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## 4. A Frame-based methodology for lexical typology

**Abstract:** The article deals with the methodology and techniques of lexical typological studies. It focuses on the cross-linguistic analysis of semantic areas that are deeply involved in semantic derivation processes, i.e. they either make a wide use of words coming from other semantic domains (as is the case with pain predicates) or frequently give rise to extended meanings (as e.g. rotation verbs, sound verbs, aqua-motion verbs, adjectives of quality). Based on these data, we propose a general approach to a lexical-typological study – a frame-based approach. It is argued that semantic comparison should rely on a set of conceptual frames that underlie the domains under examination and that can be revealed through the analysis of word combinability in natural texts (corpora, spontaneous speech, etc.). The results obtained by this approach can be easily visualized as semantic maps, in which nodes are associated with frames.

This technique is illustrated by several examples, which testify to its applicability not only to well-attested domains of semantic typology (like colors, body parts, cutting and breaking, etc.), but also to less observable and highly metaphorical domains. The typological analysis of these areas is appealing, as it allows not only to investigate their lexical organization, but also to compare, in a systematic way, the semantic shifts observed in different languages.

### 4.1 Introduction<sup>1</sup>

Lexical typology is gaining recognition as a sub-discipline of descriptive linguistics. Three major reviews (Rakhilina and Plungian 2007; Koptjevskaja-Tamm 2008; Evans 2010) have come out recently which show that an increasing number of researchers and research groups are comparing words not in two, but a dozen or two dozen, languages at a time (cf. Viberg 1983; Newman (ed.) 1998, 2002,

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2009; Blank and Koch 2000; Goddard and Wierzbicka (eds.) 1994, 2002, 2004; Levinson and Wilkins (eds.) 2006; Majid and Bowerman (eds.) 2007; Majid and Levinson (eds.) 2011; Koptjevskaja-Tamm and Vanhove (eds.) 2012, and others). The scope of such studies is also growing. Along with old favorites like color and kinship terms or names of body parts (see Koptjevskaja-Tamm 2008), attention is turning to such complex domains as perception verbs (Viberg 1983; Vanhove 2008), the predicates of position (Newman (ed.) 2002), movement (Maisak and Rakhilina (eds.) 2007), destruction (Majid and Bowerman (eds.) 2007), eating and drinking (Newman (ed.) 2009), putting and taking (Kopecka and Narasimhan (eds.) 2012), spatial relations (Levinson and Wilkins (eds.) 2006), memory (Amberber (ed.) 2007), among others.

Just as important, or perhaps even more so, as the findings about specific words and languages is the increasing realization that lexical typology needs a well-articulated method. Only when individual studies use the same theoretical framework, follow the same plan and method, can their results be fully compatible. They then reach their full worth and meaning, as typology ultimately addresses its main question: to what extent is the lexicon systematic and built on universal principles?

Some major steps have already been made in that direction. We will specifically discuss two approaches: the psycholinguistic studies at the Max Planck Institute in Nijmegen, and the method initially suggested by Anna Wierzbicka (Wierzbicka 1972, 1996). The first approach stems from research on color terms (Berlin and Kay 1969). In keeping with this tradition, the method is to collect the speakers' reactions to extralinguistic stimuli, be it color chips (Majid and Levinson 2007), samples of smells and tastes (Majid, Senft, and Levinson 2007; Senft, Majid, and Levinson 2007; Majid and Levinson (eds.) 2011), or video clips demonstrating different situations of cutting and breaking, such as tearing a rag or chopping a carrot (Majid and Bowerman (eds.) 2007). The second approach, represented by the works of Anna Wierzbicka, Cliff Goddard, and their colleagues and students (Goddard and Wierzbicka (eds.) 1994; Goddard [1998] 2011; Goddard (ed.) 2008; Gladkova 2010), is pursuing the old philosophic ideal of a natural semantic metalanguage – a small universal vocabulary of semantic primes sufficient to express any meaning in any language. Primes need to have lexical exponents in all languages. Other meanings can be explicated using these primes. Thus, meanings of words from different languages are compared with regard to which primes are needed in their respective explications. It should be noted that explicating word-meanings by primes is mostly an introspective process, but resulting definitions are supposed to predict the distribution (combinatorics, collocations, etc.) and entailments of the words being explicated, so textual examples are also used in NSM work. Recently, NSM linguists have proposed a more

systematic approach to lexical typology using the notion of semantic template (Goddard 2012).

The principles and findings of both schools of thought are documented in detailed reviews (Apresjan 1995; Geeraerts 1988, 1993; Plungian and Rakhilina 1996; Goddard 2001a) and need not be repeated here.

In this paper we present an alternative approach to lexical typology that can be called the “frame method”. It was developed and tested in the Moscow Lexical Typology Group (see <http://lextyp.org>)<sup>2</sup> and is currently used in all its projects, such as (Maisak and Rakhilina (eds.) 2007; Britsyn et al. (eds.) 2009; Kruglyakova 2010; Reznikova, Rakhilina, and Bonch-Osmolovskaya 2012).

Our main principle, taken from the Moscow semantic school of thought (Apresjan [1974]1992, 2000), is that lexical meanings can be studied and reconstructed by observing a word’s “surroundings”, or primarily collocation. They can then be compared using procedures similar to those used in grammatical typology. In the following sections we will describe how this works in detail.

We believe that this method has some advantages over the two approaches mentioned above. Namely that the psycholinguistic method, where extralinguistic stimuli need to be presented, is hardly suited for subjective, internal experiences such as emotions or pain. The disadvantage of the NSM method is that it seems to be less effective when dealing with large groups of near-synonyms. Above all, neither approach is suited to the study of semantic shifts.

Of course, the descriptive “weaknesses” are not coincidental, but arise from the particular goals each approach aims to achieve, as well as the theoretical views in which they are grounded. Still, it seems to us that lexical typology as a whole needs to have some means of describing any domain, as well as the ways in which domains relate to one another, i.e. semantic shifts, or, in synchronic terms, polysemy. Indeed, most words in a language are polysemous, and a typology that aims to compare words should account for possible (and impossible) combinations of meanings within one word.

This paper proposes to show that the frame method that we suggest is adequate to both tasks (namely, it has no limitations concerning semantic domains; it can be applied to and is well suited for describing semantic shifts) and, therefore, compares favorably with the other approaches.

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<sup>2</sup> The present members of the MLexT include A.Bonch-Osmolovskaya, E.Kashkin, L.Kholkina, L.Khokhlova, E.Kozlova, A.Kostyrkin, V.Kruglyakova, M.Kyuseva, E.Luchina, T.Maisak, S.Merdanova, L.Nanij, B.Orekhov, E.Pavlova, A.Panina, E.Parina, E.Rudnitskaya, D.Ryzhova, M.Shapiro, O.Shemanaeva, I.Stenin, M.Tagabileva, A.Vyrenkova.

The paper is structured as follows. Section I will explicate the goals of lexical typology as we see them in connection with our method; which will then be presented in more detail in Section II, as applied to some specific domains in specific languages. Section III discusses the importance of semantic shifts to lexical typology and reports on their study within the suggested framework.

## 4.2 Principles and goals of the Frame-based approach to lexical typology

As stated above, our aim is the synthesis of two schools of research, well-established in their own right: the Moscow semantic school with its methods of analyzing word-meanings; and grammatical typology. This section will show that such a synthesis is not only possible, but in a sense natural, since the fundamental assumptions about language (non-autonomous syntax, role of semantics in language modeling, etc.) in the two approaches have much in common. Going over the strong points and limitations of the Moscow semantic school in 1.1, we will then suggest some ways to overcome the limitations by adopting tools from the typology of grammatical categories.

### 4.2.1 The Moscow semantic school

Dating back to the 1960s, the Moscow semantic school has an internationally recognized standing in lexical semantics. Its main, and very powerful, method is comparing a word's surrounding constructions and collocations to those of its near synonyms (a major finding being that there is no such thing as full synonyms in any language), cf. (Apresjan 2000; Mel'čuk 2012; see also Wanner (ed.) 2008). Taking semantically related groups of words and exploring their differences proved an extremely effective lexicographic technique, as can be seen in some outstanding dictionaries, Russian and bilingual, produced within the approach (Apresjan and Rosenman (eds.) 1979; Mel'čuk and Zholkovsky 1984; Mel'čuk et al. 1999; Apresjan (ed.) 2004).

The core of the method is finding contexts in which a word cannot be replaced by a given near-synonym, and determining which properties prevent the substitution. Bilingual dictionaries treat translational equivalents as a simple extension of near-synonymy into another language. This means that the procedure is just as valid for a broad typological study, even though it would require proportionally more time and effort.

The Moscow semantic school itself does not venture into typology. Its members, lexicologists and lexicographers, maintain that the lexicon is a system which is highly motivated and structured on principles of human cognition (Apresjan 2009). However, their main practical goal is to create detailed descriptions, the so-called “lexicographic portraits”, of individual lexemes. Still, if we look beyond the lexical system of one language and observe similar systems in others, a further task arises – to distill the typologically relevant features from the mass of features relevant intralinguistically.

## 4.2.2 Grammatical and lexical typology

The other field to which we turn in our search for methods is grammatical typology. It differs from lexical typology in being several decades older and has evolved its own standards of contrastive research, especially with regard to grammatical categories (see Comrie 1976, 1985; Bybee and Dahl 1989; Corbett 1991, 2000; Aikhenvald 2000, and others).

The common opinion is that there is a limited universal inventory of grammatical meanings (Bybee and Dahl 1989: 51–52; Plungian 2000: 233–238) from which each language “selects” a subset (for further discussion of this issue, see Croft 2001; Haspelmath 2010). The subsets can be quite different across languages. Further, it is common for multiple grammatical meanings to be explicated by a single marker or construction. Most typologists believe that the process is guided by a number of cognitive strategies, which also differ from one language to another, cf. (Plungian 2000; Haspelmath 2003).

Accordingly, the main goals of grammatical typology could be seen as 1) describing the set of universal atoms of grammatical meaning, and 2) determining the strategies that languages use when combining these meanings.

If we look at lexical typology as similar to grammatical typology the former should be in search of 1) a universal set of lexical meanings, and 2) the strategies of their combination in languages. We explore both topics in the following sections.

### 4.2.2.1 Universal features and oppositions

A grammatical category tends to have a limited number of elements – three persons, about two numbers (not many more even for the systems with dual and paucal), about three tenses etc. The structure of a category is usually highly visible, with clear-cut oppositions. A group of near-synonyms constituting a

domain (=semantic field), on the other hand, is seldom so transparent; all the words in it have more or less the same meaning.

The closest thing to binary oppositions to be found in the lexicon are antonyms. Bringing antonyms into the picture often gives insight into a word's meaning; thus, *old* as opposed to *young* vs. *new* (*an old shoe/sailor* vs. *a young /\*new sailor*) points towards animacy, or rather anthropocentrism, and we may reasonably expect a language to reflect the opposition by having two words for 'old'<sup>3</sup> (see Paradis, this volume).

However, a vastly larger number of words have near-synonyms than they have antonyms. It is difficult to imagine lexical antonyms for *grass* or *house*, *golden* or *striped*, *embellish* or *burrow* etc. Even words that do pair up rarely mirror one another's semantics perfectly. For example, taking the adjectives *live/dead* we find that they highlight different aspects of the opposition – while *dead* means biological death (*a dead cat*, *dead trees* etc.), *live* seems to be the default state for everything it is applicable to, so that when it is specifically mentioned, the resulting meaning is non-trivial, as in *a live performance* (not a recording), *live snakes* (not toys), etc.<sup>4</sup>.

We have to admit that lexical and grammatical typology deal with different enough objects that the methods of one cannot be adopted into the other without some modification.

There is an additional difficulty surrounding the usage of grammatical markers vs. lexemes. Grammatical markers tend to occur in texts with a much greater frequency. While a corpus of 200–300 thousand words should yield all the relevant contexts for reasonably common markers, 100 million is not always enough to illustrate the behavior of a lexeme. With rare words billion-word corpora may be required.

#### 4.2.2.2 Combination of meanings

It is well known that a grammatical marker in a given language generally has several functions, each realized in a particular context, and that the sets of contexts differ across languages. Grammatical typologists collect relevant contexts from known languages to check new data against them. When a context proves

<sup>3</sup> Indeed, Cusco Quechua lexicalizes the opposition – it uses *thanta* for artefacts vs. *machu* and *paya* for men and women respectively, see (Cusihuamán [1976] 2001); we thank Paul Hegarty for bringing this to our attention.

<sup>4</sup> On the asymmetry of the Russian adjectives *živoi* 'live' / *mertvyi* 'dead', see Podlipentseva (2011).

relevant to the category in question in a language, it receives a place in the typological questionnaire. When some of the contexts in a given language are found to have the same explication, this pattern is what characterizes the language typologically.

The same procedure can be used for a semantic domain; listing the relevant contexts and observing the patterns in their lexical explications in different languages. If we take this approach, the main problem is technical: how to select the vocabulary, contexts and languages. The next section presents our process in detail, using examples from some of our completed and ongoing projects.

## 4.3 Methodological foundations

### 4.3.1 Selection of languages

The work starts with defining a semantic domain for the analysis. This is in itself a non-trivial task because the researcher has to decide where to draw the domain boundaries, i.e. which words should be considered relevant for the domain in question. This decision is first made with respect to the native language of the researcher and may then undergo changes as other languages are included in the study.

The number and choice of these languages is another point in which lexical typology is different from grammatical typology. Grammatical typology requires several hundred languages, usually 200–400, which, furthermore, need to be distributed equally among genetic and areal groups (Bybee 1985; Bybee, Perkins, and Pagliuca 1994). Closely related languages are almost never used, lest their similarities distort the general picture<sup>5</sup>.

The striking difference of lexical typology in this respect is that related languages tend to be just as valuable to it as unrelated ones (cf. Rakhilina and Prokofieva 2004; Rakhilina 2010a). While grammatical constructions take centuries to evolve, vocabulary is much more fluid. A single generation of speakers may witness words falling in and out of use and word meanings changing dramatically. As a result, even such close relatives as Russian and Polish do not necessarily have many cognates in a given domain, and even when they do, such words tend to have meanings quite dissimilar to those of their “cousins”.

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<sup>5</sup> Kibrik 1992, 1998, however, claim that related languages are also suited for grammatical typology.

Verbs of rotation provide a good example. Russian has *krutit'sja*, *vertet'sja*, *vraščat'sja*, and *kružít'(sja)*, and Polish *kręcić się*, *wiercić się*, *obracać się*, *krążyć*, and *wirować*. Although most of these verbs are cognates (except for Polish *wirować*), they structure the semantic domain of rotation in completely different ways. For example, Russian *vertet'sja* applies both to animate and inanimate subjects, whereas Polish *wiercić się* describes only animate subjects. The scope of Polish *kręcić się* can include, unlike Russian *krutit'sja*, long and flexible objects, such as curved hair or a meandering road. Russian *kružít'* presupposes that the Trajector is situated above the Landmark (typical examples are eagles or hawks flying above prey), while Polish *krążyć* is not sensitive to this restriction and tolerates the Trajector and the Landmark located at the same level (a boat going around an island, etc.) (Rakhilina 2010a).

As to the number of languages on the list, it does not seem realistic for lexical typology to imitate the scope of grammatical typology, especially since preexisting resources such as dictionaries are seldom sufficient, and often not available. Still, we believe that for lexical typology method takes precedence over scope. If the angle is typological, i.e. suited to accommodating different languages, a study can be considered typological even if the data is limited. The most extensive of our own projects, the domain of swimming and floating, covers 50 languages; the vocabulary of pain 30, rotation 17, and sharpness and bluntness 15. We find that even a study of 15 languages allows for some non-trivial generalizations (it is worth noting that a dozen languages is also considered a valid sample for a general sketch of a grammatical category – see Haspelmath 2003).

Naturally a typological hypothesis, even if based on a small initial sample, serves as a framework which facilitates dealing with each additional language.

### 4.3.2 Dictionaries, corpora and questionnaires

Having determined the rough outlines of the domain in question in one's native language, the next step is to consult bilingual dictionaries for translational equivalents. Any of the source words can be expected to have more than one translation into a given language, and it is equally common for several words to have the same equivalent. For example, Russian *ostrj*, 'sharp' corresponds to two Komi adjectives – *lečyd*, 'sharply edged' (*lečyd purt* 'a sharp knife'), and *jos*, 'sharply pointed' (*jos' pu* 'a sharp stick').

Sometimes the dictionaries are outdated or incomplete, so the data needs to be rechecked. The quickest way to do this is a corpus search, provided there is a corpus for the language. If the words are reasonably common and the corpus large, their typical collocation and differences in usage should become clear.



A corpus may still contain outdated, peculiar or otherwise non-standard examples, so it is best to have them verified by a native speaker. For languages without other resources, interviewing speakers is the only way to gather data. Experience shows that the most efficient way is to leave such languages for later, so as to have a list of questions ready for the interview. In this sense, examples from corpora are valuable not simply as illustrations of word usage, but as a source of contexts potentially relevant to other languages. These contexts provide the basis for a questionnaire that is then used to collect data from under-resourced languages.

### 4.3.3 Semantic features

Groups of contexts from the corpus are analyzed in the tradition of the Moscow semantic school to find the differences. For predicates, one of the key factors of their distribution is the semantic type of the subject (for verbs) or the qualified entity (for adjectives). The distinction made most often and most consistently is that of animate (especially human) vs. inanimate subjects. Many languages have predicates specifically designated for one or the other.

Motion verbs are often found in such pairs – cf. the English *swim* (=voluntary motion) vs. *float* (=being passively moved around) and their numerous equivalents – Persian *šenā kardan* vs. *šenāvar budan*, Tamil *nintu* vs. *mita*, Manyika *námún* VS. *fún*, etc., see (Maisak and Rakhilina (eds.) 2007). Active vs. passive motion can be present as distinct concepts at high levels of abstraction (Plungian and Rakhilina 2007). Verbs of rotation appear to be a rare exception, divided not by the animacy of the subject but by whether the axis of rotation is inside or outside of the rotating object: Polish *wiercić się* vs. *krążyć*, Koryak *kamlil* vs. *kavaljil* etc.

The more participants there are in a situation, the more factors a researcher needs to take into account. For example, verbs of eating and drinking are structured around the type of subject (such as human vs. animal), object (in particular solid vs. liquid), and presence or absence of specific instruments or quasi-instruments (teeth, tongue, spoon, etc). Thus in Russian we have *est'* (solid food), *glodat'* ('gnaw' – animal agent, hard object such as a bone, teeth), *lakat'* ('lap' – animal agent, liquid, tongue), etc.

Even more intricate is the domain of cutting and breaking (Bowerman and Majid (eds.) 2007). Apart from the subject being in control, or not in control, of the situation, the lexical choice is affected by at least three other variables: the type of object being destroyed, presence and type of instrument, and the end results such as size and quantity of pieces. The Russian language distinguishes, among

others, *rvat'* ('tear' – soft object, by hand); *rubit'* ('hew' – hard object, an axe or similar instrument, in half or into big pieces); *rezat'* ('cut' – moderately soft object, blade-like instrument, esp. knife or scissors); *toloč* ('grind; pound' – small hard objects, using millstones or mortar, into a homogeneous mass); *šinkovat'* (vegetables, knife or hatchet, very small pieces), and many others. Komi has the verb *jukavny* meaning 'to splinter planks', which leaves no choice of object (wood), instrument (axe or knife), or result (splinters). Another Komi verb, *šarsköbtyny*, is an otherwise ordinary verb of breaking, but with an interesting addition: a ringing sound (Kashkin 2010).

With types of arguments and other relevant parameters listed like this, it may seem that we reduce each domain to a set of oppositions, as in component analysis, cf. (Katz and Fodor 1963; Lehrer 1974). Indeed, we use semantic features to compare and contrast words across languages – e.g. verbs of rotation are classified by the following characteristics:

- internal/external axis
- elevation over the landmark
- control
- single/repeated turn, etc.

The approach seems essentially the same as the features Lehrer (Lehrer 1974: 61–63) uses to describe the vocabulary of cooking:

- use of liquids
- use of fat
- use of steam
- high/low heat
- long/short duration, etc.

However there is a crucial difference. Component analysis assumes features to be independent – hence the tendency, popular from the 1960's and onwards, to describe both semantic fields and grammatical categories by exhaustively listing their features (Mel'čuk and Kholodovich 1970; Khrakovsky (ed.) 1989).

Our approach, on the other hand, is to view features as interdependent. They fall into *gestalts*, often so closely knit together that selecting one argument restricts the others. Thus, if the subject of rotation is a bird, the axis is going to be external. Furthermore, a flying agent is moving not just around the landmark, but above it (e.g. a hawk circling over its prey), while for other kinds of subjects elevation is usually irrelevant.

Verbs of cooking (Lehrer 1974) also demonstrate the interdependency of features quite clearly. Intense heating can only last for a short time, otherwise the food will burn; water, but not fat, is used in steaming; and so on.

Translating the idea into component-analytical terms, it can be said that along with truly equipollent oppositions (+/-), we find some features better represented as +/0. They are irrelevant for most of the domain and true for one or a few lexemes. E.g. šarsköbtyny is the only verb of breaking in Komi for which sound is relevant (e.g. constitutes a part of its meaning), even though other actual situations of breaking may involve sound.

It naturally follows that the entries in a lexical typological questionnaire must represent not all features multiplied by all values, but all *gestalts* – all meaningful clusters of features, cf. in this respect (Goddard and Wierzbicka 2009).

Individual features are still of great importance when we determine what exactly constitutes each particular *gestalt*, lest some aspect of the meaning get ignored. This is especially true for predicates with three or more arguments. The study of the verbs of cutting and breaking mentioned above (Majid and Bowerman (eds.) 2007) uses 61 video clips to represent various situations in the domain, yet even this was not enough to cover the full range of possibilities. Among the situations that were overlooked are the use of a stationary background object as an instrument (e.g. smashing things against a wall) and crushing or grinding into small pieces (see Kashkin 2010).

#### 4.3.4 Frames

The *gestalts* or prototypical situations discussed above appear to be so closely related to the predicate's argument types that a full set of arguments can serve as a sufficient representation of the situation. We believe that these sets, which we shall call semantic frames, constitute a relevant unit of lexical typological description.

To describe a domain, then, is to list all the frames covering it, and for each frame to find its explication in all of the chosen languages.

For the domain of swimming and floating the relevant frames are 1) active swimming, 2) passively drifting with the current, 3) floating on the surface, 4) the movement of vessels and people on vessels. The domain of oscillation is richer; its frames include 1) the swinging of a suspended object (e.g. a pendulum), 2) rocking, 3) the bending of a tall object, 4) an object being deformed by an external force (a shaky bridge), 5) the undulating movement of the surface of a liquid, and some others.

Note that these situations differ from the traditional understanding of frames (Fillmore 1976, 1982), currently used in FrameNet (see [framenet.icsi.berkeley.edu](http://framenet.icsi.berkeley.edu)). Traditionally a frame is defined as a set of participants with their assigned syntactic roles. Valence as such, however, proves to be of little use in cross-lin-

guistic lexical studies. Adjectives, for example, are mostly one-place predicates with next to no variation in the marking of their only argument. Therefore, if their meanings are to be compared, the distinction has to be based also on the semantic, and not merely on the syntactic, properties of the argument.

The same is often true for verbs. Verbs of swimming and drifting are nearly indistinguishable in the case marking of their arguments; the difference lies in the semantic class of the arguments. Therefore, our concept of frame, as opposed to the traditional one, includes information on the semantic types of the arguments.

Our approach also differs from the NSM theory in how frames are treated. The Lexico-Syntactic Frames of NSM are rather general and are defined for an entire semantic class, as illustrated in Goddard (2012: 726), with three subclasses of physical activity verbs – locomotion, routine physical activities and complex physical activities. Each of these subclasses includes a number of lexical units (cf. *walk, run*, etc. for locomotion, *eat, drink* etc. for routine physical activities and *cut, chop*, etc. for complex physical activities) encompassing a wide range of specific situations, which we regard to be frames.

So far we have discussed frames as if they were ready-to-use tools for comparing word meanings in different languages. Yet this is not the case; frames need to be identified for each semantic domain that is being researched.

### 4.3.5 Frames and micro-frames

Grammatical typology, especially when searching for universals, has developed a procedure for working with questionnaires (Dahl 1985). It starts with a model of the category, such as the passive voice or subjunctive mood, already well-known from the previous studies. The category is associated with a set of grammatical contexts in which it usually appears cross-linguistically. These contexts are represented by the questionnaire entries. Going through them, the researcher looks for the corresponding marker or construction in a particular language. The more entries the marker covers, the closer the language is to the prototypical model.

Lexical typology, unfortunately, cannot make use of previously developed sets of prototypical situations (i.e., in our terminology, semantic frames) and check lexical units from a particular language against them. Such lists emerge only gradually from the typological data. As mentioned above, the starting point for data collection is contexts, as detailed as dictionaries and corpora can make them, with the additional subtleties added precisely because we do not know beforehand which distinctions may be relevant to lexicalization. The contexts are tested with data from different languages.

As a result, some of the contexts will systematically turn out not to be distinguished in any of the target languages. They are then collapsed, not yet into a frame but into what we call a micro-frame. Often these contexts are metonymically related, such as ‘sound of wind/sound of trees in the wind’ or ‘stream flowing/something drifting with the current’. Micro-frames are still more specific than typical word-meanings. The way they are grouped into word-meanings need not be similar in all languages, yet often several languages group them similarly. These tendencies in lexicalization show which features are more important for the domain.

Micro-frames can be compared to the units in the universal grammatical inventory: just as most languages group several of them together to be explicated by a single marker, micro-frames are clustered into frames so that for each frame a word exists in at least one language (and usually, more than one). Triple number, distinct from plural, is rare; likewise, “waterfowl swimming” does not warrant its own frame and is conceptualized as similar to either swimming or the motion of vessels, in the same way that flying insects (e.g. moths circling around a candle) are grouped together with either birds or eddies of wind.

Thus, micro-frames are rather peripheral situations that, although they exhibit variation in lexical patterning across languages, are not expressed by a dedicated lexical unit (cf. waterfowl swimming or flying insects). By contrast, frames represent the core situations of a domain and may be distinctly lexicalized in a certain language. While micro-frames must be relevant to the more detailed contrastive studies of languages, such as compiling a typologically oriented dictionary, broader frames are better suited to the task of comparing semantic fields.

### 4.3.6 Semantic maps

Semantic maps are another tool of grammatical typology that can be adapted to the needs of lexical typology. Grammatical maps represent an area of the grammatical system, such as modality or interrogative pronouns; the universal inventory of meanings forms the map’s nodes, and several nodes can be marked with a similar color to show that in a given language the meanings are expressed by the same marker. The pictures are then easy to compare across languages, see (van der Auwera and Plungian 1998; Haspelmath 2003; Tatevosov 2004).

In our lexical typological studies we build maps for larger entities – domains, or semantic fields, which would be similar to whole grammatical categories. The nodes, too, are larger – frames, rather than micro-frames. This is due to the fact that lexical meanings vastly outnumber grammatical meanings. A map built from micro-frames would be too clustered by differences between individual lexemes,

swallowing any useful generalizations. Therefore we intentionally omit some finer nuances (such as the insects from the previous section) and operate at the level of entire lexical systems.

As with grammatical maps, the nodes that are often realized by the same linguistic means are placed closely on the map. Two frames with a similar lexicalization cannot be separated by a third if it corresponds to a different word.

Lexical data is then placed on the map to show how the domain is divided into individual words in a given language, for further comparison between languages<sup>6</sup>. As an example, let us take the domain of emptiness (Tagabileva and Kholkina 2010; Tagabileva 2011). The relevant frames for it were found to be ‘hollow shape’, ‘empty container’, ‘location empty of people’, ‘large space without objects on it’ (cf. ‘a field without buildings’), small flat surface without things on it’ (cf. ‘an empty table’), and ‘empty hanger’ (Fig.1). None of the surveyed languages lexicalized all of them, but at least one frame was lexicalized in each. Chinese and Russian (Fig.2), with *kong* vs. *kongxin* and *pustoj* vs. *polyj* respectively, have only the opposition of functional emptiness vs. hollow shape (it is worth noting that, while *kongxin* is a derivate of *kong*, *polyj* and *pustoj* do not share any common roots).

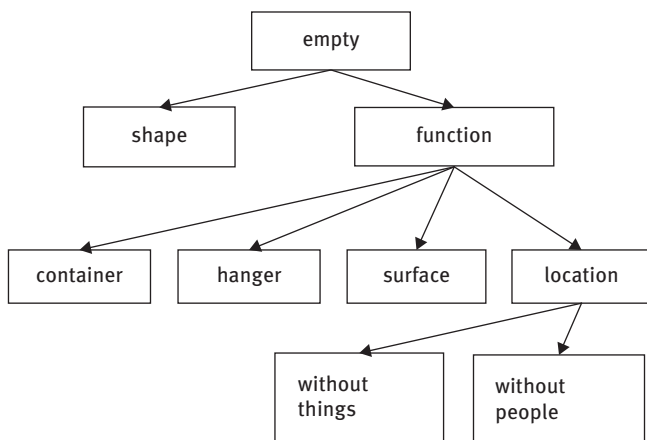
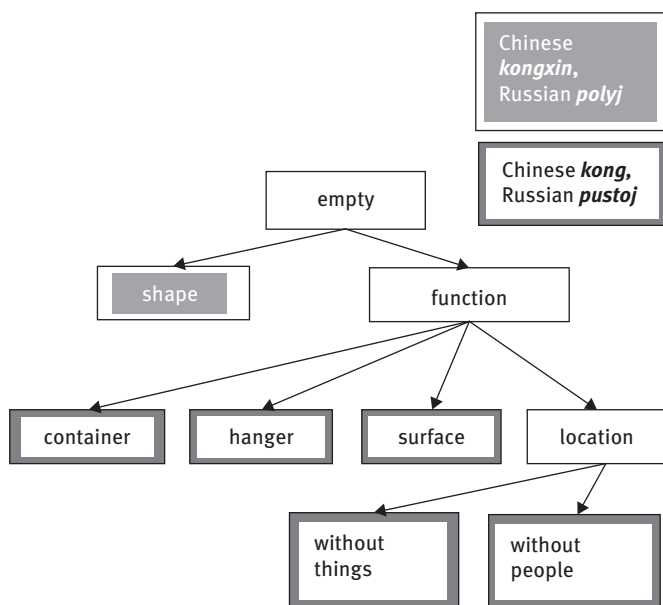


Fig. 1: Semantic map: domain of ‘empty’

<sup>6</sup> For another technique for visualization of lexical typological data see multidimensional scaling plots as used in the Nijmegen School (cf. Majid et al. 2007, 2011).



**Fig. 2:** Semantic map: domain of 'empty' in Russian and Chinese

Serbian (Fig.3), in addition to emptiness (*prazan*) and hollowness (*šupalj*), has a word specifically for absence of people – *pust*, at least in the dictionaries; speakers and corpora appear to testify that the current usage is shifting. According to Tolstaya (2008), the distinction, present in Serbian until recently, at an earlier time was common to all Slavonic languages. The corresponding word in modern Russian, *prazdnyi*, has shifted its meaning from 'unoccupied' to 'idle' and is generally fading out of active use.

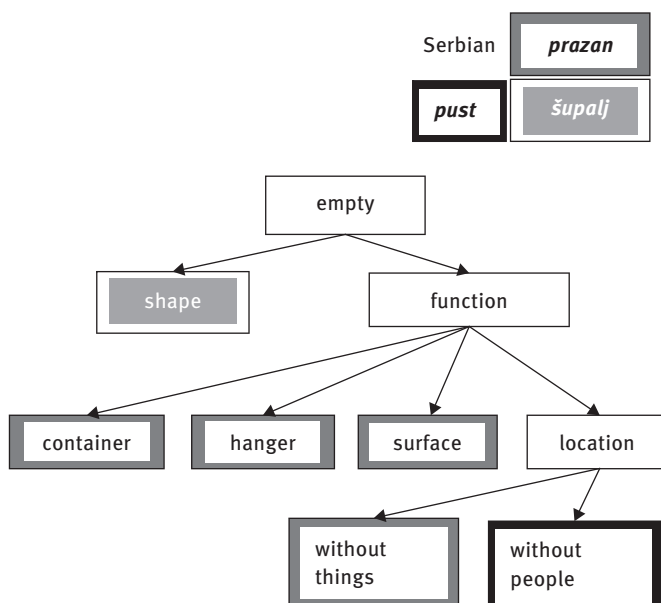


Fig. 3: Semantic map: domain of 'empty' in Serbian

Korean (Fig.4) distributes words between frames more evenly. There is no distinction of hollow object vs. empty container – an empty glass and a hollow gourd would both be described as *thengpita*. The situation is distinguished, on the one hand, from locations, *konghehata*, irrespective of whether they are empty of people or things, and on the other from working surfaces and hangers, *pita*.

Maps offer a ready and intuitive way to grasp the domain as a whole and how different languages structure it. A lexical system can be rich, in extreme cases lexicalizing every frame separately, or poor, with one word for the whole domain. Even the poorer systems, however, along with the dominant word tend to have a periphery of less common specific expressions. The Armenian domain of swimming and floating is one of these; there is the dominant verb *loyal*, which can cover all situations of swimming and floating. The others, *navel* and *navarkel*, are marginal for the domain – they are less frequent and have narrower meanings.



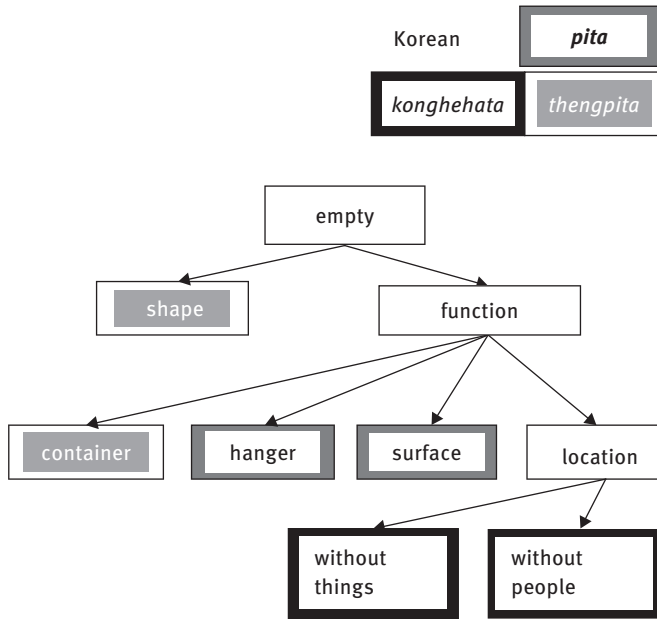


Fig. 4: Semantic map: domain of 'empty' in Korean

Thus, lexical typology can deal not just with lexemes but with lexical systems. The ambition is similar to that of the WALS (<http://wals.info>) at the Max Planck Institute that is recording the distribution of grammatical systems of different types over the world.

A working typology must have some predictive value – it should not just observe the existing systems, but judge which configurations are common and which less expected or outright impossible. In the domain of swimming and floating, for example, the frames can be ranked according to how active the subject is: *swim* > *travel by vessel* > *drift* > *float*. Seeing that vessels are usually lexicalized together with drifting (sometimes with swimming), we can expect that the most natural tendency would be to distinguish active swimming from passive drifting and floating (as in Persian, Korean etc). Another strategy, also found empirically, is based on control and contrasts uncontrolled drifting to both swimming and floating, which are grouped together (e.g. Hindi and Khakas). Some languages make further distinctions without disrupting the overall pattern<sup>7</sup>, but the absence

<sup>7</sup> Floating in a small container, such as vegetables in a stew, often gets special explication – usually with a verb of existence rather than a *float*-type verb.

of contradicting tendencies is remarkable and can be taken in support of our model of the domain. This allows us to predict with a high degree of certainty that no language is expected to have a verb for swimming and drifting opposed to another for vessels and floating.

Semantic maps express these restrictions by the placement of nodes. In grammatical typology (van der Auwera and Plungian 1998; Haspelmath 2003; also Tatavosov 2004) a similar explication for two nodes is only possible if the nodes are neighbors. Fig. 5–6 show how it works for the domain of swimming and floating:

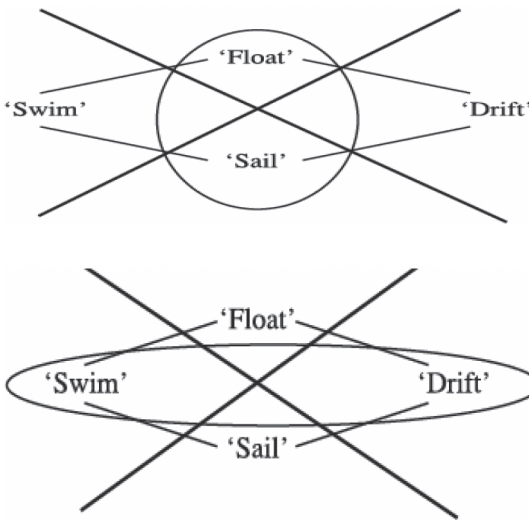


Fig. 5–6: Improbable (impossible?) systems: vessels and floating vs. swimming and drifting; vessels and drifting vs. swimming and floating.

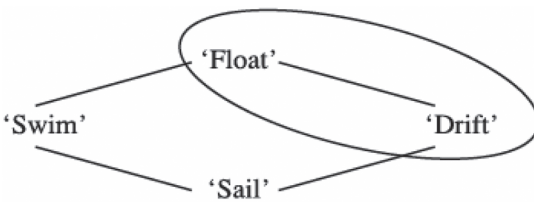


Fig. 7: An existing system: floating and drifting vs. vessels vs. swimming (cf. Tamil).

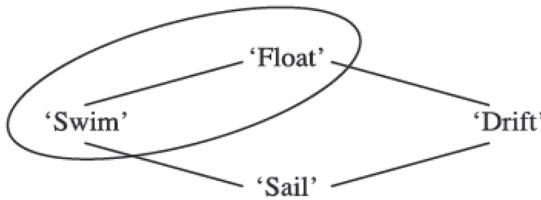


Fig. 8: An existing system: swimming and floating vs. drifting vs. vessels (cf. Komi)

## 4.4 Semantic shifts

An important difference between grammatical and lexical typology maps is their relation to the history of language. Grammatical markers often derive from one another, and their proximity on the map correlates with their diachronic relations. Historical relations between lexical meanings, on the other hand, are much more complex and difficult to observe, which makes our map a strictly synchronous device.

Exactly to what extent historical and etymological data is relevant to lexical typology is far from self-evident. For some researchers who focus specifically on the evolution of word-meanings, the answer is ‘a great deal’ (e.g. Blank and Koch 2000; Gévaudan, Koch, and Neu 2003; Dybo 1994, 1996, and others). Zalziak (2009) is also to a large extent diachronically oriented. Others, such as the Nijmegen psycholinguistic school, make no use of historic data; nor is Goddard and Wierzbicka’s metalanguage suited to describing semantic shifts (except for historical and diachronic changes, cf. Bromhead 2009; Wierzbicka 2006, 2010a, 2010b).

Our view is that meaning shifts should be studied, by lexical typology especially, for the following reasons:

- In some domains there are meanings explicated only by metaphors.
- The way a polysemous word combines several meanings is not identical, but in important ways similar, to a word expressing several frames in a domain. The typology of shifts sheds light on the shifts themselves, in particular on the difference between metaphor and metonymy.
- Meaning shifts can help determine the extent of a domain.
- From a theoretical perspective, shifts bring current and historical phenomena together.
- From the point of view of lexicological practice, metaphors provide an opportunity to look at constructions rather than isolated lexemes. It is important

to compare the syntactic properties of a word's main and metaphoric senses and explain the differences.

In the following sections we will discuss each point in detail.

#### 4.4.1 Metaphoric domains

Metaphor, by definition, involves a word shifting from one semantic domain into another. Most of the existing approaches to lexical typology focus on a specific semantic field. It may thus seem that, since metaphoric senses lie outside these fields, they are of no interest to typologists. However there are some domains which in most, if not all, languages are predominantly populated by metaphoric usages – in these cases, metaphors simply cannot be neglected.

One such example is the domain of pain and unpleasant physical sensations. The vocabulary used to describe a variety of sensations in different body parts may number as many as 50 words. Of these only a small minority, such as *hurt*, *ache* in English or *bolet'* in Russian, are the so-called primary pain predicates, and the rest originate from other domains – e.g. English *My eyes are burning*, *The wound is stinging*; Crimean Tatar *başım uvulday*, lit. 'my head is hooting'; Erzya *kar'az aj s'iž't'e* lit. 'the back is tearing'; Aghul *ze jaK-ar ar<.u-naa* 'my muscles are smashed (aching from fever)' etc, see (Reznikova, Rakhilina, and Bonch-Osmolovskaya 2012).

Of course, it must be noted that such domains are the exception rather than the rule. For non-metaphoric fields it is more efficient to ignore metaphors until after the main senses are described. The representation of metaphoric shifts in dictionaries is sporadic, and corpora present the additional challenge of separating established usages from occasional word-play by individual authors. Even interviewing speakers is not an easy way to collect metaphors. Some speakers are insensitive to semantic shifts (which is an interesting psycho-linguistic problem in itself), and when presented with a metaphoric expression tend to translate it word for word, instead of remembering a differently-worded equivalent from their native language. Calques have little value in a lexical typological study.

When we have a general picture of the domain, on the other hand, metaphoric shifts within the source domain make for an interesting follow-up study. Therefore our project on sound verbs (Rakhilina 2010b) largely focused on the verbs that have animal sounds as their main sense and sounds made by humans, nature, machinery etc. as metaphoric usages. While there is a considerable variety among languages – laughter < noise made by geese (Russian) and crickets (Armenian), hoarse speech and malfunctioning audio < crows (German), pleased

grunting < pigs (Bulgarian) etc. – there are some observable tendencies in the mapping of different kinds of animals to human behavior, and of artifacts to the sound they make.

#### 4.4.2 Metaphor and metonymy as a combination of senses

When several frames in a domain are covered by a single lexeme, it can be viewed as vagueness or a broader meaning compared to the languages that have separate words for the frames. When a word explicates frames from different domains, it is a case of polysemy – usually metaphor. It is well-known that the so-called primary metaphors (Lakoff and Johnson 1980; Grady 1999) have considerable similarity across languages, so their patterns and typological consistency could be an appealing subject for cross-linguistic lexical studies.

It is remarkable that even closely related frames differ in the direction of their “cross-domain relationships”. Active horizontal motion through the air (prototypically self-propelled flight, as of birds) is often combined with the frame of jumping – East-Armenian *tʰə́čʰel*, Persian *pāridān* etc, and passive motion (arrows and other projectiles) with the frame of falling – Sanskrit *pat-*, but never the opposite (Plungian and Rakhilina 2007). In languages that classify sharp objects into sharply pointed and sharply edged, the former frame is a typical source of metaphors for keen senses (sharp sight, hearing etc), and the latter for speed (see Kyuseva 2012). Another such pair of systematic shifts can be seen in the domain of hardness and firmness: such negative human traits as cruelty or meanness often borrow the adjective that signifies hardness experienced directly (such as hard bedding or tough undercooked meat), and positive traits such as loyalty are usually associated with firmness attested by touching with the hand or an instrument (Pavlova 2014).

What is more interesting in the examples above is not the fact that similar metaphoric shifts occur systematically in different languages, nor even the underlying semantic and cognitive factors, but the way metaphors structure the source domain. We will come back to this after pointing out some cases of typologically relevant metonymy.

The most widespread metonymy – “part > whole” – is the least typologically interesting: in such pairs as *blunt edge* > *blunt scissors*, *hard cushion* > *hard chair*,

*lock the door* > *lock the house* both usages explicate the same semantic frame and are not lexically opposed to each other in most languages<sup>8</sup>.

Other types of metonymy, however, may show greater typological variation. Travel by vessel can be lexicalized separately from the movement of the vessel itself – this is the case with denominatives in Indonesian: *berkapal* ‘go by ship’, *berperahu* ‘go by boat’ etc, which cannot refer to ships and boats themselves (Lander and Kramarova 2007: 679). For the Persian AQUA-motion verb *šenā kardan* vessels are acceptable subjects, but passengers are not – with an animate subject it can only mean swimming (Kuznetsova 2007). Several languages, such as Russian and Tamil, have different words for the motion of a single fish vs. that of a shoal of fish – *plyt*, *nintu* ‘swim’ vs. *idti*, *cēl* ‘go’ respectively (Smirnitskaya 2007). In other words, meanings that in some languages are expressed by the same lexical item, and stand in a metonymic relation, may in others be lexically opposed to each other.

Another non-trivial metonymy can be found in the domain of speed. Russian *bystryi*, English *quick*, German *schnell* all combine two meanings: speediness of a process and shortness of the interval between the point of reference and an instantaneous event: *walk quickly* vs. *decide quickly*. These are in fact different frames which can be lexicalized separately – cf. Russian *medlenno* ‘slowly’ (as in *medlenno idti* ‘walk slowly’) vs. *dolgo* ‘for or after a long time’ (as in *dolgo ne otvečat* ‘not to answer for a long time’).

A remarkable metonymic shift occurs when the same word means ‘drifting on the current’ and ‘flow of the current itself’. This metonymy is by no means universal, e.g. English and Russian lack it, but it can be observed in more than 15 languages of our sample including Chinese, Japanese, Italian, Swedish, Lithuanian, Polish, Khakas and others.

Even more typologically relevant is the so-called “end-point metonymy” (Lakoff 1987; Brugman and Lakoff 1988; Paducheva 2004; Kustova 2004) that combines the meanings of a process and its result (*he surrounded the house with a fence* > *a fence surrounded the house*). Another well-known example is the polysemy of the English preposition *over*, as in *fly over the hill* (movement) vs. *live over the hill* (location at the end point of the movement). In some languages, horizontal and vertical movement through water are also united in process-result metonymy: ‘rising to the surface > floating on the surface’, as in Indonesian *mengam-*

<sup>8</sup> This does not mean that part-whole metonymy presents no possibilities for lexical typology. An interesting task, for example, would be to find if any shifts of this kind are impossible. A likely impossible metonymy is ‘a person moving > body part moving’, as in *a skater glides by* / *\*a skater’s legs glide by*.

*bang* (also Chinese, Japanese, Hindi, Karachay-Balkar and others, see Maisak and Rakhilina (eds.) 2007).

### 4.4.3 Shifts and the borders of semantic domains

Since metaphor and the special cases of metonymy discussed above involve more than one domain, semantic maps are no longer a good illustration. Maps of the source and target domains together with the graphic representation of the shift can only be visualized as a three-dimensional structure, and overlaying several of them to compare languages would be nearly impossible. Fortunately, for metaphoric and metonymic usages, maps are largely unnecessary, since, as discussed above, semantic shifts are defined more by the specific source situation within the domain (=frame) than by the source domain as a whole.

Since different frames tend to give rise to different shifts, a semantic shift can be seen as strong evidence that its source situation exists as a separate frame. Taking the domain of swimming and floating, we find that drifting on the current in most languages is combined either with travel of vessels or with stationary floating on the surface. This might suggest that moving with the current does not constitute a frame, unless we consider metaphoric data – this situation serves as a source for a distinct group of metaphors of ‘unimpeded movement’: effortlessly gliding over a surface, moving through the air, slipping inside something etc (see Rakhilina 2007 for details).

Sometimes the precise source of a shift becomes evident only in typological perspective, while a particular language may seem confusing and even contradictory to the general tendency. This is often the case when the source sense of the polysemous word is itself a combination of multiple frames. The sense ‘passage of time’ for such verbs as the Japanese *nagareru* seems to derive from the above-mentioned ‘drifting with the current’ if we look at it isolated from the other languages. In fact, the source of this metaphor is not the situation of drifting but the flow of the current itself, metonymically expressed by the same verb (cf. Panina 2007). Both the metonymy of flowing/drifting and the metaphor of TIME as a STREAM (cf. English *the flow of time*) are much more in keeping with typological evidence than ‘time as a drifting object’, and it turns out, the metaphor is not related to the domain of swimming and floating.

An interesting question is whether some shifts could have abstract sources which subsume several frames from different domains, especially for metaphors with a very abstract target. For example, the idea of approximation can be expressed by verbs of oscillation (Russian *kolebat'sya*), rotation (Spanish *rondar*),

and even floating (English *floating exchange rate* and its calques in other languages, see Rakhilina 2007).

#### 4.4.4 Shifts and etymologies

The examples above deal with the current state of language, but evolution of lexical meanings in its essence is nothing but a semantic shift where the source and target belong not just to different domains, but to different time periods.

From this point of view it is theoretically possible to use typological data to evaluate etymological hypotheses once lexical typology has covered enough languages and domains for such an application. Likewise, etymological dictionaries are already valuable sources of additional information for lexical typology and were used extensively in Plungian and Rakhilina (2007) and Rakhilina and Plungian (2013). Even if we differ from Zalizniak's approach in not giving historical data a more central role, sometimes the historical approach can produce interesting methodological results.

In the previous section we have mentioned the regular combination of the senses 'jumping/self-propelled flight'. In Plungian and Rakhilina (2007) it is examined synchronously in a number of languages, some of which have one verb for both situations (Rutul *la=w=č-*), and others which have cognates, diverging into different senses completely or partially (Lithuanian *lėkti* 'to fly' vs. Latvian *lekt* 'to jump'; Polish *latati* 'to fly' covers some contexts of the Russian *прыгать* 'to jump', as in *usta mu lataja* 'his lips quiver'). The direction of this shift is not evident. Usually the more abstract of the two meanings is assumed to be the target, but in this case both meanings are physical and fairly specific.

Turning to etymological data, then, we see that the Baltic root is related to Slavonic *\*let-* / *\*lēt-*, and more traces are observed in other Indo-European languages, usually with the meaning 'to jump, hop', but sometimes also 'to kick', 'to step on' and some others (Fasmer 1986, 2: 488). This leads us to believe that for the metonymical pair in question jumping was the source and active flight the target of the shift, while 'projectile flight > falling' is probably a later development.

#### 4.4.5 Lexical typology as construction typology

Cataloguing every source and target of semantic shifts is an engrossing, but so far unfinished, task. Both Heine and Kuteva's dictionary of lexical sources of grammaticalization (Heine and Kuteva 2002) and the Database of semantic shifts



(Zalizniak 2009), mentioned above, are far from complete, and may take years to reach their goals. The former, for example, covers only two adjectival meanings: ‘bad’ and ‘true’.

Even when completed, however, such a catalogue would be insufficient for typological generalizations, because a semantic shift is more than just its source and target.

Two other properties essential to a semantic shift are its type (metaphor or metonymy, i.e. similarity of frames vs. contiguity within a frame); and syntactic constructions by which the source and target are expressed, especially the similarity or dissimilarity of the source and target syntax. This last can be studied as such (see Apresjan 1967 and many others), but typological studies also exist (Haspelmath and Buchholz 1998; Shemanaeva 2008; Koch 2012, and the cross-linguistic project *Valency Classes in the World’s Languages* at the Max Planck Institute Leipzig<sup>9</sup>), see also (Britsyn et al. (eds.) 2009).

The object of typological comparison in this case is the process which is triggered as a word meaning crosses into another, differently structured, domain. Sometimes the transition is accompanied by a dramatic change in syntax – indeed, this change is one of the linguistic markers of the semantic shift. On the other hand, syntactic constructions may be preserved if the source and target frames are isomorphic.

Source frame mapping directly onto target is typical for abstract notions which cannot be experienced directly. Emotions often “borrow” frames from simpler and more straightforward physiological states, usually preserving the constructions in which the source word participates and its valency behavior – e.g. Russian *mnye bol’no smotryet’ na svet* ‘It hurts me to look at the light’ (physical pain) vs. *mnye bol’no (strashno / grustno) videt’ eto* ‘It pains (frightens/saddens) me to see this’ (emotions), or English *the fire seared his skin* vs. *jealousy seared him*.

More typologically interesting are cases where source and target frames are extremely dissimilar, as with various idioms describing luck. Here Russian uses a verb with the main sense ‘to carry’, *vezti*, lit. ‘it transports to one’, and Japanese – ‘to stick’, *tsuku*, lit. ‘one has it attached’, cf. also slang expressions such as the English *dig* ‘excavate; enjoy’. Such examples, which cannot be reduced to the mapping of one situation onto another, are largely ignored by the theories of metaphor (Lakoff and Johnson 1980; Croft 1993), or of mental spaces (Fauconnier 1985). Both models are primarily concerned with direct similarities in the conceptualization of the source and target. Discussion of the famous examples, such as

<sup>9</sup> <http://www.eva.mpg.de/lingua/valency/index.php>

ARGUMENT IS WAR (Lakoff and Johnson 1980) or SURGEONS ARE BUTCHERS (Grady, Oakley, and Coulson 1999; Fauconnier and Turner 2002), focuses mainly on the opposing parties in one, or the agent, patient and instrument in the other, i.e. the common elements identifiable due to the structural similarities of the situations. The differences between source and target, such as quarrels being non-lethal, or surgeons dealing with people and not meat, are dismissed with the explanation that no metaphor can be complete. (Indeed, looking at the Russian *kačat* ‘to pump > to download’ we find that some components, in particular ‘manual labor and/or use of heavy machinery’, of the source sense are lost, while some new properties appear: even when conceptualized as a liquid, information still exists in countable chunks such as files etc). But the dissimilar examples, like ‘carry > be lucky’, are different from these cases in that almost everything needs to be changed in order to produce *Mne vezet* ‘I am lucky’, lit. ‘It carries to me’, from *Mul vezet poklažu* ‘A mule carries baggage’. The Agent and Patient must be omitted, an Experiencer added, and the initial situation generally becomes unrecognizable.

We have encountered many such shifts when studying the typology of predicates denoting pain. Most of them are derived from physical actions, e.g. Russian *svatit* ‘to grab’ or Japanese *sashikomu* ‘to stab’ used to describe a pain in the stomach. The shifts are often accompanied by dramatic changes in valency (*sashikomu* becomes intransitive), syntax (*svatit* is used in an impersonal construction), or sometimes even morphological limitations. We view the process as a special type of semantic shift, separate from both metaphor and metonymy and related to grammaticalization in the amount of fundamental change on all levels that it entails. For details on this type of shift, that we term “rebranding”, see Rakhilina, Reznikova, and Bonch-Osmolovskaya (2010); Reznikova, Rakhilina, and Bonch-Osmolovskaya (2012). The study of it appears to be one of the most promising tasks for lexical typology, bringing it closer to more general linguistic issues concerning the structure and function of language constructions.

## 4.5 Conclusion

Different approaches to lexical typology give this new branch of linguistics different goals; theoretical and practical, and all equally fascinating.

The Nijmegen school views the lexicon as a reflection of psychological reality – do speakers of different languages react to the same stimuli similarly or differently? The stimuli need not exhaust all the possibilities, and the verbal response is viewed mainly as behavior. Morphology, syntax, semantic shifts and other purely linguistic phenomena do not always get enough attention even in

such outstanding works as Levinson (2003); Levinson and Wilkins (eds.) (2006), among others. The primary search is for the universal cognitive basis underlying and transcending linguistic experience.

Cliff Goddard and Anna Wierzbicka, leaders of another lexical typological school, are working on a venerable logic problem: is it possible to reduce all meanings in all languages to a small set of semantic primes, supposedly omnipresent? Words are contrasted not with words from other languages directly, but via this meta-vocabulary (Wierzbicka 1997; Goddard 2001b; Goddard and Wierzbicka 2008, 2009; Ye 2010, and many others). Success in this task, aside from showing the limits of linguistic variation, would have a tremendous impact on cross-cultural communication, enabling mutual understanding at unprecedented depth and scale.

Our own approach to lexical typology focuses on actual word-senses, semantic domains and lexical systems as they are. The end result may take the shape of a multilingual (ideally universal) dictionary with situations, or semantic frames, as entries. Obviously, the sheer scope of this task makes its significance theoretical rather than practical.

We believe that semantic fields are structured after a limited number of basic patterns, and we hope to gradually learn to extract these patterns even from a small initial selection of languages. After this a thorough study of structures would help us predict the behavior of words as new languages are observed or as known meanings evolve and change, which has always been a fascinating target for linguistic studies.

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