITY is used as a deliberately ambiguous cover term to characterize both kinds of lexical units, compounds and phrases, based on more than one lexical stem. Importantly, unlike in some other studies, compounding as a type of word-formation is subsumed here under the lexical type of analyzable items, and thus not terminologically subsumed under derivation.

Further, differences in the presence of additional grammatical material that different languages require to be present are diregarded. Thus, whether analyzable expression of this kind are typically formed with the dependent constituent in the genitive case, as in Kildin Saami, whether there is a free-standing word expressing the association of the two constituents as in example (6g.) from Swahili, or whether the typical structural template for the formation of complex expressions involving two stems requires the presence of such a marker *and* reduplication of the head, as in (6h.) from Fijian, or whether any other grammatical material or process next to two lexical stems is present, is disregarded: what matters for typologization is the presence of two elements with lexical meaning that have the potential to occur freely (though note that North American-type lexical affixes are treated along with these). Note also that this entails that additionally present derivational markers do not affect classification of a given form as being of the lexical type.

While the manner of classifying complex forms proposed here does not require a clear-cut distinction between compounds and lexicalized phrases, it does require some knowledge about the potential of the involved morphemes to occur as free-standing forms to distinguish between derived and complex lexical expressions, because this distinction is based on the number of lexical morphemes that are present. One problem for this classification, then, is the very common grammaticalization path by which certain lexemes which are used frequently in compounds or phrases come to lose their semantic content over time and develop into derivational morphemes. For instance, the present day German derivational morpheme *-heit*, used to derive abstract nouns from adjectives and nouns, originates in the full Proto-Germanic noun **haidu* 'manner, appearance' (Kluge 2002).[18] Indeed, there are several languages in the sample which have a class of morphologically complex terms formed according to a quite frequent recurrent pattern involving a certain word, as in (7.) and (8.):

[18] 'Art und Weise, Erscheinung' is the original German gloss.

(7.) Toaripi lexemes with *fare* 'fruit'
a. *ori fare* 'bird fruit' = 'egg'
b. *kōu uti fare* 'back bone fruit' = 'kidney'
c. *kō fare* 'scrotum fruit' = 'testicle'

(8.) Chickasaw lexemes with *oshi'* 'son'
a. *akankoshi'* /akanka'-oshi'/ 'chicken-son' ='egg'
b. *okkisoshi'* /okkisa'-oshi'/ 'door-son' = 'window'
c. *ilbak-oshi'* 'arm/hand-son' = 'finger'

In Toaripi, complex terms with *fare* 'fruit' are commonly used to denote objects that are roundish in shape, and in Chickasaw *oshi'* 'son' occurs frequently in terms for comparably small things. It is therefore natural to wonder whether Toaripi *fare* and Chickasaw *oshi'* can be considered to have their full lexical meaning in the complex terms in question or whether they are rather used (or are on their way to being used) in a derivational fashion, with the semantics bleached to something like 'roundish thing' and 'small thing' respectively (indeed, it is common cross-linguistically for diminutives to develop from words meaning 'child,' Jurafsky 1996). This is a potential problem for classification, but one for which provisional criteria are available to make analytic decisions in a principled way: grammaticalization often (but not always, at least not in the initial stages of the process) involves phonological reduction. Therefore, if the questionable morpheme is not different in its phonological structure from a free-standing form with lexical meaning in the consulted source, the form was analyzed as being of the lexical, not the derived type. Second, the very fact that there is a lexeme with lexical meaning listed in the source provides evidence that indeed this lexical meaning is available to speakers and (at least) potentially perspicuous to speakers when occurring in the complex structure. Both is the case for Toaripi *fare* and Chickasaw *oshi'*. Consequently, the examples in (7.) and (8.) were analyzed as lexical, not derived.

A further type of formal relation that is of less importance cross-linguistically, but still needs to be distinguished as a separate type is SYSTEMATIC ALTERNATION OF GRAMMATICAL PROPERTIES which distinguishes different meanings of essentially the same phonological form. Examples are in (9.).[19]

[19] Another possible class of lexical relation that is theoretically included in this rubric is systematic tone alternation. There are some potential examples that may be instances of this, compare for instance Sko *hì* 'blood' and *hí* 'resin.' However, this may also be due to sheer accident, since there are no other examples of the same technique to

(9.) a. Number Alternation
Bezhta *häy* = 'eye;' *häydä* 'eye.PL' = 'glasses'

b. Gender Alternation
Embera *kidhátrɨ* 'chin' (masc.); 'jawbone, mandible' (fem.)
Khoekhoe *ǂare-s* 'tail/buttocks-3SG.MASC' = 'tail'
ǂare-b 'tail/buttocks-3SG.FEM' = 'buttocks'

c. Noun Class Alternation
Kiowa *tè̀i-p* 'calf/buttocks-NOUN.POSTFIX' = 'calf'
tè̀i-dl 'calf/buttocks-NOUN.POSTFIX' = 'buttocks'

Lumping these different processes together into one single category is questionable given the diverging nature of each single subtype; in spite of this, it is done because of the relative paucity of examples of each type in the database. The cover term ALTERNATING will be used to describe each of the subtypes.

Finally, with regard to terms such as (6h.), from Rama, it will be said that they are ANALYZABLE, but semantically REDUNDANT, and therefore not motivated according to the definition: *ngárkali ~ ngarkalima* alone already means 'flame' and *abúng* 'fire' does not add any further apparent semantic content (note that redundancy in this sense is a purely formal notion, and does not necessarily rule out that the complex term fulfils pragmatic or other functions).

3.6.2. SEMANTIC CLASSIFICATION

This section develops the approach to the classification of semantic relations adopted in this study. In doing so, the discussion attempts to weave together various threads from different approaches to semantic relations. These include traditional accounts of semantic relationships of noun-noun compounds, Cognitive Linguistics, and Cognitive Psychology. Last but not least, reference will be made to the grid developed by Koch (2001) and Koch and Marzo (2007) to arrive at a cross-linguistically workable inventory of semantic relations. It should be noted right at the outset that cognitive or psychological reality of the semantic analyses made is explicitly not claimed, in spite of adducing literature from Cognitive Linguistics and Cognitive Psychology. Arguably, waiving claims as to psychologi-

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connect lexical meanings by tone alternation, and such isolated instances were therefore disregarded in the light of absence of evidence for systematicity of the attested cases.

cal reality does not absolve the analyst from providing a framework that is in line with findings of related disciplines and to allow him/her to set up analytic categories as s/he pleases.

3.6.2.1. Review of previous accounts

3.6.2.1.1. *Studies of semantic relations in Noun-Noun Compounds.* The discussion departs from proposed classifications of semantic relations in noun-noun compounds in individual languages. Quite a large number of different accounts of semantic relations within these have been proposed. Table 1 provides an overview:

	Proposed Relations
Li and Thompson (1981); wording at times altered	place of location, place of application, use, unit, piece of equipment used in sport, protective device against, causation, container, parallel, product, material, place where sold, disease of, time for, source of energy, metaphorical description of, component of, source of, employee or officer of, proper name, person who sells or delivers
Marchand (1969)	comparison, material a thing is made of, purpose, place, time
Downing (1977)	whole-part, half-half, part-whole, composition, comparison, time, place, source, product, user, purpose, occupation
Levi (1978)	CAUSE, HAVE, MAKE, USE, BE, IN, FOR, FROM, ABOUT
Warren (1978)	source-result, part-whole, origin in time or space, purpose, activity-actor, resemblance

table 1: suggested inventories to describe semantic relations between the members of Noun-Noun Compounds

As becomes immediately obvious, the different inventories of semantic relations vary with respect to their granularity: Li and Thompson's (1981) inventory of proposed relations within Mandarin Chinese noun-noun compounds is larger and contains more specific relations than does, say, Marchand's (1969). Also, the classifications vary with respect to their purpose: While Li and Thompson (1981: 49) find it simply "pedagogically and heuristically useful to describe them," Levi (1978) is a study in the framework of Generative Semantics that aims to show that compounds can be derived from underlying propositions (sentences) by means of deletion of an underlying predicate, whose semantics is said to be captured by the relations she posits.

The classifications also vary with regard to their scope. Levi (1978), for instance, restricts the scope of her study to endocentric compounds from the start and therefore her inventory lacks the 'metaphorical description/comparison/resemblance'-category used to describe relations within exocentric compounds in the other classifications. To be fair, with the exception of Levi (1978: 75), who claims that "the variety of these relationships is in

fact confined within a very limited range of possibilities," all above quoted authors make explicit that their proposals are not meant to be exhaustive and do not aim at appropriately describing all semantic relations between two members of a compound that could ever be found. In fact, Marchand (1969: 22) states that "[i]t is no use trying to exhaust the possibilities of relationship" and that "many compounds defy an indisputable analysis," echoing in a moderate version the (in-)famous statement made by Jespersen (1942: 143) that "the number of possible logical relations between the two elements is endless." Indeed, it can be argued that this is the case, given that the semantic relation within two given compounds will always be subtly different every time, and Plag (2003: 148) notes that "such semantically based taxonomies appear somewhat futile" because of their inherent arbitrariness. What is desired, however, is a useful way to abstract from individual cases, and this certainly was the goal of the above mentioned authors, as is the goal within the present study.

Unfortunately, the proposed inventories are not directly applicable to the task of the present study, for a variety of reasons. First, in some cases, the semantic relations are sometimes very specific (for which researchers can hardly be blamed, as they were trying to account for recurrent patterns in the languages they were describing). More importantly, however, the suggested categories do not describe the present data exhaustively, and it is desirable to find a semantic grid which is general enough to describe all semantic relations that surface in the database on which this study is based. For instance, it seems difficult to assign Rendille *daáyto* 'pupil,' a compound consisting of *daáyi* 'black' and *to* 'thing,' to any of the categories in any of the above classifications. What is more, only compounds are considered in the reviewed proposals, whereas for the present task also semantic relations in derived and colexifying lexical items are to be described. However, it is worth bearing in mind for the subsequent discussion that mostly a basic distinction in the classification made by earlier authors can be spotted: on the one hand, there is the relation of 'metaphorical description of' (Li and Thompson 1981), 'comparison' (Marchand 1969, Downing 1977) and 'resemblance' (Warren 1978) to describe semantic relations within exocentric compounds. This relation is not very elaborate in all schemes. Instead, the above mentioned studies at large concentrate on semantically "harmless" endocentric compounds at the expense of a detailed analysis of the metaphorically driven ones which are presumably more difficult to describe. On the other hand, all other proposed criteria can be grouped into one large class, in which the relation between the elements of the compounds, typical for the endocentric type, are not based on some perceived similarity or resemblance but rather on some more immediate semantic relation.

3.6.2.1.2. *Qualia Structure.* Qualia structure is one of the three dimensions argued for in Pustejovsky (1995) for the semantic analysis of lexical items of a given semantic category within the more general theory of the "Generative Lexicon," an approach to lexical semantics in principle compatible with computational implementation. It deserves discussion not only because the notion of qualia structure is outlined mostly with reference to nominals in Pustejovsky (1995), but also because it is a semantic account that allows to elegantly deal with lexical items related by word-formation. One of the advantages of introducing qualia structure is that it allows "nouns, and consequently the NPs containing them, to encode information about particular properties and activities associated with the them [sic!]" (Pustejovsky 1995: 79). This is one of the major novelties of the Generative Lexicon approach, because qualia structure thus provides the verbs with information that is required to arrive at a consistent semantic interpretation of the clause as a whole, and thus distributes the information for semantic interpretation of clauses more evenly among its elements than other heavily verb-based approaches to clausal semantics. There are four qualia structures in Pustejovsky's approach, though not all need always be specified. These are CONSTITUTIVE, FORMAL, TELIC, and AGENTIVE (Pustejovsky 1995: 85-86). The constitutive quale specifies the relation between an object and its constituents, such as material, weight, and parts and component elements, whereas the formal quale is "[t]hat which distinguishes the object within a larger domain." Examples mentioned by Pustejovsky are dimensions such as orientation, magnitude, shape, dimensionality, color, and position. The telic quale is easiest to summarize: it specifies the purpose and function of an object, while, complementary to the telic quale, the agentive quale spells out "[f]actors involved in the origin or 'bringing about' of an object." Thus, a *novel* is said to be characterized by the agentive quale writing and the telic quale reading. Pustejovsky (1995: 89) is now in a position to describe the semantics of derived nouns such as *typist* by simply stating that "the TELIC makes direct reference to the process-denoting verb from which its nominal is derived." Similarly, for compounds, the telic role in nouns such as *book shelf* can be viewed within the theory of qualia structure to be specified by the dependent element *book*. Thus, although conceived of from a quite different and more formal angle, Pustejovsky here approaches traditional accounts to compound semantics as described above.

3.6.2.1.3. *Cognitive Psychology*. This section briefly reviews relevant literature for the topic at hand from Cognitive Psychology, beginning with psychological evidence for the notion of semantic relatedness as evidenced by semantic networks revealed by lexical priming (a strand of research initiated by Collins and Quillian 1969) and moving on later to a discussion of conceptual combination, which is a topic related to morphologically complex expressions.

Collins and Quillian (1969) have shown that encyclopedic information about concepts that are stored together with a primed concept can be retrieved faster the closer the association is. Moss et al. (1995) conducted priming experiments for three types of lexical activation, namely co-taxonomic or taxonomic relations, functional relations (e.g. that between 'broom' and 'floor') and what they call "script-related" relations (i.e. what others would call relations of contiguity, e.g. the relation between 'restaurant' and 'wine'). They found that the latter type of relation yielded only marginally significant results in priming experiments, concluding that this is a less central aspect of semantics than other types of information. However, even in the psychological literature, what the category of "associatively related items" should be taken to include is often not deduced from experimental data. Instead, the knowledge of what is and what is not associatively related is itself axiomatically presupposed as a prerequisite to the experiments. Revealing in this context is that Neely (1991: 294) speaks of nodes for both semantically and associatively related words being " 'stored close together' " (single quotes in the original), which implies that it is not at all clear what the precise psychological reality of being "stored close together" is. Furthermore, psycholinguistic studies of word sense discrimination appear to make use of the microstructures of dictionary entries to a surprising degree. According to Miller et al. (1988: 4), as quoted in Jorgensen (1990: 168), "[b]y and large, psycholinguistic experiments presuppose the validity of the general structures that linguists and lexicographers have identified and try instead to test hypotheses concerning the way such structures arise or how they contribute to other cognitive processes." This, of course, limits the exploitability of such psycholinguistic approaches for the present task, because their experiments are not independent of potentially arbitrary and unprincipled decisions made by lexicographers in the process of dictionary making.

Next to these approaches, there are also accounts of adjective-noun combinations that operate within prototype theory as initiated by Rosch's (1978) research. Smith et al. (1988) discuss the possibility to decompose prototypes in attribute-value pairs. An attribute is "a concept that describes an aspect of at least some category members. For example, *color* describes an aspect of birds, and *location* describes an aspect of *vacations*" (Barsalou 1992: 30). Smith et al. (1988) propose that a modifying adjective in an NP can be seen as overriding the inherent prototype value for the respective attribute relevant for the head noun. For instance, 'apples' can be argued to have prototypically a red color, which would be the default value inherited from the prototype without further adjectival modification. In the phrase *green apples*, then, the adjective *green* selects the relevant attribute in the noun (color in this case) and overwrites the prototypical value.

Another research current of Cognitive Linguistics that is relevant for the present context are studies concerning so-called "conceptual combination," because they are

intricately connected with morphologically complex expressions. The basic question researchers engaging in this field ask is according to what psychological rules people combine existing concepts (expressed by lexical items) to coin neologisms and what procedures they apply in deducing the semantics of a novel word from its constituent parts. There are at least three concurring theories with regard to this question, the dual process theory, as forwarded e.g. by Wisniewski (1996, 1997), the relational theory (e.g. Gagné and Shoben 1997), and the constraint theory (e.g. Costello and Keane 2000, 2001). Brief discussion of all these theories, which however cannot do full justice to details, follows (see also Estes 2003: 305-308, who influenced this discussion).

According to dual process theory, novel attributive compounds are understood by means of a sequence of two distinct cognitive mechanisms of comparison and following attribution. Thus, in hearing the noun-noun compound *cactus carpet*, the concepts 'carpet' and 'cactus' are compared with each other. This comparison then determines which property will be mapped and where it will be mapped to. The comparison will reveal that carpets are typically soft while cacti are typically prickly, which is one of the key features in which the two concepts differ. The second step of the comprehension and interpretation process that follows the comparison is the attribution, which is why such interpretations are called attributive interpretation; in this particular case the "prickliness" of cacti will be mapped as an attribute of the carpet as a feature that sets it off from other carpets (example from Estes 2003). In the dual process theory, so-called "relational combinations" such as *floor television* are said to be interpreted by a completely distinct mechanism, namely assignment of theta roles. In the above example, *floor* would be assigned the theta role of location, and the head noun television is that which is located. To make the distinction between attributive and relational interpretations clearer, another example may serve: in Wisniewski and Love's (1998) study, some participants interpreted *book magazine* as 'a magazine about books.' This is a relational interpretation. Others, however, interpreted this compound as meaning 'a thick magazine,' which is an attributive interpretation, in which a property of books, namely being thick, is transferred to the magazine in question.

The competing relational theory does not posit two distinct processes for the comprehension of conceptual combination. Instead, it is argued, "nominal combinations are understood by inferring some relation that is purported to exist between the constituent concepts" (Estes 2003: 306). This approach rejects the distinction between attributive and relational processes, and instead views attributive relations, which it does recognize, as a particular relational process, namely that of resemblance.

A third approach - constraint theory - posits, as its name suggests, three constraints on the interpretation of novel compounds, namely, the plausibility constraint, the

informativeness constraint, and the diagnosticity constraint, which "requires the construction of an interpretation containing diagnostic properties from each of the concepts being combined," and which is the most important constraint in this framework (Costello and Keane 2001: 257). Thus, the compound *cactus fish* is more likely to be interpreted as meaning 'a prickly fish' rather than 'a green fish,' since "*prickly* is more diagnostic of cactus than *green*." (Costello and Keane 2001: 257).[20] Given that each novel compound can be assigned a very large variety of interpretations, the constraints are a modeling of how the best interpretation is arrived at by the hearer.

Each theory makes different predictions as to how novel compounds will be interpreted, which are not of further concern here. More important for the present purposes is that relational interpretations (as when the compound *apartment dog* is interpreted as meaning 'a small dog that lives in city apartments') and property interpretations (as when *elephant fish* is interpreted as meaning 'a big fish') bear a striking resemblance to the notions of similarity and contiguity, the mechanisms commonly assumed to be underlying the phenomena of metaphor and metonymy (though Cognitive Psychologists might disagree). When *elephant fish* is interpreted as 'big fish,' this fish is perceived to be similar to an elephant in some respect. When *apartment dog* is interpreted as 'small dog living in apartments,' the typical location such dogs are encountered in are apartments; thus, the meaning of *dog* and that of *apartment* are in a relationship of spatial contiguity.

However, it should be borne in mind that the cited studies all deal with fabricated novel compounds, not institutionalized lexemes of the participants' language (English). Murphy (1988: 530) is very clear about this: perhaps surprisingly, he makes an a priori equation of morphological simplicity with conceptual simplicity by defining that a "concept is 'simple' if it can be represented as a single lexical item" and "a concept that requires more than one lexeme is 'complex'." However, he hastens to add to the second definition "[u]nless its linguistic expression is lexicalized (i.e., idiomatic)" and explains that this qualifier "serves to rule out idiomatic phrases like *dog house*, which has the conventional meaning 'house that a dog sleeps in,' and therefore may no longer be a truly complex concept." This limitation is probably to some extent borne out of the psychologists' need for controlled experimental settings in which participants of studies are unbiased in that they are confronted with complex terms they have not heard before. It is obviously most unfortunate for the context of the present study, because it deals precisely with such conventional expressions, not neologisms.

[20] The reason why different studies are equally fond of using properties of cacti as examples is not clear.

3.6.2.1.4. *Diachronic Semantics.* Possible avenues towards a classification of semantic relations are not only suggested in synchronic studies from different theoretical perspectives, but also in studies of semantic change. Matisoff (1978) employs a cross-classification of semantic associations in diachrony according to whether the change involves a shift in the semantic domain (trans-domain change) or not (intra-domain change). An example of the former would be a semantic shift from 'stomach' (in the semantic domain of body-parts) to 'cave' (in the semantic domain of topological concepts). An example of the latter would be when a body-part term shifts in meaning to denote another body-part term, with the semantic domain remaining the same. Further, Matisoff distinguishes between, roughly put, metonymic and metaphoric changes, with further subdivisions that are particularly tailored for application to the domain of body-part terms. Interestingly, Matisoff, leaving the primarily diachronic orientation of his classification somewhat, also discusses "association via compounding." This illustrates nicely the sometimes intricate commonalities as far as semantics is concerned that can be observed in colexifying and complex lexical items noted in § 3.5.[21] Matisoff's approach is adopted, in a terminologically modified version, in Wilkins (1996), and is applied there exclusively to semantic change. As Riemer (2010: 376) summarizes, "[t]he centrality of metaphor and metonymy in semantic change is due to the fact that they jointly exhaust the possibilities of innovative word use and thus subsume all the other descriptive categories." Notably, however, semantic change does not come about suddenly, but rather involves an intermediate stage in which both the original and the innovative sense are available for the same linguistic sign (Wilkins 1996, Traugott and Dasher 2002, Evans 2010). The lexical semantics of polysemy/colexification in synchrony, in turn, is central to the present study, and there is thus no principled reason why it should not be possible to accommodate frameworks for studying diachronic semantic change to synchronic questions and vice versa.

3.6.2.1.5. *Meaning-text theory and semantic derivation.* Another relevant line of research is that of the meaning-text theory associated most prominently with the name of Igor A. Mel'čuk. Meaning-text theory is a formal framework for the description of natural language in which semantic representations (meanings) are mapped onto final phonological representations (texts) via a number of intermediate stages (an outline is in Mel'čuk 1981). One of the points that sets meaning-text theory apart from other such frameworks is that it assigns a central role to the lexicon. Mel'cuk and Polguère (1987: 265) turn the

[21] Similarly, François (2008) mentions the possibility that his semantic maps showing exclusively associations by colexification be amended by associations by word-formation.

Bloomfieldian slogan of the lexicon as an appendix to grammar around by saying that in meaning-text theory the grammar, conversely, is an appendix to the lexicon. Hence, work in terms of meaning-text theory incorporates a detailed description of semantics of lexical items and their combinatorial possibilities. This rich information is collected in so-called Explanatory Combinatorial Dictionaries, compiled by Mel'čuk and associates for Russian and French. A crucial role, in particular in the modelling of cooccurence restrictions, is played by so-called lexical functions. These include traditionally recognized lexical relations; for instance, the lexical function called "Syn" returns, if the argument *to shoot* is passed to it, *to fire*. There are all in all more than 50 such lexical functions, and some relate to another (relatively marginal) concept within meaning text-theory, namely semantic derivation. This is conceived of as a purely semantic counterpart to morphological derivation. Thus, as Mel'čuk's (2007: 120-121) example runs, Russian *stolovaja* 'dining room' is derived morphologically from *stol* 'table,' but semantically from *est'* 'eat.'[22] A prerequisite for semantic derivation in this sense to be diagnosed is that the semantic association is regular and found in other like lexical pairs within the same language.

But the notion of semantic derivation is also applied more broadly; in fact, in Apresjan (1992: 194) semantic derivation appears as a synonym for polysemy (see Apresjan 1992: 209-211 for references to literature which brought about this broadening). The term also plays a role in cross-linguistic approaches to the lexicon in the Russian linguistic tradition. For instance, in Zalizniak et al. (2012) the term is used akin to polysemy, but in a slightly broader way, namely to describe the relationship between two related meanings of a word that can be considered as derivative from one another, on the one hand in the form of general semantic templates of polysemy present in a given language, but also in the form of non-systematic semantic associations as long as they recur with some frequency cross-linguistically. In this use, semantic derivation also includes diachronic aspects (cf. the term semantic shift in Zalizniak 2008, Zalizniak et al. 2012, which is also construed broadly to include semantic association by way of polysemy, word-formation, diachronic semantic change, and some other types). In the first mentioned sense, the term is identical to Apresjan's (1974) "regular polysemy," called "regular" because part of the definition is that

[22] Mel'čuk (1976c) in a similar vein argues that formal complexity in derivation need not always correspond to semantic complexity. Hence, *katit'sja* 'to roll oneself' is derived formally from *katit'* 'roll,' but semantically *katit'* is said to be more complex in that it is inherently causative. This Mel'čuk (1976c: 70) calls "inverse word-formation" ("inverse Wortbildung;" "obratnoe slovoobrazovanie"). There is also the related notion of derivational suppletivism ("derivationeller suppletivismus") mentioned by Mel'čuk (1976c: 68): *vrač* 'doctor' is in the same relation to *lečit'* 'heal' as *spasitel'* 'saviour' is to *spasti* 'save.' Mel'čuk (1976c: 78) suggests to always differentiate between morphological and semantic facts in derivation (see also Mel'čuk 1976b, Apresjan 1992: 184-185).

the general abstract relationship between polysemous readings occurs in more than just one example in a language (as with Mel'čuk's semantic derivation). Apresjan (1974: 17-18) also explicitly recognizes the close relation between (regular) polysemy and word-formation along a variety of parameters that is relevant for present purposes as seen in § 3.5. (compare also Apresjan 1992: 209-211 for different views of authors in the Russian tradition concerning the relationship between polysemy and word-formation). Apresjan (1974) importantly also operates with the distinction between metonymy and metaphor, stating that in regular polysemy meanings stand most often in a metonymic relationship to one another, while in irregular polysemy metaphor is more frequent. Regular polysemy in this sense is also what Mel'čuk (1973: 111) has in mind, when talking about "polysemy of the type of Russ. *sliva* – 'plum' – 'plum tree' (*gruša* 'pear' – 'pear tree', *višnja* 'cherry' – 'cherry tree') and in general, the widespread phenomenon of the same stem having both the meaning X and 'something connected in a definite way with X', for instance an action and its result (*nagnoenie* 'festering'), an action and its place (*mojka* – 'washing' and 'washing place'), an action and its object (*vyšivanie* 'embroidering' and 'embroidery'; *trebovanie* 'requiring' and 'requirement'), an action and its instrument (Engl. *intake*), etc." He even suggests use of the term "semantic derivation" for such regular polysemies, but since this term is already used in meaning-text theory, suggests the label "semantic conversion" instead. [23]

3.6.2.1.6. *Cognitive Linguistics.* The rise of Cognitive Linguistics in the early 1980's, with works such as Lakoff and Johnson (1980) and Langacker (1987a), made available a fundamentally new perspective on semantic phenomena (which seem at least partly reflected in Wilkins's 1996 typology of semantic change). Particularly influential was Lakoff and Johnson's (1980) notion of conceptual metaphor, which, as they have argued in detail, pervades thinking and links whole areas of thought with each other. Metaphor, according to a standard Cognitive Linguistics definition, can be understood as a "cognitive mechanism whereby one experiential domain ... is partially mapped onto a different experiential domain, the second domain being partially understood in terms of the first one. The domain that is mapped is called the *source* or *donor domain*, and the domain onto

[23] This discussion is embedded in the establishment of a general typology of form-meaning pairings. Mel'čuk (1973) states that the relationship between two forms or two meanings can only be of four kinds: identity, inclusion, intersection (existence of common part), and absence of common part, which yields a cross-classification of different types of formal and semantic relations with 17 distinct scenarios, some of which model classical categories such as homonymy, others particular types of derivation or even more special cases, such as the aformentioned semantic conversion.

which it is mapped, is called the *target* or *recipient domain*" (Barcelona 2002: 211). A textbook example of metaphor is the ARGUMENT IS WAR metaphor discussed by Lakoff and Johnson (1980: 4), which accounts for the appropriateness of sentences like *Your claims are indefensible, he attacked every weak point in my argument, his criticisms were right on target, I demolished his argument,* and so on: expression from the domain of arguing (*claims, criticisms, arguments*, etc.) are mapped to the domain of war (*indefensible, attack, demolish*, etc.). Note that metaphor is explicitly not a linguistic, but a cognitive phenomenon in this view: linguistic utterances merely reflect, but do not constitute, metaphors such as ARGUMENT IS WAR.

Metonymy was initially the step child of Cognitive Linguistics, but has more recently (e.g. Kövecses and Radden 1998) been at the focus of attention within the research paradigm. It has come to be conceived of as "one of the most fundamental processes of meaning extension, more basic, perhaps, even than metaphor" (Taylor 2003: 126), as several authors have suggested that many metaphors have a metonymic basis. Metonymy is formally understood to be a mechanism "whereby one experiential domain is partially understood in terms of another experiential domain included *in the same common experiential domain*" (Barcelona 2002: 215). Examples (except for the last, which is common lore, from Kövecses and Radden 1998) include *the buses are on strike* (in which *buses* refers not to the buses themselves, but to the busdrivers operating them), *the White House did not intervene* (in which *the White House* is used metonymically to refer to the government it hosts), and the infamous *the ham sandwich wants the bill*, in which *ham sandwich* is meant to refer to the restaurant guest who has previously ordered it

However, despite the new possibilities it opens up for semantic description, Cognitive Linguistics has relatively little to say about the nature of semantic relations in lexical items, i.e. conventionalized expressions as opposed to ad-hoc processes. There are, however, some notable exceptions. As Dirven (1985: 87-88) writes, "[o]ne of the many self-imposed limitations found in linguistic and philosophical writings is that metaphor is only seen at the sentential level ... If one starts from a view on metaphor as a ubiquitous cognitive process, one would rather expect metaphor (in its broader sense) to be operative at various levels of language structure and linguistic units, and not just at that of the sentence." In a sense, the focusing of Cognitive Linguistics on sentential processes is of little surprise: Cognitive Linguistics is mainly concerned with the dynamic mental construal of extra-linguistic situations by cognition and its mirroring in linguistic structure. The non-dynamic nature of lexical items and the relatively fixed semantic relations that may hold between members of complex lexical items or different senses of lexically entrenched polysemy therefore seem to be simply of little interest to the

Cognitive Linguistic enterprise. This position is present from the very beginning of the development of the field. Lakoff and Johnson (1980: 54-55) say:

> In addition to these cases, which are parts of whole metaphorical systems, there are idiosyncratic metaphorical expressions that stand alone and are not used systematically in our language or thought. These are well-known expressions like the *foot* of the mountain, *a head* of cabbage, the *leg* of a table, etc. These expressions are isolated instances of metaphorical concepts, where there is only one instance of a used part (or maybe two or three). Thus the *foot* of the mountain is the only used part of the metaphor A MOUNTAIN IS A PERSON. ... The point here is that there are metaphors, like A MOUNTAIN IS A PERSON, that are marginal in our culture and our language; their used part may consist of only one conventionally fixed expression of the language, and they do not systematically interact with other metaphorical concepts because so little of them is used. ... They ... are not metaphors that we live by.

Of equally little surprise, then, is that cognitive approaches to word-formation are not so much concerned with actually existing word-formation items and their morphological and semantic structure, but more with abstract schemas available to speakers which allow them to coin new compounds (Tuggy 1987, 2005) or with an, itself metaphorical, extension of the well know figure-ground organization to the domain of word-formation (Ungerer 2007). Ungerer (2007: 671), in fact, states that "current cognitive research in word-formation is still very much in its initial stages" and that "the application of most empirical methods has been too selective for a proper evaluation of their usefulness."

Still, it is not at all the case that Cognitive Linguistics analyses cannot be fruitfully exploited in the present context. Cognitive Linguistics has, by redefinition of long-standing classical ideas, revived the powerful analytic notions of metaphor and metonymy, and in fact, these have been applied to account for ad-hoc semantic extensions of particular lexemes at the utterance level and sometimes also to certain cases of conventionalized lexico-semantic extensions (e.g. Lakoff 1987, see also Svanlund 2007). Both notions are widely used and have come to be the quasi-standard means of describing semantic extensions (though see Levinson 1994 for critique of analyses of extensions of body-part terms in terms of metaphor). Now, analyses on the utterance level are not in principle different phenomena from lexically entrenched meaning extensions, because the latter typically arise out of the conventionalization of the former. Cognitive Linguistic analyses, however, including those involving metaphor and metonymy as descriptive categories, have been criticized for their speculative nature (Riemer 2010: 255). In addition, the notions of metaphor and metonymy would need to be accommodated to be applicable to the slightly shifted context of the present study, with this accommodation ideally at the same time eliminating some of the indeterminacy of traditional Cognitive Linguistics. An attempt to achieve these goals is presented in the following section.

3.6.2.2. Metaphor and Metonymy within the lexicon

The analyses to be made presently pertain to the lexicon, conceived of as an inventory of fixed conventionalized expressions. Therefore the notions of metaphor and metonymy need to be slightly altered to be applied to lexical items, and to ultimately make available similar tests as commonly employed in lexical semantics to diagnose phenomena in individual languages (see e.g. Cruse 1986). Test frames would also reduce a felt arbitrariness in analytical decisions to a significant degree.

One proposal that goes into this direction in fact exists: in order to test for the presence of metaphor at the utterance level, Ray Gibbs, as quoted in Kövecses (2002: 146), suggests the so-called 'is like'-test to identify similarity-based conceptual mappings.[24] Examples are:

(10.) a. The *creampuff* was knocked out in the first round of the fight.
b. We need a new *glove* to play third base.

In (10a.), *creampuff* refers to a boxer in a boxfight, while in (12b.), *glove* refers to a baseball player. Gibbs's 'is-like' test makes explicit the underlying semantic processes of those substitutions:

(11.) a. The boxer is like a creampuff.
b. *The third baseman is like a glove.

(11a.) is acceptable, and thereby (11a.) is diagnosed as a metaphorical substitution, while (11b.) is not a felicitous statement in English, and is therefore not a similarity-based substitution (it is said to be automatically metonymic in Kövecses 2002; as will be discussed below, in the present framework a separate test will be used).

This test is well suited not only for utterance-level metaphorical and metonymical substitutions, but is also applicable to semantic relations in colexifying and complex expression, although it was not originally designed for this purpose. It will be used, with some modifications that formalize the application of the test somewhat, as the prime

[24] There appears to be little agreement between scholars in Cognitive Linguistics as to the status and necessity of the notion of similarity in metaphor (see e.g. Grady 1999 for an overview). Note that the very notion of metaphor being based on similarity is explicitly rejected by Lakoff and Johnson (1980), although also in recent work, such as Riemer (2005), contiguity and similarity are at the heart of Cognitive Linguistics analyses. For a defence of similarity, see also Murphy (1996).

device to identify metaphor-based relations between different senses of colexifying lexical items and constituents of complex expressions here. Consider the following colexifying words one of whose dictionary glosses is 'beard':

(12.) a. Arabela *mohua* 'beard, antenna of insect'
b. Tetun *timir* 'beard, chin'

Applying the 'is like'-test to different senses of a colexifying lexical item involves inserting the glosses into the general template of the test frame:

(13.) <gloss 1> is like <gloss 2>

Thus for Arabela *mohua* in (12a.) one gets 'a beard is like the antenna of an insect,' which is a semantically acceptable statement drawing attention to certain similarities between beards and antennae (they are both structures that protrude from the head of a living being, etc.). In contrast, for (12b.), one gets 'a beard is like a chin.' Clearly, this is an odd and infelicitous statement, as the relation between 'beard' and 'chin' is not one of being like each other, but rather characterized by the fact that beards grow on chins. The 'is like'-test has thus shown that (12a.) can be characterized by a similarity-based metaphor, and has demonstrated that (12b.) is not so describable. One can also use the 'is like'-test for morphologically complex expressions. Consider the examples in (14.).

(14.) a. Cashinahua *kex-ni* 'mouth-forest'[25]
b. Dadibi *penani nisi* 'chin hair'

Using the 'is like'-test on the level of lexical analysis involves inserting the overall meaning of the complex term and each of the constituents of the complex term with lexical meaning into the general template of the test:

(15.) <meaning of term> is like <constituent$_{1,2,...,n}$>

Doing so for each of the four constituents in the examples in (14.), this only yields a fortuitous result in one case, namely with the element meaning 'forest' in Cashinahua: for (14a.), one gets 'a beard is like a forest' and 'a beard is like a mouth,' and for (14b.) 'a beard

[25] In fact, *kex-* is a prefix that can also refer to the 'lips' as well as more abstractly to an 'edge' or 'contour.'

is like hair' and 'a beard is like a chin.' (14a.) is a felicitous statement about a perceived similarity between some properties of forests with some properties of beards (they are both dense agglomerations without any inherent structure of individual entities, hairs and trees), and by virtue of this, the 'is like'-test yields a positive result (it is enough for metaphor to be diagnosed if this is the case with one of the constituents). The other statements, in contrast, are odd semantically: a beard is not like hair, if anything it is a kind or a certain configuration of hair, and so on. The results of the 'is-like' test appear to be reconcilable with Gentner's (1983) account of metaphor, where metaphor is thought of as a special subtype of analogy as a more general device of cognitive structure mapping.

The 'is-like'-test allows describing the semantic relations in (12a.) and (14a.), but what about (12b.) and (14b.)? These cases are instances of what would intuitively be called contiguity-based semantic relations: 'beards' are spatially contiguous to 'chins' and to 'mouths' in that this is the place where they grow, and they are a particular configuration of hair. However, the notion of contiguity is, while intuitively appealing and looking back to a millennia-long tradition,[26] oddly ill-defined (Geeraerts 2010: 27), and this vagueness in definition remains to some extent to the present day (Seto 2003). Koch and Marzo (2007: 262), for instance, merely state that it is "the fundamental connection underlying all kinds of frames, scenarios, scripts etc. and including part-whole relations," a definition which recurs to the equally vague notions of frames, scenarios and scripts, however widespread and useful they may be.[27]

In the present context, therefore, a complementary test to the 'is like'-test will be used in order to diagnose contiguity-based relations that is foreshadowed in Mel'čuk (1973: 111). This is the 'has something to do'-test, which works analogously to the 'is like'-test in

[26] Contiguity as a technical term goes back to Aristotle's treaty on remembering Περὶ μνήμης καὶ ἀναμνήσεως, also known as de memoria et reminiscentia, where the three mnemonic principles contiguity, similarity, and contrast are established ("ὅταν οὖν ἀναμιμνησκώμεθα, κινούμεθα τῶν προτέρων τινὰ κινήσεων, ἕως ἂν κινηθῶμεν μεθ' ἣν ἐκείνη εἴωθεν. διὸ καὶ τὸ ἐφεξῆς θηρεύομεν νοήσαντες ἀπὸ τοῦ νῦν ἢ ἄλλου τινός, καὶ ἀφ' ὁμοίου ἢ ἐναντίου ἢ τοῦ σύνεγγυς"/ "Whenever, therefore, we are recollecting, we are experiencing certain of the antecedent movements until finally we experience the one after which customarily comes that which we seek. This explains why we hunt up the series (of *kineseis*) having started in thought either from a present intuition or some other, and from something either similar, or contrary, to what we seek, or else from that which is contiguous with it," Beare's 1908 translation). These principles were elevated to the status of "laws of association" in the philosophy of the British empiricists such as Hume and Locke, and from there have made their way to the slowly emerging psychology as an independent field of research (see Warren 1921 for an excellent overview) and to linguistics thanks to Jakobson (1956/1971).

[27] Compare e.g. Fillmore (1982: 111): "By the term 'frame' I have in mind any system of concepts related in such a way that to understand any one of them you have to understand the whole structure in which it fits."

analyzing colexifying lexical items, with the difference that the additional statement "but is/are not similar to it/them" is added to force the contiguity-reading "of having something to do" (after all, 'beards' also "have something to do" in one sense with 'forests' in that a certain similarity between them may be perceived).

(16.) <gloss1> has something to do with <gloss2>,
but is/are not similar to it/them.

Thus for (12b.), one gets 'beards have got something to do with chins, but are not similar to them' which is a semantically acceptable statement. For complex terms such as (14b.), the 'has got something to do'-test is applied by inserting the overall meaning of the expression and again each of the constituents into the test frame.

(17.) <meaning> has something to do with <constituent$_{1,2,...,n}$>,
but is/are not similar to it/them.

Thus one gets, analogous to the colexifying term in (12a.), 'beards have got something to do with chins, but are not similar to them,' and so on. Note that the 'is like'-test yields negative results in contiguity-based semantic relations; in other words, the two tests most of the time yield mutually exclusive and unambiguous results (though see below for residual cases). The present approach avoids the fuzziness inherent into any conception of contiguity in that a semantic relation that is said to be characterized by contiguity is simply defined by yielding a positive result in the 'has got something to do'-test.

This yields a very basic and very broad distinction of semantic relations into two types, traditionally called similarity-based or metaphorical and contiguity-based or metonymical, which are both widely employed notions with a long historical tradition. The advantage of the present approach is that it combines these traditional notions with well-defined tests of the type used in lexical semantics to base the analyses on. If one or more of the constituents are verbal in nature, the test frame has to be accommodated by forming a gerund and inserting it into the test frame (as is done in Cruse 1986: 139 for another lexical semantic test). Thus, Gurindji *tiwu-waji* 'fly-AGENT' = 'airplane' would be (positively) tested for contiguity by saying 'an airplane has got something to do with flying.' This example also illustrates how derivatives which contain only one lexical root are tested, namely by creating the following test-frame:

(18.) a. <lexical root> is like <meaning of term>
b. <lexical root> has got something to do/is like <meaning of term>, but is not similar to it/them

Summarizing, the two very basic test frames can be applied equally well to diagnose semantic relations between different senses of colexifying lexemes, the relation of the derivation base to the meaning of the derived term as a whole in derivatives, and the semantic relations encountered within compounds and other types of morphologically complex expressions containing more than one lexical root. Results are normally unambiguous (see § 3.6.2.4. for exceptions). This is a major difference to the Koch approach, where the reasoning how in each individual case, metaphor, metonymy, and taxonomy is identified is not made clear. As Koch and Marzo (2007: 283) explicitly state themselves, "[i]n the present research, it is the linguist who, in the end, makes the decisions on whether there is or is not a motivational relation between two lexical units (and which is the formal and which is the cognitive relation at issue)" and go on to state that "[i]t would be tempting and empirically more sound to get this information from speakers." Ultimately, of course, in the present framework it is still the analyst who makes the decision whether the test yields a positive or negative outcome, but importantly, guided by the test frames. It still seems that test frames as employed presently are an important, albeit only first step, on the way to achieving intersubjectively comprehensible accounts. The general problem of intersubjectivity is remarkably not discussed in detail in the literature (Kilgarriff 1997): different analysts or informants may have diverging opinions as to the acceptability of the statements resulting from the tests.[28] Ideally, the test frames would be applied by using questionnaires translating the frames into the target languages and have native speakers evaluate the acceptability of the resulting statements (see, notably, Marzo and Rube 2006 and Marzo et al. 2006 for an application of the framework by Koch and colleagues to speaker-judgment based experiments).

[28] However, note that this problem also pertains to analyses not guided by test frames, and is perhaps even more acute here. Contrast two analyses of the association between 'the pupil of the eye' and 'little girl,' 'child' and like meanings (Tagliavini 1949, Brown and Witkowski 1981, Urban forthcoming, and Appendix E, 130): this pattern, according to Blank (2003: 55), "is explainable as the small reflection of oneself in the other's eye. We have, thus, an inseparable combination of similarity (ONESELF – THE LITTLE PICTURE) and conceptual contiguity (THE LITTLE PICTURE – THE ORGAN ITSELF)." In contrast, Riemer (2010: 376) says that "[t]his can be explained by metonymy. Our eyes have 'pupils' because of the small doll-like image that can be observed there: spatial contiguity, in other words, underlies the shift."

3.6.2.3. Refining analyses

Having established two basic types of relations, which are also implicitly or explicitly present in traditional analyses of noun-noun compounds and Cognitive Linguistics, they may be refined by asking: *in what way* are the two meanings inserted into the test frame, if a similarity-based relation is diagnosed, like each other, and, if a contiguity-based relation is diagnosed, *what* do the two meanings have to do with each other? These questions lead to the establishment of subtypes of both similarity-based and contiguity-based relations. At this point potentially arbitrariness comes into play, as this refinement can be done at different levels of granularity, and waterproof test frames to justify more fine-grained distinctions still need to be worked out. Concomitantly, contrary to the basic split into contiguity vs. similarity-based semantic relations, it is not entirely clear that these analyses in fact mirror linguistic reality in any meaningful way, although they offer a way of subcategorizing the observed patterns in an exhaustive and relatively elegant fashion. Therefore, these refinements are offered as parts of a preliminary typological grid that may serve as a starting point for further work on the topic, but, in the evaluative part of the present work, they will not be operationalized and semantic relations beyond the basic split as it has been so far established will not be tested for systematically.

For similarity-based relations, consider the following contrast between the following terms for 'beak':

(19). a. Laz *kinçi-çxindi* 'bird-nose'
b. San Mateo del Mar Huave *ombeay quiec* 'animal.mouth bird'

Both are similarity-based, because the 'is like'-test can be felicitously applied in both cases. However, the kind of perceived similarity differs: beaks are similar to noses in that they have a similar appearance (both are pointed etc.), whereas beaks do not look like human mouths, but are similar in function in that they are used for ingestion. Thus (19a.) can be called an example of a metaphor-based conceptualization of 'beak' that is driven by PERCEPTUAL SIMILARITY between the two referents, whereas (19b.) is a case of FUNCTIONAL SIMILARITY (see Geeraerts 2010: 34 for a distillation of early classifications of semantic change in which the same basic split appears to be recognizable). Kemler Nelson et al. (2003) provide empirical support for this distinction from psychology: they demonstrate that names children give to novel artifacts they are presented can be exhaustively described by the categories of perceptual and functional similarity.

The general semantic relation of contiguity can also be subclassified further. Given the fact that contiguity and the related process of metonymy are traditionally very broadly

construed (compare Bredin 1984 for a general overview and Waltereit 1999: 234 for an overview in terms of Cognitive Linguistics), a number of subtypes can be distinguished. Here, a division into as few subtypes as possible but as many subtypes as are required to classify the vast majority of cross-linguistically recurring semantic strategies as sampled for the present context is desirable.

First, contiguity, as traditionally and also presently conceived of, is often more specifically characterizable as SPATIAL CONTIGUITY, that is, the situation when the semantic relation between two meanings (i.e., what they have to do with each other, as defined by the contiguity test) is based on them typically or necessarily co-occurring in space. Representative examples are:

(20.) a. Badaga *gaḍḍa ~ geḍḍa* 'chin, beard'
b. Nez Perce *ʔipelíˑkt* 'cloud, thundercloud, sky'
c. White Hmong *qhov-ntswg* 'nose-hole' = 'nostril'
d. Aymara *uta* 'house, room'

Note that spatial contiguity includes part-whole relations, as seen in example (20d.) (as also stated by Waltereit 1999: 234 and Koch and Marzo 2007, among others). In contrast, the examples in (21.) are instances of FUNCTIONAL CONTIGUITY, i.e., the two meanings to be tested have something to do with each other in that one of them specifies the function or utility of the other:

(21.) a. Pawnee *rakaraaraaruukitaʔiituʔ*/rakaraa-raar-huukita-iit-uʔ/
'dishes-place-on.top.of-in.a.line-NOM' = 'table'
b. Chickasaw *aa-nosi-'* 'LOC-sleep-NMLZ' = 'bed'
c. Welsh *cysgod* 'shadow, shade, shelter'
d. Cheyenne *he'enénestôtse* /he'e-nén-hestôtse/
'female-nurse-thing' = 'nipple'

Terms in (22.) are instances of what will be called PERCEPTUAL CONTIGUITY. Characteristic for such terms is that their lexical designation highlights a particular aspect of the referent's appearance, such as color, shape, or its typical action.

(22.) a. Rendille *daáyto* /daáyi-to/ 'black-thing' = 'pupil'
b. Wintu *teˑd* 'blood, red'
c. Chukchi *ilə-lqen* 'damp-on.top' = 'swamp'
d. Ngambay *lò-ndùl* 'time-dark' = 'night'

As may have been noted, the perceptual vs. functional distinction is used in classifying both contiguity-based metonymic and similarity-based metaphorical lexical relations. This provides a desirable element of symmetry in the classification, but, crucially, it does not entail that the lines between contiguity and similarity become blurred. Contrast, for instance, (22a.) with Yanomámi *mamo ishiishi* 'eye coal,' which also means 'pupil.' The relation underlying the Rendille term is one of perceptual contiguity, that in Yanomámi clearly one of perceptual similarity. (22a.) highlights a particular aspect of the appearance of the pupil of the eye (its blackness) *directly*, but crucially, the pupil is not *like* blackness which would be a defining feature of a similarity-based conceptualization. In contrast, Yanomami *mamo ishiishi* explicitly compares the pupil of the eye with a piece of coal in that it is *like* coal *by virtue of* its blackness.

What will be called PROVENIENCE CONTIGUITY in the present study is intended as a cover term for what is usually called producer-product polysemy as well as some other types of lexical relations that have a common structure in that one of the tested meanings is the producer, source, or any other type of prerequisite for the existence of the second, such as lexical associations between the material an artifact is made of and the artifact itself. This category also covers the so-called "actual-potential polysemies" commonly found in the languages of Australia (O'Grady 1960, Dixon 2002: 56-57). Examples include:

(23.) a. Pawnee *haak- ~ rak-* 'tree, wood'
b. Wappo *húy* 'breast, milk'
c. Noni *kemfemtɛɛn* 'mucus, catarrh, flu'
d. Ngaanyatjarra *yawarra* 'wound, scar'
e. Nunggubuyu *aŋ̲bana* 'rain, raincloud'
f. Dongolese Nubian *šém̀a* 'wax, candle'
g. Cavineña *huaja* 'bee, honey'

CONFIGURATIONAL CONTIGUITY refers to a relationship between two meanings such that one is a certain configuration of the other. One possibility would be that one meaning denotes a mass of a certain substance and the other is a certain configuration of this mass, or an individual entity and a group of such entities. More generally, this category also includes sub-kinds of a given concept that are distinguished from the general meaning by virtue of being characterized by a distinctive property and thus by being a configuration of the more general meaning. In this sense, what is called configurational contiguity here draws near in some instances to the lexical relation of 'kind of.'

(24.) a. Pipil *a:t* 'water, river, rain, well, pool'
b. Mali *vutka* 'house, village'
c. Cashinahua *xau* 'bone, skeleton'
d. Greek *chártīs* 'paper, map'
e. Kapingamarangi *monowai doo* 'river fall' = 'waterfall'

The sixth and final subtype of a contiguity-based relation is TEMPORAL CONTIGUITY. This is mainly, but not exclusively, needed to account for semantic relations occurring in terms for phases of the day. Examples are in (25.).

(25.) a. Muna *alo* 'evening, night'
b. Abzakh Adyghe *śəble* 'thunder, lightning'
c. Copainalá Zoque *jama* 'sun, day'

3.6.2.4. *Residual cases*

While application of the 'is like'- and the 'has something to do'-test in the vast majority of cases delivers clear results, there is a residual class that cannot be unambiguously analyzed. One class of terms, which is widely discussed in word-formation textbooks, but occurs exceedingly infrequently in the terms for the meanings under investigation, are classical exocentric compounds, such as Hausa *sha ra'ba* 'drink dew' = 'calf (of leg).' Since the calf of the leg is neither similar to drinking nor to dew, nor does it have something to do with any of them in the strict sense, the tests do not take effect. However, since exocentric compounds like this in fact are based on a metaphorical comparison, but with the tertium not being realized by one of the constituents but lying outside of the construction, they are classified as being metaphorical in nature for present purposes.

For other cases, SEVERAL ANALYSES are POSSIBLE. This situation can occur due to two different reasons. The first is when colexifying terms have several different senses (i.e. more than two), at least one of which is analyzable in terms of similarity to at least one other sense, and at least one of which is due to contiguity to another one. Examples are in (28).

(26.) a. Ngambay *mùnjù* 'bean, kidney, heart'
b. Meyah *mei* 'water, river; sperm'
c. Chukchi *jiliil ~ jiləjil* 'tongue, language, blade of oar'

In (26a.), the obviously perceived similarity is the reason for using the same term for 'bean' and 'kidney' (compare English *kidney beans*). On the other hand, spatial contiguity may be involved in the conflation of the meanings 'kidney' and 'heart.' Likewise, with regards to

(26b.), a 'river' is a configuration of water (and therefore contiguous), whereas 'sperm' may be conceived of as being *like* water; and in (26c.), the 'tongue' stands in a functional relation to language in that it is used to produce sounds, whereas the 'blade of an oar' has got nothing to do with the tongue save for it being perceptually similar to it.

The second situation that leads to several possible analyses is when actually both tests yield positive results. Examples of colexifying lexical items for which this is true are:

(27.) a. Abipón *-aan- ~ -aanl- ~ -aana* 'thorn, needle'
b. Bezhta *baƛa* 'gut, sausage'
c. Kolyma Yukaghir *iŋd'i:* 'sinew, thread'

All examples can be conceived of as cases of colexification motivated by functional contiguity: a thorn may serve well as a needle by virtue of it being sharp, guts are used to produce sausages, and sinews may serve as a natural material to be used as thread. However, it is also at least imaginable that both senses are not in a functional relation, but are perceived to be similar to one another, and it would require a fair amount of ethnographic knowledge to determine whether, say, the Abipón used the thorns of plants as needles to substantiate this scenario.[29]

Finally, it must be mentioned that some apparent conceptualization strategies remain UNCLEAR. This pertains mostly to analyzable lexical items and reflects the fact that some denominations rely on highly culture-specific conventions that cannot be analyzed without intimate knowledge of cultural scripts and/or ethnographic information. A fine example is the Mali term for flood, *milatka avuouk*, which consists of lexical roots *milat* 'coconut shell' followed by the masculine singular suffix *-ka* and *uouk* 'grandmother,' preceded by the masculine singular possessive marker *av-*. The underlying metaphorical transfer pattern is at first glance probably unclear to most people who do not speak Mali, and indeed, this fact might lead someone who is not an expert on the Mali language to have serious doubts about the correctness of the morphological analysis of *milatka avuouk*. Stebbins (n.d.: 16), however, explains: "The scraper referred to here is a half coconut shell, used to scrape small weeds from food gardens. This expression makes use of the term grandmother to refer to something gigantic. For example, the cassowary is also known as the 'grandmother of the birds.' This type of flood is so powerful that it 'scrapes' away trees from the banks of the river" (see § 6.2.3.4. for a cross-linguistic survey of such kin-based

[29] Indeed, use of thorns as needles is documented, for instance for ancient Peruvian cultures (Harcourt 1962/2002: 9) and the Western Apache (Moerman 1998: 53). Still, this evidence is merely anecdotal in nature and does not rule out a similarity-based conceptualization in other languages.

metaphors). Obviously, it is an extremely lucky and rare coincidence that Stebbins happens to explain the underlying conceptualization of *milatka avuouk*. The conclusion that can be drawn from this example is that some cases where the semantic relation between constituent parts and overall meaning of the complex term in the database underlying the present work remains unclear, it could in principle be motivated if enough detailed cultural information were available that allow to "make sense" of the conceptualization.

On the other hand, the policy of allowing the relations between constituents and the entire complex term to be unclear also increases the danger of erroneous superimposition of morphological complexity when in fact none is there. For instance, given that in Yanomámi *u* is 'liquid' in the extreme case an analysis (not proposed here) of *puhutu* 'bud' (or any other word containing the vowel *u* for that matter) might be **p-u-h-u-t-u* '??-liquid-??-liquid-??-liquid.' A minimum of human judgment cannot be entirely eliminated here, in spite of the practical conventions for operationalizing the extraction of morphological complexity to be introduced in § 3.7.2.1.

Unclear conceptualization strategies are sometimes also encountered in colexification. As noted by Haiman (1974), it would be a quite remarkable coincidence if two languages had accidental homonyms with precisely the same meanings. These cases are therefore all the more interesting, and fleshing out the semantic motivation that links the two meanings is a challenge that would be worth pursuing. Two examples are in (28.).

(28.) a. Khalkha *xuvar* 'smallpox, flower, picture'
Kolyma Yukaghir *šörilə* 'flower, picture'
b. Sentani *ja* 'day, rain, already'
Bezhta *wodo* 'day, rain'

Note that in some of these cases a link is conceivable in that the semantics of the colexifying lexemes do not seem to be entirely unrelated, but its precise nature escapes analysis. With regard to (28b.) specifically, one would suspect, given the evidence of the present sample that some languages (Guaraní and Mandarin) colexify 'day' and 'sky,' while others (Katcha and Manange) 'sky' and 'rain,' that at an earlier stage, Sentani *ja* and Bezhta *wodo* also had the meaning 'sky' that served as a semantic bridge linking 'day' with 'rain.' However, Nikolayev and Starostin (1994) suggest that phonological developments in Bezhta led to the collapse of two originally distinct words with the meanings 'day' and 'rain' respectively.

3.6.2.5. *The notions of Semantic Domains and Domain-Supported Metaphor*

For the standard theory of metaphor and metonymy in Cognitive Linguistics, the notion of cognitive domain plays a key role, because for the differentiation of metaphor and metonymy, difference versus identity of semantic domain is the key differentiating feature (compare the definitions quoted in § 3.6.2.1.6.). A domain is understood in Cognitive Linguistics to be the sum of the background knowledge needed to understand the meaning of a particular linguistic item. In more formal parlance, concepts such as 'arc,' 'radius,' 'diameter' etc. are *profiled* against the background domain of 'circle' whose meaning is presupposed by the meanings of the profiled concepts (Langacker 1987a). Similarly, the days of the week can only be understood against the background knowledge of what a week is in the first place, and the meaning of week in turn recurs to a set of calendrical concepts such as 'month' etc. that are needed to understand the meaning of 'week' (Lakoff 1987).

Fine-grained subsequent research has argued, however, that a sharp division between metonymy and metaphor as strictly distinct mechanism along the lines of the standard definitions is hard to maintain and leads to analytic problems. In particular, it was argued that a metonymic base can be recognized for metaphorical processes (Goossens 1990, see also Barcelona 2000b for discussion). This gave rise to the so-called "demarcation problem," i.e. the question where to draw the line between metonymy and metaphor. Some scholars have called into question whether a strict division can be meaningfully maintained between mappings within the same domain and mappings that cross the boundaries of one domain, and some have therefore argued that it would be best to abandon the distinction between mappings within and across domains as defining properties of metaphor and metonymy (Feyaerts 2000, Riemer 2002b). Identity and non-identity of domain, in this view, would be maintained as a descriptive parameter, but would crucially be independent from the distinction between metaphor and metonymy.

Consider, as a first approximation, the following examples. These are instances of metaphors at the utterance level, which are discussed before turning to word-level metaphors because utterance-level conceptual transfers are the traditional subject of analysis in Cognitive Linguistics:

(29.) a. *As the sun sinks, the young bats stream from the cave-mouth like smoke and set off on the first stage of their long journey south.* (British National Corpus, F9F 641)
b. *Her words drifted like smoke.* (British National Corpus, GUK 2731)
c. *The fog seemed to part without warning, revealing the great headland of Rhuaival over three hundred metres above us, mist trailing like smoke from its peak and even a stray beam of sunshine lighting up the craggy outlines of the cliffs.* (British National Corpus, CRJ 899)

The source of the metaphorical transfer is in all cases 'smoke,' which belongs to the domain of aerosols in the sense used in physics, i.e. suspensions of fine solid particles or liquid droplets in a gas.[30] In the examples above, the comparison is already made explicit in that it is signaled overtly by a prepositional phrase headed by *like*. (29a.) and (29b.) are textbook examples of metaphor. But what about (29c.)? The comparison of 'mist' with 'smoke' is not an instance of any kind of contiguity: they do not necessarily co-occur together either spatially or temporally, they do not cause each other, they are not in a part-whole relation with each other, etc. Like (29a.) and (29b.), the relation between the two concepts would also be positively tested for metaphor by the 'is like'-test. If, however, it is accepted that 'mist' and 'smoke' belong to the same experiential domain, this is a case of metaphor that does not involve a conceptual trans-domain transfer. Moving on to the word-level, lexico-semantic associations between 'mist' and 'smoke' are not very common cross-linguistically, but they do occur, for instance in Jarawara, where *hote/hotone* is used with both meanings.

As an additional complication, there appears to be a gap between very technical definitions of what a domain is within Cognitive Linguistics itself. Croft (1993: 339) defines a domain as "a semantic structure that functions as the base for at least one concept profile," while Barcelona (2000b: 32) calls them "structured blocks of knowledge and experience which constitute the background for linguistic meaning," and the term indeed seems to be frequently used in a much looser sense that is more akin to the traditional notion of semantic field as opposed to cognitively oriented reasoning. Indeed, building the notion of domain into the definitions of metaphor and metonymy "raises the additional problem of stating precisely what an experiential domain is, when two domains are different, and when a domain is superordinate to another domain." (Barcelona 2000: 32).

Problems also arise when the technical and loose definition of domains clash. Heine (1997: 137), for instance, explicitly speaks of the "domain" of body-parts, and in discussing semantic shifts and extensions of body-part terms, aligns himself with the standard theory of metaphor as conceptual trans-domain mappings (1997: 139). Surprisingly, he then summarizes "that metaphor... is the only tool that takes care of the main features that characterize the transfer from object to body-part (e.g., from 'mouse' to 'muscle'), *from one body-part to another (e.g., from 'finger' to 'toe'),* or from body-part to inanimate part (e.g., from 'eye' to the 'eye of a potato')" (Heine 1997: 143, emphasis added).

For the present work, the notion of semantic domain is therefore employed, but in a relatively loose fashion, given that the goal is not to provide a cognitively or psychologi-

[30] Obviously, this scientific definition will not be present to some or probably even most speakers, but that concepts such as 'mist,' 'smoke,' 'steam,' 'ash clouds,' etc. do form a coherent semantic domain is suggested by the strong lexico-semantic ties between these meanings cross-linguistically (see § 6.3.2.2.).

cally sound account of semantic classification. Reference will be made to the domain of artifacts, the domain of body-parts and so on, bearing in mind Brinton's (2000: 112) definition of a semantic field as "a segment of reality symbolized by a set of related words [that] share a common semantic property." Consequently, the standard Cognitive Linguistics account of metaphor and metonymy is departed from in that the notion of semantic or experiential domains are not taken to be defining properties for these conceptual operations, but rather, the present framework relies exclusively on the established test frames to diagnose the presence of either. As the fairly detailed discussion of 'smoke' and 'mist' has already made clear, intra-domain metaphorical mappings are explicitly allowed (compare Rice's 2012: 35 metaphor PARTS ARE OTHER PARTS explained as "intra-domain metaphorical mapping based on form similarity" to describe denominations such as *setth'utthila* 'my nipple,' literally 'my-breast-head-hand(extremity)' in Dene Sųłiné). Consider also the body-part and body-fluid terms in (30.) and (31.).

(30.) a. Bakueri *ikéngé já ḿmɛ́ndɛ́* 'neck GEN leg' = 'ankle'
b. Efik *i'nua* 'mouth, nipple' (inter alia)
c. Swahili *shavu la mguu* 'cheek of leg' = 'calf'

(31.) a. Nez Perce *simqéheqs* /símqe-heqes/ 'penis-pus' = 'semen'
b. Abzakh Adyghe *pe-šən* 'nose-pus' = 'viscous snot'
c. Kwoma *moku sobo* 'semen raw/unripe/pure' = 'urine'

However, the notions of source and target domain are borrowed from Cognitive Linguistics because of their descriptive usefulness by referring to the element of a similarity-based complex lexical item and that of a contiguity-based complex lexical item triggering the tests to become positive as SOURCE CONCEPTS and to the overall meaning of complex terms as TARGET CONCEPTS. The term is used also for patterns of colexification where a particular direction of mapping suggests itself, but has to be taken with a grain of salt here, because, in spite of claims in Cognitive Linguistic literature to the effect that the source domain is in the overwhelming majority of cases concrete and the target concept more abstract (e.g. Kövecses 2002), directionality of semantic extension is not a priori clear in the absence of overt marking by derivational processes (Koch and Marzo 2007, Umbreit 2010, Urban 2011, see also Grady 1999 for a critical view from within Cognitive Linguistics).

It is probably not surprising that Wilkins (1996), a study exclusively devoted to semantic change in the domain of body-part terms, also allows for domain-internal metaphorical processes. Examples such as those in (30.) and (31.), which are all similarity-based and therefore metaphorical in nature, lead to the recognition of a subtype of

similarity as defined above, namely similarity that is at the same time assisted by the similarity being established between two referents in the same domain, that is, in other words, DOMAIN-SUPPORTED. Metaphorical transfers are powerful, but bold conceptual operations, and it appears possible that intra-domain transfers provide an additional element of conceptual fastening within the original domain to maintain comprehensibility of the semantic extension.

3.6.2.6. Contiguity Anchoring

Such conceptual bonding is also established by another subtype of metaphorical transfer which will be called CONTIGUITY ANCHORED and pertains exclusively to morphologically complex lexical items. Consider again the data already presented in (1.), reproduced here for convenience as (32.).

(32.) a. Bezhta *beš* 'skin, bark'
b. Mbum *ŋgàŋ-kpù* 'skin-trunk/tree' ='bark'

(32a.), from Bezhta, is colexifying and does not feature any overt marking that would mark the metaphorical connection between the two meanings of the term. (32b.), in contrast, is identical to (32a.) with respect to the semantic transfer that occurred (metaphor, based on resemblance of the concepts 'skin' and 'bark'), but formally, the term is a compound, with *kpù* 'trunk, tree' featured as an additional element. Now, 'trunk, tree' is contiguous to the meaning of the term as a whole, 'bark' (more specifically, there is a part-whole relation between the two meanings). This does not affect the overall metaphorical nature of the term as diagnosed by the 'is-like'-test. Therefore, it will be said that terms such as (32b.) are characterized by metaphor, that is, the semantic relations between the source and target concepts can be described as SIMILARITY that is CONTIGUITY-ANCHORED. In fact, most cases of perceptual similarity found in the data are of this type.

3.6.2.7. Why no taxonomic relations?

Koch (2001) and Koch and Marzo (2007) employ "taxonomic relations" as a matter of course without explicitly defining them. Indeed, hyponymy and hyperonymy are among the most well-established and best-known types of lexical relations. A distinction between hyponymy (defined in lexical semantics by test frames such as Xs are Ys) and the more narrowly defined taxonymy (defined by the more specific test frame Xs are a type of Ys) is often made (Cruse 1986, Croft and Cruse 2004), and it is unclear which of the two are meant in the Koch approach. Further, taxonomic relations as descriptive semantic relations are afflicted with a number of problems that are not immediately obvious. Cruse (1986: 137),

for instance, discusses some problems of taxonymy and presents seemingly straightforward examples which however do not produce normal results with the standard test frame for taxonymy (see also Cruse 2002 for a more complete outline of problems with hyponymy and a prototype-based approach to account for some apparently aberrant subtypes and Murphy 2003: ch.6 for review). Koch and Marzo's taxonomic super- and subordination appear to be very similar to, if not identical, with Cruse's taxonymy, but this is hard to be sure of as they do not offer an explication of these notions. One instance of taxonomic subordination Koch and Marzo (2007: 270) mention that does not seem so clear to the present author (as a native speaker) is German *stadt-rand* 'outskirts,' literally 'city-edge' which is said to be a taxonomic subordinate of *rand* 'egde.' Is there really a cognitively entrenched domain of 'edges' which has subordinates such as *stadtrand*?

The boundaries to both metaphor and metonymy (i.e. endo- and exocentric compound on the level of the signifier as far as compounds are concerned) appear to be more fluent than one would expect, although clearly taxonomic relationships are psychologically real at some level (see e.g. Moss et al. 1995).[31] Whether two signifieds are in a taxonomic relation with each other seems to vary to a considerable degree with the intuitions of different speakers/linguists (see Bright and Bright 1965 for discussion of difficulties with taxonomic relations in a fieldwork context).

The present approach therefore aims to minimize taxonomic relations as analytic categories altogether. In similarity-based conceptualizations, taxonomic relations do not arise in the first place because of the typically exocentric nature of such compounds, where the head constituent is not susceptible of being in a taxonomic relation with the overall meaning of the term. In contiguity-based conceptualizations, the test frame is designed to automatically target the element being contiguous to the target concept. In instances of colexification that might be thought of as exhibiting a taxonomic relation between their senses (which are rare anyway), the problem can often be avoided because, as Köveces and Radden (1998: 53) and Radden and Kövecses (1999: 34) have suggested, relations between some lexical items that could potentially be treated as taxonomic in nature can equally well

[31] Note that classic instances of exocentric ("bahuvrihi") compounds such as *egghead*, *redbreast*, etc., where the literal meaning of the compound denotes a salient aspect of the denotated entity of the term, interestingly are hardly represented in the slice of the vocabulary presently under investigation. These are typically said to be metonymic in nature (part for whole, see e.g. Ungerer 2002: 551). In some of these, metonymy and metaphor interact in often intricate ways which would pose an analytic problem, and, in fact, as Geeraerts (2002a) points out, several analyses for such items are possible. It would be interesting to further investigate just how common such compounds are, and in what areas of the lexicon they typically appear.

be accommodated under a broad notion of contiguity-based metonymy.[32] In the present framework, this would mostly be a relation of contiguity of the configurational subtype.

However, there are a number of recurrent patterns of colexification where indeed a taxonymic relationship between the two senses appears to be the only acceptable analysis. Notably, these are restricted to semantic areas that clearly form a coherent semantic field, and there is well-established evidence from prior research that indeed this semantic field is structured according to taxonymic principles. These are, first, the domain of ethnobiological classification, which is hierarchical in nature (e.g. Berlin 1992) and where colexification across the levels of the taxonomy are frequent (e.g. Berlin 1972) and second, the domain of artifacts (compare Cruse 1986: 147).[33] Examples include:

(33.) a. Imbabura Quechua *yura* 'tree, plant'
b. Huambisa *kuntin* 'bird, animal'
c. Miskito *raks* 'weapon, rifle'
d. Wappo *má·kina?* 'car, machine'

These types of colexification will be said to exhibit TAXONOMIC AMBIGUITY. This is closely related, if not in some cases identical, to the phenomenon of autohyponymy (Horn 1984, see also Becker 2002 for discussion relevant for word-formation). Note that there is the problem, at least for theories which seek to keep semantics and pragmatics distinct, of adequately distinguishing between context-triggered implicatures (which belong to the realm of pragmatics) and truly lexically entrenched senses (which belong to the realm of the lexicon) when meaning conflation of this type is concerned.[34] There is, unfortunately, no good principled methodological decision available to approach this issue. Given the fact that taxonomic ambiguity of this type plays an important role in the expansion of ethnobiological classification systems, at some point the semantic association must be viewed as belonging to the lexicon rather than being merely pragmatically conditioned. Moreover, given that the distinct senses made their way into dictionaries, it seems unlikely that these cases are pragmatically induced readings only, although of course the possibility cannot be altogether ruled out.

[32] Note also the group of conceptual transfers known as "generic is specific," which are argued to be metaphorical by Sullivan and Sweetser (2010) but considered metonymic by Rice (2012). Examples like these illustrate that there is little agreement in the cognitively oriented literature as to such cases.

[33] Note also that Rosch and Mervis (1975), while arguing for a prototype-based account of membership in the category 'furniture,' at no point deny that 'furniture' is a category.

[34] This distinction itself has been subject to criticism, see for example Nunberg (1979).

3.6.3. ISSUES IN COMPARATIVE SEMANTICS

3.6.3.1. Introduction

Cross-linguistic studies, in particular as far as semantics is concerned, require some important adjustments so as to render analyses meaningful and justifiable. Some of them were already noted; the next section is concerned exclusively with issues that arise when attempting to compare a large number of languages with respect to semantic features or, as is done here, semantic processes operating on the level of the lexeme. It is not without good reasons that recent approaches to cross-linguistic semantic analyses or *semantic typology* (e.g. Levinson and Meira 2003, Ameka and Levinson 2007, Bohnemeyer et al. 2007) operate with fine-grained data gathered using questionnaires with largely non-linguistic stimuli during actual fieldwork on relatively few languages. Indeed the question whether it is possible to arrive at meaningful results about cross-linguistic semantic patterns using published sources is in principle open.

Up to now, the discussion has operated with two assumptions the foundations of which require extensive additional discussion. Semantic relations between senses were posited by invoking the traditional notions of metaphor and metonymy, with the difference that in the present work these are established by test frames as used in lexical semantics. However, these test frames operate on the level of the metalanguage, not the object-language, which is on the one hand probably unavoidable. On the other hand, the fact that the locus of analysis is metalanguage glosses requires attention. First, the raw data on which this study is based is information from dictionaries, and, in the particular case of colexification, dictionary glosses for lexical items. Second, in the above classification, dictionary glosses were used as the basis for distinguishing different types of semantic relations, both in morphologically complex expressions and in cases of colexification. But it is not at all given that dictionary glosses correspond to senses as defined in lexical semantics! Further, taking into consideration simplex terms with several different meanings also introduces another problem. With complex terms, the analysis is in principle straightforward: one would, oversimplifying, have to establish the meanings of the constituent parts and state their semantic relations to the overall meaning of the complex terms. By contrast, without any overt mechanism, the analysis is much more complicated because there are no morphological or other clues to the different meanings of the terms in question. Among the associated problems with this general concern are (i) the notoriously difficult distinction between polysemy and semantic vagueness or generality, in particular (ii) in its relation to metalanguage issues and cross-linguistic comparison.

3.6.3.2. Polysemy vs. Vagueness

Polysemy is a notorious concept. While well-entrenched in the vocabulary of semanticists, it is probably the hardest of all lexical semantic relations to define unambiguously. Much recent research has dealt with the problem of delimiting it unequivocally from semantic vagueness. It has been demonstrated in great detail that traditionally employed tests to distinguish the two are problematic and often yield mutually contradictory results (Geeraerts 1993, Tuggy 1993, see Dunbar 2001 for a reply). To make matters even worse for cross-linguistic studies, these tests would have to be employed on a language-specific level for every individual case in every individual language. It is methodologically a no-go to make claims as to the status of a particular lexical item in a particular language with respect to polysemy and vagueness without careful application of the available tests (and even then, statements should be made with great caution). For instance, Terrill (2006) establishes that Lavukaleve *tau* which may translate to English as either *hand* and *arm* and might hence be dubbed polysemous is in fact semantically vague and could therefore be glossed with 'limb' rather than 'hand, arm.' The criticism of premature analyses in terms of polysemy expressed by Enfield et al. (2006: 141) and their conclusion that "[t]he burden of claiming polysemy is to explicitly establish it using linguistic tests" is well-founded. Likewise is Enfield et al.'s statement that "[s]tandard sources, such as dictionaries, do not provide the information required for distinguishing between a term's status as general or ambiguous." In a similar vein, Evans (2010: 524) points out that "not all sources have gone through the necessary analytic steps to demonstrate unquestionably whether monosemy or polysemy is involved." However, establishing the precise status of a given lexical item with respect to the distinction between ambiguity and vagueness is obviously impossible by sheer time restrictions, which require large-scale analyses such as the present one to be based on extant sources, such as dictionaries. Dictionaries, however, are in the first place practical tools, and their goal is not necessarily to provide detailed semantic analyses of its headwords, but rather to group distinct senses of a given lexeme in a meaningful way (employing the traditional lexicographic procedures concerning the microstructure of lexical entries, such as nesting) so as to facilitate the user's very purpose of consulting a dictionary: to find out about the meaning of a given word.

3.6.3.3. Metalanguage biases and the issue of sense division

Another issue that arises is the role of the metalanguage chosen for semantic analysis. As Malinowski (1935: 11) famously points out, "translation must always be the re-creation of the original into something profoundly different," and this statement is true no matter whether what is to be translated are whole passages of text or individual lexical items. The linguistic sign is irreducible in that its meaning cannot be described or explained other

than by recurring to linguistic signs, either from the same semiotic system or from a different meta-system chosen for analysis. This is the semiotic principle (Peirce 1932: 230-231). It poses serious problems for semantic analyses, because the semiotic meta-system, the metalanguage, is itself not neutral, but will potentially bias the analysis made of the object language in systematic ways (Goddard 1994, Goddard and Wierzbicka 2010, Evans and Sasse 2007: 68). To use a very simple example, if English is used as the metalanguage to describe the meaning of the Burarra term *murna*, it will be noted that the translational equivalent of *murna* in English is sometimes 'finger' and sometimes 'hand.' Since two different metalanguage terms are needed to adequately capture the meaning of the object language sign to be analyzed, the conclusion that one might reach is that *murna* is not monosemous, since it covers two related but distinct senses that are distinguished lexically in the metalanguage, or that *murna* is at least vague with respect to the two senses distinguished in the metalanguage. However, if the metalanguage is to be Ngaanyatjarra, another Australian language, then one metalanguage sign, *mara*, would suffice to adequately describe the meaning of Burarra *murna,* and the conclusion that might be reached under these circumstances is that *murna* is a simple monosemous lexical item. "[T]he delimitation of the number of word senses is always at the mercy of the metalanguage chosen for the analysis, and therefore open to potentially unlimited different analyses" (Riemer 2005: 124).

Recent work in lexical typology has lead to the realization of the momentousness and consequences of the metalanguage problem (e.g. Koptjevskaja-Tamm 2008: 43), has found a workable, albeit not optimal solution to circumvent the serious problems posed by the semiotic principle: instead of trying to characterize the semantic properties of a given set of terms that are to be compared on a language-internal basis (this would first involve an analysis of Burarra *murna* only using lexical semantic methods and establish its status with respect to homonymy, polysemy and vagueness) and its place in the language system emically, one goes for an etic characterization that "sets out all logically distinguishable possibilities regardless of whether or not individual languages group them together" (Evans 2010: 509). This approach is adopted also in François (2008), and since it is not based on language-internal tests, but on cross-linguistic comparison, the term COLEXIFICATION is used rather than POLYSEMY to reflect the different methodology. Since the present study operates on a similar basis, the terminological difference is adopted here. Colexification, as a comparative concept in the sense of Haspelmath (2007, 2010), is thus used to refer to any kind of conflation of several distinct meanings, defined as metalanguage glosses needed to capture the full semantic range of an object-language linguistic item. This does not entail any commitment as to the internal semantic structure of the analyzed terms and is to be understood strictly as a convenient cover term employed from a cross-linguistic point of

view. That is, with respect to the meanings 'finger' and 'hand,' one would simply restrict oneself to noting that there is at least one language, English, which employs two distinct lexical items, the meanings of which are conflated in Burarra. Using this approach, potentially valuable information for individual languages is lost. In particular, there is the problem of spurious sense division (Riemer 2002a): for instance, saying that Burarra *murna* conflates two meanings, 'finger' and 'hand,' conceals the possible elemental monolithic semantic structure this word might in reality have. The precise status of a particular linguistic item with respect to the monosemy-polysemy distinction would need to be established on a language-internal basis using lexical semantic tests (although these are plagued with problems themselves, as shown by Geeraerts 1993).[35] [36] Furthermore, Riemer (2002a, 2005) provides an account of semantic extensions that allows to circumvene many of the problems associated with the problematic distinction between polysemy and vagueness.

However, it is of utmost importance to note that the language in which testing for semantic relations is carried out is the metalanguage, not the object language itself for which the very relations are to be analyzed. Furthermore, it is not clear that the entities which are tested for the presence of this or that semantic relation (that is, dictionary glosses) indeed really are distinct senses in the object language. How can these unavoidable requirements (at least in the context of the present work) be justified and how can influences from the metalanguage on the analyses be excluded? The view adopted here is heavily influenced by the framework exposed in Riemer (2002a, 2005), and therefore Riemer's account will be described in detail in the following.

First of all, according to Riemer, it is not the case that the problem of potential influences of the metalanguage chosen for semantic analysis is genuinely associated with cross-linguistic work, but instead is a fundamental fact that all semantic work inevitably faces: "In fact, it is only in some translation metalanguage that the meanings can be brought to light and discussed in the first place: the only way we can talk about the different senses of a … lexeme is by providing a paraphrase of them in some different

[35] Compare also Sandra's (1998: 371) critique of certain types of analyses in Cognitive Linguistics, noting "the suspicious lack of a set of decision principles, which would make it possible to decide in an objective and replicable way whether two usages of a linguistic unit (lexical item or grammatical construction) are distinct or not" and summarizing that "[i]n other words, what is lacking from the enterprise is a set of scientifically valid principles."

[36] This approach is not anglocentric, just because English happens to make more lexical distinctions than Burarra. Similarly, English is lexically underspecified with respect to the referent 'lip' when compared with Dadibi, which distinguishes between *gani* 'lower lip' from *pedauwali* 'upper lip,' and with respect to 'lip,' English would be evaluated according to the same procedures that are applied to all other languages that are being investigated.

semiotic system" (Riemer 2002a: 5). This echoes the cardinal importance of the semiotic principle as formulated by Pierce (1932) for any attempt of semantic description. Riemer (2002a: 5) further argues "that metaphor and metonymy retain significant explanatory usefulness in spite of the restriction of their applicability to metalanguage glosses." Departing from the probably uncontroversial view that a linguistic item is a device for co-categorization of a variety of (sometimes highly dissimilar) real-world referents that establishes an equivalence between them by the very fact that they are referred to by the same expression, Riemer (2002a: 5-7, 2005: 159-161) argues for a threefold distinction of levels on which this co-categorization may take place:

> Micro-level categorization is the process involved in the ordinary, unmarked use of a linguistic expression for typical tokens of its class of referents, for example, the use of the word *flower* to refer to a particular individual flower manifest to the speaker for the first time. This level of categorization is the site of what could be called 'micro-polysemy' of words, that is, the potentially infinite minute differentiation to which referents and the nuances which accompany them are open while still counting as typical members of the lexical category in question ... The micro-level of categorization is essential to speakers' ongoing ordinary use of language to refer to the world. ... At the opposite extreme, macro-level categorization is the process in which atypical referents are assimilated to a pre-existing lexical category. This is the domain of many linguistic phenomena, including irony, exaggeration and other types of rhetorical effect, and, in particular, many types of consciously employed metonymy and metaphor. ... In contrast to the unconscious nature of micro-level categorization, here the use of a lexical item for an atypical referent involves a high degree of self-conscious, metalinguistic awareness, since it represents a marked departure from the typical referential norms of the speech community. ... These two extremes jointly define the residual intermediate level of lexical categorization. This level comprehends an array of disparate categorizations which are neither absolutely typical of the lexical item in question, nor absolutely atypical. Examples of the types of phenomena on this level would include dead metaphors and idioms, slightly atypical referents, and some of what ... we may call 'contextually modulated' categorizations. (Riemer 2005: 159-161)

Micro-level categorization, in this view, does not entail the creation of new word senses (otherwise a new sense of the word *flower* would come into being every time someone refers to a particular flower). Macro-level categorization, however, clearly does. Theories of metaphor, then, unnecessarily restrict the application of metaphor and metonymy as technical terms to the upper levels of categorization, while they can be equally well seen as being operative on the micro-level of categorization. For instance, when a real-world entity is categorized as a 'flower,' it is its resemblance, its similarity to the concept 'flower' that is the operative principle that governs categorization. "This connection, which is one of resemblance, is a metaphorical connection par excellance" (Riemer 2005: 164). In this view, analyzing a particular semantic relation as metonymical or metaphorical does not

necessarily entail postulation of distinct senses. As Riemer (2005: 166) further points out, "[t]he validity of postulating metaphorical and metonymic links between particular metalinguistic glosses can thus be guaranteed if these glosses identify features of referents that are salient on *one* of the levels of categorization (i.e. either the unconscious referential level, or the conscious conceptual one)." But how can this be guaranteed? This is indeed a difficult question on which the validity of the whole analysis crucially depends. Riemer approaches this issue by the introduction of so-called "S-Glosses" as a subtype of all possible metalanguage glosses that could be employed to describe the meaning of an object-language term.

S-Glosses, in his terminology, are glosses with "properties of referents which are sensorily manifest to speakers/hearers. Since these properties are at least perceived by speakers, they are part of the categorization process, if only on the micro-level" (Riemer 2005: 169-170). Consider Riemer's account along these lines of the semantics of Warlpiri *pinti*, glossed as 'skin, bark, peel,' which is worth quoting at length not only because this will serve to illustrate Riemer's approach, but also because terms with a similar semantics are in consideration in the context of the present work and have in fact already been mentioned above:[37]

> All three glosses are S-glosses: differences between skin, bark and peel are all clearly perceptible to Warlpiri speakers: these things, quite simply, all look different. Adopting a micro-level interpretation of the semantics of *pinti* would involve seeing the three glosses as not reflecting separately entrenched senses. Rather, the cocategorization of the three denotations would be explained by the semantic commonality between them: ... skin, bark, and peel are all *similar*, this similarity being captured by the superordinate description just given. Adopting a macro-level interpretation, on the other hand, would mean recognizing a correspondence between metalinguistic glosses and separately stored senses in the mental lexicon. In this case, 'bark,' 'skin' and 'peel' would each refer to a separately entrenched polysemous meaning of *pinti*, one of which would have to be taken as the core sense, with the others related metaphorically to it. Given that Warlpiri speakers can certainly perceive a difference between the referents named by the three glosses, the metaphorical link is part of Warlpiri speakers' linguistic knowledge *at least* referentially, on the micro-level of categorization. As previously noted, whether it is also part of their cognitive representations of the semantics of *pinti* is a question that will ultimately only be made meaningful if clear brain correlates are identified for the notion of a separate sense. ... The glosses of object-language words, the statuses of 'core' and 'extended' attributed to them, and the metaphoric and metonymic links by

[37] Note in the context of this discussion also the example sentence for Kaingang *far* in the consulted source for this language: *nén kar vỹ, far nũ: ka kar, nén tánh kar, ẽg mẽg kar, ẽg ke gé*. 'Everything has *far*: trees, plants, animals, us, too' (original translation: 'Tudo tem 'pele': árvoles, plantas, animais, nós também').

> which the glosses are related, have to be interpreted quite strictly as theoretical terms within a metalanguage and not necessarily revealing the status and interrelations between different senses in a psychologically realistic way for Warlpiri speakers. The division of the glosses of each word into 'core' and 'extended' meanings that will be made in the analysis in this book is therefore not to be interpreted as claiming that the different metalanguage senses attributed to a word all correspond to different polysemous senses. Rather, the status of these senses as either separate meanings on the macro-level of categorization, or as 'modulations' of the same meaning ... on the micro-level, is left unspecified. The interpretation retains a minimal degree of psychological plausibility ... if ... only S-glosses are chosen ... Clearly, this will only be possible for words referring to 'concrete' or perceptually available entities (Riemer 2005: 171-173).

This, importantly, is exactly the case in this study, which is restricted from the very start mostly to perceivable "objects" in the extra-linguistic world for precisely the reasons for which Riemer finds it necessary to ground analyses on what he calls S-Glosses.[38] This reasoning can be illustrated with two examples, one metaphoric, the other metonymic. The first was already briefly mentioned: In Yélî Dnye, *mbu* is used to refer to mountains, but also "to conical elevations of any size, even a heap made by a burrowing crab on the beach" (Levinson 2008: 261). Given that conical shape seems to be the semantic feature most prominently encoded by *mbu*, the correct analysis on language-internal criteria would perhaps be that *mbu* is monosemous rather than polysemous with several distinct senses such as 'mountain,' 'heap made by crab,' etc. But note that the distinction between monosemy and polysemy is not at stake presently. What matters is that there is a relation of similarity between mountains and heaps made by crabs precisely because of their common conical shape. Whether this similarity-based grouping of referents under the umbrella of one lexical item occurs at the unconscious micro-level of categorization or at the conscious macro-level of deliberate linguistic behavior that is the domain of most Cognitive Linguistics analyses, or occurs at the intermediate level is a question that no commitment needs to be made to. The similarity relation between the disparate referents of *mbu* is enough to diagnose its senses as being in a metaphorical relation to each other.

A second example is provided by conflation of the meanings 'thunder' and 'lightning' into one lexical form, which is common in languages of South America (see Appendix

[38] Note that the view expressed by Riemer that 'skin,' 'bark' and 'peel' "quite simply, all look different" as well as the very notion of 'objects' in the extra-linguistic world entail some implicit assumptions which are at the very core ultimately philosophical in nature. Lyons (1977) is one of the few to explicitly state that the basis of his semantic views is a philosophical position of 'naïve realism' which he considers 'harmless.' However, it is important to note that taking a harmless point of view nevertheless still *is* taking a point of view.

E, 35,64), but occurs also in German *Gewitter*. The two meanings are in a relationship of contiguity with each other: they typically co-occur spatially and temporally. If one adopts a micro-level analysis of terms that can be translated as both 'thunder' and 'lightning,' one would assume that such terms are essentially monosemous, the general label reflecting their co-occurrence. On the other hand, a macro-level analysis would entail the assumption that there are two distinct lexically entrenched senses of the term, 'thunder' and 'lightning.' However, the explanation for this grouping of colexified senses would remain essentially the same. This account of semantic extension is not only descriptively elegant for cross-linguistic purposes. By remaining non-commital as to the level of semantic extension and hence to the issue of sense division, it also allows to circumvene to some extent the need to rely on an account of semantics in which lexical items host distinct reified senses which is both descriptively difficult to handle and, perhaps even more importantly, glosses over the dynamic nature of the emergence of semantic structure in the context of utterances (Geeraerts 1993, Allwood 2003).

3.7. PRACTICAL PROBLEMS

This section is concerned not so much with problems of a theoretical nature, but rather with questions that arise when actually extracting data from extant sources. A number of issues arise, some general in nature, others pertaining to either the formal or semantic side of the lexical items gathered only.

3.7.1. General Considerations

Data were excluded from quantitative analysis when the lexicographer explicitly marked a certain term, or its morphological make-up, as dubious. The same was done when lexicographers made explicit that a certain term is very rare or archaic, or that it belongs to a specific register of the language (this would include motherese, avoidance registers, etc.) and does not occur in ordinary speech.

Pawley (1996a: 189) points out that "there is a continuum, rather than a sharp division, between nonce forms and highly conventionalised expressions," and there is no principled fashion in which a lexical item's status with respect to this continuum can be inferred from dictionaries. Therefore, in the most extreme case, there is the potential issue that complex items listed in dictionaries might be artifactual, that is, neologisms coined in the course of the linguist's work on the language to refer to a specific entity in the non-linguistic world that does not constitute a part of the ordinary vocabulary of the language in question. Haspelmath and Tadmor (2009b: 10) discuss the case of Indonesian, which lacks a word for 'pasture' and speakers consequently make use of a complex term when urged to

name a word for this particular referent. Similarly, Sawyer (1965) remarks that the complex Wappo term *ʔùču·aʔ-meʔ hín* 'night-belonging.to sun' for 'moon' is "possibly contrived." While this seems unlikely in this particular case given the overall areal distribution of complex terms for 'moon' (see Appendix E, 38), the issue remains problematic in general. Further, overly long terms are suspicious in this respect. For instance, the consulted source for Yoruba gives *ibiti o dabi ẹnipe ilẹ̀ ati ọrun pade*, literally "place where land and sky appear to meet," as the Yoruba equivalent for 'horizon,' and indeed, Joseph Atoyebi (p.c.) informs that this is not a lexicalized expression in Yoruba but rather a circumlocutory definition of the concept. However, unless additional information such as that provided by Sawyer is given in the consulted source, there is no principled criterion available to sort out such cases when working with extant sources. On the other hand, it seems rather unlikely that there are very many of such non-lexicalized expressions in dictionaries, although a small bias in one direction or the other cannot be entirely excluded.

3.7.2. PRACTICAL PROBLEMS IN FORMAL CLASSIFICATION

3.7.2.1. Problems with extraction of morphological complexity

In principle, whether what one is dealing with is a morphologically complex lexical item can be determined straightforwardly. However, in practice, two problems arise.

The first relates to the way lexicographers choose to include information about morphological complexity. In the ideal case, constituent parts of complex items are directly given as part of the lexical entry. This is generally the case with data from Haspelmath and Tadmor (2009c), which, however, have the drawback that they are not so explicit about colexifying structures. The second best situation for the context of the present investigation is when dictionaries do not provide object-language constituent parts, but provide a "literal" translation which can then be used to infer the gloss of a given complex lexeme and to identify the lexical material present. Unfortunately, this is not always the case either. In the worst of cases, no information at all is included in lexicographic sources about possible morphological constituents of listed headwords. As a rule, where possible, grammatical descriptions of each sampled language were consulted, either in the form of separately published grammars or, where these were sufficient, grammatical sketches provided in the dictionaries themselves, to get an idea of the language-specific ways word-formation in each particular case and to get an overview of the form and function of derivational morphemes (if any are present). Further, orthographical conventions can be of some help here, e.g. when one or more constituent parts are written as separate words, which can then be looked up under own their individual entry. Often, especially as the investigation proceeded past its initial stages, regularities of

semantic association emerged which were in many cases of help for the identification of constituent parts (compare Brown's 1999 "educated guess approach"). In the database, it is coded for each individual dataset whether the morphological constituents of analyzable terms were explicitly stated in the source or whether they were inferred. Errors cannot be excluded, and are indeed likely to be present in one case or the other, either in the form of a complex formation not being recognized as such, or in the form of erroneous superimposition of morphological complexity that is in fact not there, or in correctly diagnosing morphological complexity, but erroneous recognition of constituents. In terms of quantity, this problem is much more likely to cause an underestimation of the degree of overtly marked items than an overestimation.

Second, a recurrent and unfortunate problem is that, for a given lexical item in a given language, some constituent parts are recoverable from the source, i.e. the lexical item is putatively a complex one, but not all are. This may be due to three different reasons: (i) the involved putative morpheme(s) are "cranberries" and as such due not have a lexical entry of their own in their source, (ii) the involved putative morpheme(s) are indeed meaning-bearing, but for some reason were not included in the consulted source and thus cannot be glossed, or (iii) the elements in question are altered by either synchronic morphophonemic rules of the language in question or by lexicalization (in which case the procedure outlined in § 3.7.2.2. applies). The policy adopted for such cases is the following: putatively complex terms were only counted as such if and only if (i) the number of identifiable morphological elements outnumber the unidentifiable ones and (ii) from the meanings of the identifiable morphological elements, a reasonable picture of the semantic relation between them and the meaning of the term itself can be obtained. For illustration, examples in (33.), all from Biloxi, were coded as being semianalyzable, and examples in (34.), again from Biloxi, were coded as being analyzable in spite of containing unknown elements.

(33.) a. hadi´xtciya^{n}´ /hadi´xi-tciya^{n}´/ 'urine-??' = 'bladder'
b. *nḳa-´toho* '??-lie.down' = 'bed'

(34.) a. *pĕ´xĕno^{n}n´ sŭpi´* 'fire:?? black' = 'coal'
b. *a´diṭo^{n}ni ~ adito^{n}´*/a´-ti-ṭ-o^{n}ni/ '??-eat-??-make' = 'table'

Exceptions from this rule were made only if the morphological constituents of complex terms are unclear, but the lexicographers explicitly provide a "literal" translation. For instance, the Lakhota term *wakȟiyaṭuwąpi* 'lightning' is not amenable to precise morphological analysis on the basis of the consulted source, but is said to be "literally" translatable as

"the thunderbirds are looking." Such statements (which are rare) were taken to be equal to identifiable morphological complexity for evaluation, though languages with sources where they are the only clue to morphological complexity were if possible avoided (which is why Lakhota is not in the core sample).

3.7.2.2. The problem of lexicalization

A related question arises if constituent parts can be inferred, but these are phonologically altered in comparison with their shape when occurring as free-standing forms. In the absence of any objective criteria to ensure that analyzable terms are also transparent in the senses defined above, such phonological deviations are taken to be a clue that the lexical item in question is LEXICALIZED. The term lexicalization has many related and unrelated uses in linguistics (Brinton and Traugott 2005). Here, by lexicalization is meant the diachronic process that causes the originally present morphological make-up of complex terms to lose psychological reality to speakers (they become non-transparent). This will subsequently, in some cases facilitated by high frequency of usage, blur morpheme boundaries up to the point that originally complex structures can only be restored by etymological work.[39] An example of this frequent diachronic process is Spanish *comercio* 'trade,' which goes back to Latin *commercium* with roughly the same meaning. In Latin, the term is synchronically analyzable, consisting of the prefix *con-* 'with, together,' *merx* 'merchandise, good' and an abstract derivational suffix. Obviously, there are no synchronic rules of Spanish phonology that would allow relating *comercio* to underlying *commercium*. Further, the fact that the Spanish cognate is clearly univerbated is evidenced by the loss of *merx* in the course of the development to Spanish. Now note that in Latin *commericum* itself there is a phonological mismatch in the final consonant of the prefix *con-*, which is assimilated in its place of articulation to the following consonant in the complex term. The crucial difference is, however, that this is due to a regular synchronic assimilation process of Classical Latin grammar, and is thus predictable.

For the determination of whether a given lexical item whose status with respect to analyzability is dubious, the guideline adopted is the following: whenever the phonological deviations are accountable by synchronic phonological rules occurring at morpheme boundaries (such as assimilation, as in Latin) of the analyzed language, such terms are judged to be analyzable (but not necessarily transparent), whereas any alternations that are not are taken to be indicative of lexicalization, and lexicalized terms are as a rule not

[39] This process is also called univerbation by some authors.

considered to be analyzable from a synchronic point of view. As examples, consider data from Kashaya in (35.)

(35.) a. *muśa·laqol* /muša·la-ʔahqol/ 'snake-tall' = 'rainbow'
b. *qʰaṭʰuʔul* /ahqʰa-ṭʰuʔul/ 'water-old' = 'swamp'
c. *hokare·ta* /ʔoho-kare·ta/ 'fire-wagon' = 'train'
d. *qʰa·moš* /qʰa·-moš/ '??-sour' = 'star'

Examples (35a - c.) illustrate the regular phonological process of aphesis, i.e. loss of morpheme-initial syllables containing /ʔ/ or /h/ in polysyllabic words when entering into a construction, such as a compound (Oswalt 1961: 305).[40] (35d.) looks similar, but in fact, the first constituent, *qʰa-*, is, according to Oswalt (n.d.), "apparently derived by irregular contraction from *qʰa·ʔa* nightlong or *qʰaʔa* morning, producing an unpredictable accent on a long syllable." Consequently, (35a. - 35c.) are analyzed as being analyzable, whereas (35d.), although the morphophonological resemblance to free-standing forms whose semantic would match is intriguing, is said to be semianalyzable.

A more systematic and extreme case is posed by the so-called "combining forms" of nominal roots in Sora. This process is of great importance to the present study because "Sora makes extensive use of root/stem compounds and lexicalized derivational elements in the creation of its nominal lexicon" (Anderson and Harrison 2008: 321). In Sora, there is a systematic alternation with respect to the shape of nominal roots, depending on whether they occur bound or as free-standing forms. Examples are in table 2.

Free Form	Combining Form	Meaning
aŋgaj	*gaj*	'moon'
daŋgo	*daŋ*	'stick'
kinad	*kad*	'crab'

table 2: examples of free and combining forms in Sora, from Starosta (1992: 85-86)

At first glance, the combining forms appear to be the result of irregular contraction of an originally free form, somewhat reminiscent of the genesis of lexical affixes in North American polysynthetic languages. However, experts agree on the basis of comparative

[40] Interestingly, this process does not shut down transparency for speakers. When asked about the "literal meaning" of *qʰami lahwal* 'coast,' a Kashaya consultant answered "all I know is it's got something to do with water" (*ahqʰa*). Although the statement needs to be restricted to the individual case of Kashaya only, this piece of evidence corroborates the distinction presently made.

evidence that the combining forms are diachronically original, and the free forms are derived from them by a variety of morphological processes. Consequently, since the combining forms are primary, they are not treated as being lexicalized and are viewed as synchronically identifiable lexical elements when occurring in morphologically complex terms.[41]

However, in a considerable number of cases it is not possible to find the relevant information in the existing literature on the sampled languages. In these cases, the rule of thumb adopted is that if the deviation from what is expected if forms were fully transparent is no more than one segment, the respective analyzable term was considered to be analyzable rather than semianalyzable. Thus, for instance, Berik *tokwa es* 'spark' is considered to be analyzable, consisting of *tokwa* 'fire' and *ese* 'flower.'

3.7.3. PRACTICAL ISSUES AND METHODOLOGICAL ADJUSTMENTS IN DATA INTERPRETATION

3.7.3.1. Analyzability and Colexification

The descriptive categories of analyzability on the one hand and colexification on the other are not mutually exclusive, i.e., analyzable lexemes may sometimes have several senses, such as in the examples in (36.).

(36.) a. Comanche *puhihwi* /puhi-ekahwi/ 'leaf-shiny' = 'money, gold'
b. Itzaj *säk-b'ej* 'white/grey-trail/road' = 'Milky Way, highway'

Behrens (2002: 327), following Schmidt (1982), points out that "it is not entirely clear whether or not the homonymy-polysemy distinction is applicable to morphologically complex lexical forms (e.g. compounds)." Morphological analyzability as opposed to colexification is regarded as primary for the purposes of the present study, and consequently analyzable terms with several apparently distinct senses are categorized as

[41] A similar and somewhat problematic situation might obtain in Hani. For instance, *saqguq*, with *saq* meaning among other things 'muscle, meat,' is 'tendon,' while *sivqguq*, with *sivq* meaning 'blood,' is 'vein.' *Guq* alone is glossed as 'to need, to require,' which does not bear a recognizable semantic relation to either 'tendon' or 'vein.' Still, that the terms share this element raises the suspicion that really *guq* bears the meaning 'tendon, vein,' which is a common enough pattern of colexification (compare Appendix E, 141 and 147) but does for some (prosodic?) reason not occur as a simplex (note further that it occurs in *keelguq* 'Achille's tendon,' where one would expect 'foot' to be the meaning of the second element in a complex term if indeed *guq* bears the meaning 'tendon' and 'vein' alone; indeed, *aqkeel* means 'foot,' but again, only occurs in connection with *aq*). There are several similar cases. Since an analysis along the lines of the above, however, is unlike the Sora case conjectural, a more conservative solution is preferred, and, for instance, *saqguq* and *siyqguq* are treated as semianalyzable.

analyzable, not colexifying, for quantitative evaluation. However, in chapter 6 and Appendix E, patterns of colexification in analyzable lexemes are also borne in mind.

3.7.3.2. Idiosyncratic language-specific meaning extension

As François (2008: 163-164) points out, "the more languages we explore, the more examples we find of unique metaphors and unexpected cases of semantic shift – probably one of the most thrilling mysteries and charms of language discovery. But what generally happens is that we focus our attention on the most exotic cases, and overlook the information that is of most interest for the hunter of semantic universals: namely, that a great deal of lexical polysemies are in fact widespread across the world's languages, and, as such, deserve to be highlighted and analyzed." This is precisely one of the goals of the present study. But what to do with the unique cases of colexification that are encountered? Examples include:

(37.) a. Bakueri *e̱w̱umá* 'ball, orange'
b. Sahu *utu'u* 'root, aerial root, buttress'
c. Cayapa *ñi* 'seed, fire, flame'
d. Hawaiian *ānunue* 'rainbow, scallop-like design on tapa and tapa-beater'

In principle, it appears to be harmless and indeed appropriate to also take into account such unique conceptualization strategies. However, there are at least two problems associated with them. The first is that, if the semantic association by means of a purportedly colexifying lexical item is encountered only in one language, mere accidental homonymy is at least a possibility. This seems to be rather unlikely for cases such as (37a.) and (37b.) because the semantic motivation for the meaning conflation is quite obvious. However, more serious doubts, which are reinforced by the shortness in terms of segments of the object language term, about the semantic connection between 'seeds' and a 'fire' in (37c.). Indeed, recent work on comparative semantics, in particular work carried out in connection with the semantic map approach to cross-linguistic comparison has adopted an explicitly cross-linguistic stance to deal with this issue. In the words of Haiman (1974: 341), "[i]f a word exhibits polysemy in one language, one may be inclined, or forced, to dismiss its various meanings as coincidental; if a corresponding word in another language exhibits the same, or closely parallel, polysemy, it becomes an extremely interesting coincidence; if it displays the same polysemy in four, five, or seven genetically unrelated languages, by statistical law it ceases to be a coincidence at all." Croft (2003: 106) elevates this observation to a full-fledged typological principle for distinguishing polysemy from homonymy. It is adopted in the present work. That is, if a putative semantic relation is showcased only by one language in the sample, it is not taken into consideration for

quantitative analysis. This is an answer to the important question raised by Koch and Marzo (2007: 282) as to "from which threshold on are we allowed to disregard senses appearing in our material, as it has been defined by our methodology?"

It should be noted, however, that both Haiman and Croft are interested primarily in the semantics of closed-class grammatical items and recurrent cross-linguistic semantic overlap. The semantic range of closed-class items tends to be more restricted in the possible range of different uses than the comparably unconstrained members of the open-class lexical categories of a language's lexicon. Therefore, the criterion will undesirably sort out some likely cases of genuine metaphor-driven colexification such as (37a.) and (37b.), which are in principle no less interesting than cross-linguistically recurrent patterns of colexification. This leads to the second problem with unique cases of semantic extension, which is that at least some cases of unique patterns of colexification in the database are based on highly culture-specific connections, and it is therefore little wonder that they remain without a counterpart in another language. (37d.) is an example. Intuitively, one could image encountering another language in which the same word is used for 'ball' and 'orange' as in Bakueri, but one would not expect to find the same, or even a similar, semantic extension of 'rainbow' as in example (37d.) from Hawaiian. This illustrates that the boundaries between idiosyncrasy and rarity cannot, of course, be adequately drawn on the basis of the sample underlying this study alone. Therefore, it is safer to use Croft's criterion and draw a partly arbitrary, but not entirely unmotivated line in the sand by the application of this principle. In other words, the level of granularity of recognizing distinct senses is jointly defined by the glosses offered by the dictionaries in the sample languages.

For quantitative evaluation, however, unique conceptualizations that are manifested by morphologically complex lexical items are taken into account, because they can, at least in principle, be straightforwardly analyzed and are not plagued by analytic issues comparable to those arising with colexification. Furthermore, the above mentioned procedures with respect to the analysis of colexification also serve another important purpose, namely to normalize the raw data with respect to the level of detail in which lexicographers elaborate on different senses of a given lexical item. This may potentially bias analysis: a full-fledged dictionary of a "big" language will normally also provide more detailed information about the semantics of the individual lexemes listed in it, whereas a dictionary (not to mention mere wordlists) of a small minority language that has received comparably little attention by linguists will tend to be more coarse-grained with respect to the semantic distinctions that are recognized in the dictionary. This observation should not be read as a statement concerning the quality of the lexicographic work undertaken; nevertheless it is clear that socio-politically more important languages simply tend to be allocated more resources to produce comprehensive dictionaries. Importantly, however,

the more senses of a lexeme are listed, the more specialized they will be semantically, and the less likely they therefore are to recur cross-linguistically. For instance, Lessing's (1995) dictionary of Mongolian provides an impressive level of detail in the description of the semantics of its headwords. Consider the examples in (38.)

(38.) a. *ceceg ~ cicig ~ seceg* 'flower, smallpox, comb of cock, club (in cards)'
b. *terge(n)* 'vehicle, cart, wagon, carriage, car, rook (in chess)'

The procedure of only recognizing a pattern of colexification if it occurs in at least two languages sorts out the meanings 'smallpox,' 'comb of cock' and 'club in cards' of Khalkha *ceceg* and the meaning 'rook in chess' of *terge(n)*, and thus allows to normalize the typological data in a consistent fashion. This is desirable, because otherwise elaborateness of the source would lead to an unjustified increase in the amount of colexification diagnosed in the presently investigated slice of the lexicon when compared with languages where the source is more restricted. However, such influences cannot entirely be ruled out (see § 3.7.3.4). After all, the more senses a source provides, the more likely it is for one of them, however specialized semantically it may be, to occur elsewhere in the world.

3.7.3.3. Assessing Influences of different types of sources statistically

Influence of the nature of the consulted sources was in addition assessed for two of the major variables surveyed in this study: degree of morphological complexity and degree of colexification (recall that the relation between form and meaning assumed here is many-to-many. Thus, for instance, if a language has two terms for a particular meaning, one morphologically complex and the other not, this language is assigned a value of 0.5 analyzable terms for that particular meaning). To this end, different breakdowns of the statistics sample were used and then checked for statistical correlations. The following breakdowns were tested:

(i) The main source is or is not a vocabulary contained in the World Loanword Database

(ii) The main source is or is not a (short) unpublished manuscript, an appendix in a grammar rather than a full-fledged dictionary, or any other type of publication which is not designed mainly to provide lexicographic information about a particular language. The latter group includes, for instance, the etymological dictionaries for Chukotko-Kamtchatkan and Yukaghir (Fortescue 2005, Nikolaeva 2006) from which the Chukchi and Kolyma Yukaghir data mainly stem.

(iii) The main source is or is not a dictionary produced by members of the Summer Institute of Linguistics
(iv) The publication date of the main source consulted

The obvious possibility of using the number of pages the source has as a statistical predictor variable was refrained from, because sheer number of pages depends heavily on typesetting conventions and does not necessarily represent a fair measure of the overall scope of the source.

With regard to categories (iii) and (iv), no difference for any of the variables was obtained that could be meaningfully interpreted. Thus, there is no appreciable effect of the age of the consulted source on any of the variables under study, nor is there an effect of the provenience of the source. Concerning factors (i) and (ii) however, there is a statistically significant effect of the source type on the behavior of the language: in spite of the countermeasures described in the above section, there is an effect on the measured degree of colexification in the statistics sample that is caused by the source being a vocabulary contained in the World Loanword Database ($W = 442$, $p = .0407$, Wilcoxon rank sum test). Similarly, the measured degree of colexification is significantly lower for sources other than standard dictionaries ($W = 511$, $p = .001759$, Wilcoxon rank sum test). At least the second test remains significant when correcting p-values for multiple testing using the Bonferroni correction at $p = .014072$.

In effect, while there is no indication that the measured percentage of morphologically complex terms fortunately depends on the nature of the consulted source, the diagnosed amount of colexification apparently does to some extent. In a way, this result is hardly surprising: the purpose of the World Loanword Database simply is not to provide a highly detailed picture of the lexical semantics of each individual lexical item in the vocabularies (though, of course, there is some information). Likewise, the main job of an etymological dictionary is to identify cognates in genetically related languages and perhaps provide a reconstruction of the proto-word, but not to analyze in detail the semantic microstructure of daughter-language lexical items. Because of these results, there will be no following discussion and quantitative search for correlations that might trigger the measured degree of colexification. But this does not at all entail that the gathered data on covert semantic patterns in the lexicon cannot be put to meaningful use. It can, and it will be, for instance in the search for areal and universal lexico-semantic associations carried out in § 6.4.3.

Furthermore, there is an effect on the measured number of semianalyzable terms when comparing data from the World Loanword Database, in which information on analyzability and semianalyzability is coded directly by experts, to data from other sources.

The difference is significant at $p = .009424$ (W = 477, Wilcoxon rank sum test). Consequently, other data are likely to systematically overestimate the amount of truly semianalyzable terms and concomitantly to underestimate the number of analyzable motivated lexical items, which could not be identified as such. However, since this effect pertains to the majority of the datasets in the statistics sample and thus more or less to the sample as a whole, drastic effects on the conclusions drawn from it are not to be expected. However, it should be emphasized that when a term is called "semianalyzable" anywhere in the following chapters, this should always be read as "semianalyzable on the basis of the consulted source," thus not excluding the possibility that the term, given more knowledge on lexicon and grammar of a particular language, would turn out to be fully analyzable.

3.8. CHAPTER SUMMARY

This chapter developed a framework for the study of lexical motivation. It departs from previous approaches, in particular Koch (2001) and Koch and Marzo (2007), in both its formal aspect as well as in its semantic side. As for the latter, it is, unlike previous approaches, based on lexical semantic test frames to guide the analyst in his decisions as to classification. These yield a basic two-way split of semantic relations along with the establishment of further optional subtypes. The basic split is compatible with the notions of metaphor and metonymy as traditionally conceived of. In the course of the exposition, two methodological problems in the classification of semantic relation and the (preliminary) solutions chosen for them here were pointed out: first, the non-neutrality of any (natural) meta-language chosen for analysis and the concomitant issue of appropriately identifying senses in colexification (the problem of sense division), and second, the appropriateness of postulating semantic relations in the case of colexification.

The major variables that emerge from the discussion so far are the (i) relative degree of morphologically complex expressions, (ii) their type (lexical, derived, or alternating), and (iii) the amount of semantic associations by colexification. In addition, there is (iv) the variable of the relative proportion of metaphor- as opposed to metonymy-driven semantic patterns. However, since there are biases in the data with respect to the relative degree of colexification itself which are caused by the nature of the consulted sources, it will not be evaluated in quantitative terms. The relative degree of metaphor as opposed to metonymy, however, is evaluated using data from morphologically complex expressions as well as those of colexification, since, as shown above, this distinction is equally applicable to both types of lexical motivation.