Computer-Assisted Language Comparison in Practice

Tutorials on Computational Approaches to the History and Diversity of Languages

Cross-Linguistic Colexifications with Body Concepts: Metaphor, Metonymy, Analogy

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Colexification describes the relation between two meanings that are expressed with the same form in a given language. A colexification is established based on a linguistic analysis of word meanings in the same language. While the term is a cover term for different semantic relations (i.e., vagueness, polysemy, homophony), the discussion of particular types of colexifications often is connected to linguistic terminologies such as *metaphor* or *metonymy*. This is not only the case because there are prominent linguistic theories that argue for the pervasiveness of metaphor (and metonymy) in everyday life, but also because semantic relations are assumed to mirror conceptual relations. The linguistic analysis of metaphor and metonymy thus provides insights into the human mind. However, one needs to be careful to make claims about cognitive mechanisms solely based on linguistic evidence. Therefore, it is important to also consider frameworks from psychology such as *analogical reasoning* in order to explain the processes behind a linguistic phenomenon. In the following, I discuss ideas on metaphor and metonymy from linguistics that highlight the cognitive underpinnings of both notions, as well as a proposal for how analogical reasoning can explain their processing.

1 Introduction

In German, we use two separate words for the body parts foot and leg: *Fuß* and *Bein*, respectively. Other languages do not make a lexical distinction between foot and leg and use the same term for both concepts, for example, *noha* 'foot, leg' in Czech (Tjuka 2019). From the perspective of the linguistic form, the term colexification can be used to describe the semantic relation between the two concepts FOOT and LEG. Colexification is a cover term for different semantic relations (François 2008). The use of an identical form to express two concepts does not necessarily indicate whether the colexification

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occurred due to the two concepts being related (polysemy) or unrelated (homophony). In linguistic terminology, polysemy can even be further divided into metaphor and metonymy (see Figure 1). A word like *noha* can be described as polysemous since the two meanings of the word are related, whereas the word *bank* 'financial institution, river bank' is homonymous because the two meanings are unrelated. Polysemy is an extension of meanings that exploit different kinds of relations: metaphorical extensions such as *foot the bill* based on a shared similarity between the two meanings or metonymical extensions due to a continuous relation between the meanings as in *head of the department* (for an overview of the terminology related to polysemy, see Vicente 2018).

Polysemy, metaphor, and metonymy are semantic relations that are assumed to have a mental reality in the human mind. Therefore, it is important to bridge the theoretical discussions about these constructs with experimental data on language processing. Here, I take a first step in that direction by describing a subset of linguistic theories about metaphor and metonymy and linking this information to a theory of analogy from psychology. In addition, I use examples of colexifications with body part terms to illustrate the scope of the terminology.

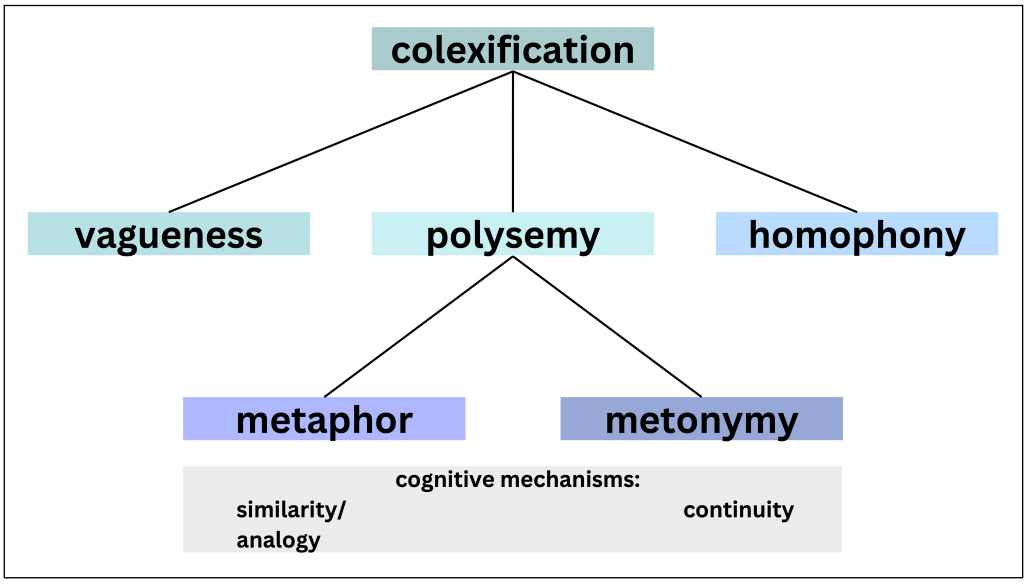

Fig. 1: Hierarchical representation of linguistic terminology and cognitive mechanisms.

Before we look more closely at metaphor, metonymy, and analogy, we need to consider the notion of domains (or frames, see Blank 1999; Koch 2001). In his discussion of the function of domains in the construction of metaphors and metonymies, Croft (1993) argued that metaphor is constructed based on a domain mapping between two distinct domains of separate matrices, whereas metonymy is the result of a domain highlighting within a domain matrix. A matrix in Croft's proposal is comprised of matter, shape, and location (Croft 1993). This approach assumes that there is not a single semantic domain but a collection of different domains in which a given concept is

integrated. The wide-ranging discussion about the term *domain* will not be further elaborated here because it is either used interchangeably in the linguistic literature or identifies the same theoretical framework (for a detailed discussion on the terms frame and domain, see Croft & Cruse 2004).

However, it is essential to note that domains are a defining factor in some accounts of metaphor and metonymy. Metonymy is often defined as an intradomain transfer (e.g., Wilkins 1996), whereas metaphors as an interdomain transfer (e.g., Goossens 1990; Kovecses & Radden 1998). In contrast, Riemer (2002) argued that the distinction between metonymy and metaphor cannot be based on domains alone, since the definition of the domain would influence the selection of one or the other. Nevertheless, I use the term domain in the description of examples since it is an explanatory device for particular semantic relations.

Another point that we need to keep in mind is that the distinction between metaphor and metonymy is not always clear-cut. For this reason, linguists have tried to establish new terminology to account for examples that blur the picture of distinct categories given in Figure 1. I briefly illustrate two examples. First, Goossens (1990) established the term *metaphtonymy* to account for the combinatory processes between metaphor and metonymy. Based on conventionalized expressions found in Longman's Dictionary of Contemporary English, he showed that the process of deriving a *metaphor from metonymy* was the most frequent in the domain of sound. *Metonymy within metaphor* appeared in the domain of body parts only, whereas *metaphor within metonymy* was rare across domains. The study demonstrated intricate connections that can only be established by an in-depth semantic analysis. Second, Riemer (2002) proposed the terms *hypermetonymy* and *hypermetaphor*. He argued against Goossens' proposal that metaphor and metonymy cannot be clearly distinguished. In Riemer's view, some conventionalized terms grow beyond the state of pure metaphor or metonymy and evolve through the process of reinterpretation into something called *hypermetonymy* and *hypermetaphor*. I do not aim to give a final answer to this discussion but there are certainly examples from body part terms used for objects where the distinction between metaphor and metonymy is not apparent. For example, the colexification BACK-BARK could be metaphorically interpreted because the two concepts are similar in shape or as a metonymic extension based on the fact that people often lean or sit on trees with their backs.

2 Metaphor

Aristotle defined metaphor as a transfer of a name from one thing to another based on analogy (see Poetics 21 1457b). Since its establishment in classical rhetoric, metaphor has been featured in numerous important works on figurative language in philosophy and linguistics. Generally, metaphor is seen as a semantic extension across domains based

on a similarity mechanism. Summarizing the vast literature on metaphor is a task for an entire dissertation. Here, I focus on giving an overview of the conceptual metaphor theory (Lakoff & Johnson 1980) and then turn to examples of meaning extension from the domain of the body to the domain of objects.

Conceptual metaphor theory is one of the most widespread and actively researched approaches to metaphors in linguistics. By demonstrating that metaphor is pervasive in everyday language, Lakoff and Johnson (1980) established a theoretical framework in which a conceptual domain is understood in terms of another. One of the most famous examples of a conceptual metaphor is ARGUMENT IS WAR which underlies expressions such as *She shot down my argument.* In Lakoff and Johnson's analysis, the concrete domain of WAR is the source domain from which metaphorical expressions of the abstract domain of ARGUMENT are derived. The mappings between the conceptual domains stem from image schemas that seem to be grounded in our human experience and unidirectional. Lakoff and Johnson's work has branched out into many directions, inspiring researchers in cognitive science (e.g., Pinker 2007) and psychology (e.g., Gibbs 1994).

Besides its huge influence on the field, the approach based on conceptual metaphor theory has also earned criticism. By postulating a conceptual metaphor based on a handful of examples in a particular language, the researchers make a generalization drawn from an unbalanced sample of data. This top-down approach is theory-driven but cannot explain all the patterns we see across languages. The theory falls short of describing the diversity of language use (for an overview of the criticism and an attempt to reconcile it with the theory, see Kovecses 2008). Another point of criticism is the assumption that the mappings are unidirectional and grounded in the sensory perception of our body. Examples of an object referring to a body part such as *belly button* or the semantic shift from 'bag, purse' to MEngl. *bely* (Koch 2016) show that there are counter-evidence for the embodied hypothesis.

Although Lakoff and Johnson (1980) explicitly excluded expressions such as *foot of the mountain* or *table leg* from their considerations, these expressions are shown to be an important puzzle piece in analyzing the cognitive mechanisms underlying meaning extensions. In her study on Basque, Ibarretxe-Antuñano (2012) demonstrated that body part terms are used based on spatial alignment in expressions such as *mendiburu* lit. 'mountain head', i.e., 'mountain summit'. Furthermore, a detailed analysis of the meaning extensions of body part terms in Tzetal by Levinson (1994) showed that speakers of the language employ a geometrical algorithm to assign a body part term to a given object on the basis of shape features. Levinson (1994) argued against the assumption that this system is due to a metaphorical transfer and proposed that speakers perform a volumetric analysis of shape in line with visual object recognition. Body parts are also used to refer to landscape features in Tzeltal and in other languages (Burenhult & Levinson 2008).

Here, too, shape is the decisive factor: "Whether this is metaphor or a looser form of analogy is a moot point: the body part system used with inanimate objects [i.e., landscape features] is based on geometry and shape" (Brown 2008). Especially in the case of meaning extensions across two concrete domains, it is difficult to group all occurrences under one theoretical term. Another approach to avoid the definitional maze is to use tests to account for a semantic relation between two concepts, as Urban (2012) did with an "is like" and "has something to do with" test.

In my own work, I have focused on the use of body part terms for objects, i.e., food, landscapes, plants, artifacts, etc. While I used the term *body part metaphors* in my MA thesis (Tjuka 2019), I have adopted the notion of colexification in my current work. There are two reasons for this decision. First, given a cross-linguistic dataset, the distinction between vagueness, polysemy, and homophony is not always straightforward. Second, the methodological advantage of using large-scale lexical datasets such as Lexibank (List et al. 2022) and the automatic creation of data collections such as CLICS (Rzymski et al. 2020) allows a bird's eyes view of the possible connections drawn between body and object concepts found in the world's languages. However, given the bottom-up approach, assigning the colexifications to linguistic terminology is a challenge. The colexification TOOTH-LEAF can be interpreted as based on a similarity in shape whereas HEAD-TOP can be seen as a spatial relation. Although both could be interpreted as metaphors the frequent occurrence of colexifications between HEAD and TIP OF OBJECT, CAPE (HEADLAND), or SUMMIT, as well as between TOOTH and SPROUTSHOOT, or BEAD indicate a more systematic approach to using body part terms to objects and not an on the spot creative process. Also, a directionality, as proposed by Lakoff and Johnson (1980) and advocates of grounded cognition, is distorted by the use of different body concepts for the same object. For example, HEAD or NOSE are colexified with TIP OF OBJECT. Only a few cases such as BONE-ROPE and EYE-FIRE cannot be explained by a literal similarity and thus, fall into the realm of metaphor.

3 Metonymy

Metonymy is commonly understood as a figure of speech in which a name or a part of something stands for something else. In contrast to metaphor, the meaning extension is a continuous link within the same semantic domain. Examples include mappings from part to whole as in *to lend a helping hand* or *I saw some new faces in the crowd* where a body part stands for the whole person. Due to the popularity of metaphor in linguistic theory, metonymy was long overlooked. This changed with edited volumes showing the importance of metonymy for cognitive linguistics (Kovecses & Radden 1998; Panther & Radden 1999; Barcelona 2003) and research programs developed in historical

linguistics (Koch 2001, 2011; Koch & Marzo 2007). In the following, I focus on two approaches that explore meaning extensions with the help of cross-linguistic data.

In the diachronic cognitive onomasiological approach (Blank 1999, 2011; Koch 2008, 2011, 2016), a three-dimensional grid is used to illustrate the conceptual and formal relations of the source and target domains. By examining French vocabulary, Koch and Marzo (2007) developed such a grid (see Fig. 2) for the description of lexical motivation and found that the most frequent motivation in high-frequent French vocabulary is based on metonymic relations. Furthermore, Koch (2011) demonstrated the pervasiveness of metonymy as a conceptual relation of continuity in semantic changes. He defined metonymy as a figure-ground effect that highlights certain aspects within a conceptual frame and showed that it is a formal device for lexical innovation including semantic change, conversion, suffixation, prefixation, and composition.

absence of motivation	motivation							
	formal relations	cognitive relations						
		conceptual identity	contiguity	metaphorical similarity	cotaxonomic similarity	taxonomic superordination	taxonomic subordination	onceptual contrast
	formal identity/ polysemy	0	1	2	3	4	5	6
	tone alternation	10	11	12	13	14	15	16
	reduplication	20	21	22	23	24	25	26
	number alternation	30	31	32	33	34	35	36
	gender alternation	40	41	42	43	44	45	46
	voice alternation	50	51	52	53	54	55	56
	stem alternation	60	61	62	63	64	65	66
	word-class alternation	70	71	72	73	74	75	76
	suffixation	80	81	82	83	84	85	86
	prefixation	90	91	92	93	94	95	96
	compounding	100	101	102	103	104	105	106
	serial verb	110	111	112	113	114	115	116
	lexical. syntagm	120	121	122	123	124	125	126
	idiom	130	131	132	133	134	135	136
	...							
	...							

Figure 2: Three-dimensional grid of lexical motivation recreated from Koch and Marzo (2007: 268). The numbers in the cells are arbitrary and are only used to identify the squares.

In a cross-linguistic corpus study, Hilpert (2006) found distinctive patterns of meaning extensions of body part terms illustrating the usefulness of identifying conceptual metaphors based on a corpus analysis instead of intuitions. Similarly, Hilpert (2007) explored the assumption that meaning is established by conceptual shift, i.e., chained metonymies. In this study, he used expressions with body part terms in a corpus of 76 languages to illustrate serial extensions such as the path from OBJECTS ARE HUMAN BEINGS > PART FOR ORIENTATION > PLACE FOR ACTION expressed in back → back part → behind. This chain involves a metaphor followed by a metonymic extension and another metonymy. However, the result showed that serial extensions were

not as frequent as expected and that metonymies based on metaphors were rare which supported previous findings based on English (Goossens 1990; Taylor 2002).

A domain in which metonymic extensions are frequent is the human body. Pattillo (2018) found that South American languages extend body part terms to other body part terms based on metonymy. Interestingly, the metonymy PART FOR WHOLE expressed in a HAND-ARM colexification was not as frequent as in other geographical areas such as Africa and Eurasia. Five out of 26 languages expressed the colexification as polysemy 'hand, arm', and another five languages as complex terms such as 'hand-bone'. The study also showed that the metonymy PART FOR REGION represented by polysemies such as 'hand, forearm' and 'hand, wrist' was not as common as proposed by Wilkins (1996). Another metonymical pattern described in Wilkins (1996), relates to meaning extensions of body part terms to pieces of clothing or jewelry that are worn on a particular body part. Wilkins (1996) listed semantic changes such as 'footling' to 'foot' and 'earing' to 'ear' for Dravidian languages. In my study on cross-linguistic body-object colexifications, I found similar instances, for example, the colexifications WAIST-BELT, THROAT-NECKLACE, and NECK-COLLAR which can be interpreted as originating from metonymy.

4 Analogy

The above studies from linguistics offer valuable insights into the multifaced semantic relations that occur in language. It is not surprising that a common thread throughout these studies is the expectation that there is a cognitive mechanism underlying the semantic relations of metaphor and metonymy. However, metaphor and metonymy are linguistic terms and they might not have a cognitive reality. To find out the underlying cognitive processes, linguistic evidence is not enough although it may give important hints. Therefore, I discuss a theoretical framework from psychology - analogical reasoning - that can explain some of the mechanisms expressed in the relations by which meaning extensions of body part terms are established. Metaphor has received a lot of attention from psychology and cognitive science in the past two decades (e.g., Reijnierse et al. 2019; Thibodeau & Boroditsky 2011; Speed et al. 2019, to name a few). Here, I focus on the framework by Dedre Gentner to illustrate one compelling example of how psychology can inform linguistic analysis and vice versa.

Gentner (1983) proposed a theory of analogy to describe how meaning is derived. "The central idea is that an analogy is an assertion that a relational structure that normally applies in one domain can be applied in another domain" (Gentner 1983). The basis for an analogy in her framework is a relational comparison rather than a similarity in object characteristics. The relations represent higher-order relations of the mapping which is formulated in the *systematicity principle*. In her view, "metaphors are predominantly

relational comparisons, and are thus essentially analogies" (Gentner 1983). Building on this assumption, Gentner and her colleagues conducted several experiments to examine how metaphors are psychologically processed, summarized in an article poignantly titled *Metaphor is like analogy* (Gentner et al. 2001). There are two important results of these studies. First, there is a difference in how novel versus conventional metaphors are processed. The former is based on domain mapping, whereas the latter are processed as alternate word senses and thus are retrieved from stored meanings instead of an online interpretation. Second, a directionality effect in the processing of metaphors was present in that an early symmetrical alignment process was followed by directional processing. These findings are important for linguistic analysis because they reveal underlying cognitive mechanisms and provide a framework for a more informed interpretation of semantic relations.

When the use of body part terms for another body part or an object is found in dictionaries or word lists and appears as cross-linguistic colexifications, we can assume that these instances are conventional expressions. If one follows the proposal by Gentner, the distinction between metaphor and metonymy as either intra- or inter-domain mappings becomes obsolete because conventional metaphors are already stored in the mental lexicon and represent polysemous words. Thus, from a cognitive perspective, colexifications such as HAND-ARM, ARM-BRANCH, or FOOT-WHEEL should be processed similarly. Nevertheless, there are colexifications between body and object concepts that seem to be based either on continuity (NECK-COLLAR) or similarity in shape (NOSE-ARROW), space (HEAD-ROOF), or function (BLOOD VESSEL-ROOT). In my view, these conventionalized relations tell us a lot about the mechanisms that are established to form novel connections between meanings. It seems to be the case that some body-object colexifications occurred based on a perception of relations rather than object characteristics indicating that the underlying process was analogical reasoning. To work out the exact cognitive processes, future research needs to test predictions of the theoretical framework with cross-linguistic data and supplement these with experimental studies.

5 Conclusion

This overview does not claim to give a complete overview of the debate surrounding metaphor, metonymy, and analogy in relation to the use of body part terms. I have focused on a subset of the debate that highlights some of the assumptions regarding their cognitive underpinnings as well as an account of how analogical reasoning could be the underlying processing mechanism when body part terms are used for objects. Making sense of the semantic relations expressed with body part terms is a challenge, but the discussed literature provides indications on how to interpret the cross-linguistic patterns

and the linguistic diversity that we see. The generalizations given in terms of cognitive mechanisms can also inform linguistic analysis, allowing for an overarching picture without getting lost in the peculiarities of individual languages.

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