Body-part metaphors as a window to cognition: A cross-linguistic study of object and landscape terms

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Abstract

Thus far, the cognitive basis of the mapping of body-part terms to object and landscape features has not been fully explored. Lakoff & Johnson (1980) declare that metaphors are pervasive in everyday life, and therefore, represent cognitive units which are responsible for the structuring, storage, and processing of information (concepts). However, they dismiss body-part metaphors, which refer to object and landscape features, because they are isolated instances (Lakoff & Johnson, 1980). They argue that these body-part metaphors are not systematic in our language. On the other hand, Kraska-Szlenk (2014) claims that language comparison uncovers common patterns in the metaphorical mapping of body-part terms to inanimate objects. In addition, Ullmann (1963) states that metaphors are widespread if they are based on an obvious similarity, e.g., 'foot of a hill' or 'leg of a table'. Studies which investigate this claim show that the dimensions of *shape*, *spatial alignment*, and *function* play a crucial role in determining the similarity between a body-part and an object or landscape feature (cf. Levinson 1994; Ibarretxe-Antuñano 2012; Tilbe 2017). Furthermore, Tilbe (2017) reveals that speakers of Mesoamerican languages assign more body-part terms to objects than English speakers. He also found that languages differ in terms of which dimension they use more frequently.

Based on Tilbe's observations, I test the hypothesis that language variation can be explained by the preference of a language in terms of which dimension it chooses more frequently for the mapping. Furthermore, I investigate the hypothesis that a body-part metaphor is more frequent if it relates to more dimensions. This thesis includes the first systematic typological study of body-part metaphors in object and landscape terms. The research questions of this investigation are as follows:

1. How frequently do languages use body-part terms to express parts of objects and landscapes?

2. Of the three dimensions (shape, spatial alignment, function) is one used more frequently than the others?

3. How much variation do we find between languages with respect to 1) and 2)?

For elicitation, I used a seed list of 92 body-part metaphors and corresponding pictures. 13 speakers of the following languages participated in my study: Czech, Marathi, Persian, Modern Greek, Vietnamese, Wolof, Mandarin Chinese, Khoekhoe, Hungarian, Japanese, Modern Hebrew, Turkish, and Bahasa Indonesia.

The results of the cross-linguistic comparison show that languages differ in terms of how frequently they apply body-part terms to object and landscape properties. However, the expressions *leg of the chair/table/bed* occur throughout the entire language sample. Moreover, the analysis of the three dimensions indicates that languages differ in terms of their preferences for the dimensions. Nevertheless, the preference for a specific dimension did not always explain the choice of a certain body-part term in a metaphor. In some cases, additional factors seem to influence the mapping.

Keywords: Lexical Typology, Cognitive Linguistics, Conceptual Metaphor Theory, Body-Part Metaphors, Meronymy.

Zusammenfassung

Die kognitive Verarbeitung, die der Zuordnung von Körperteilen zu Objekt- und Landschaftsmerkmalen zugrunde liegt, ist bislang noch nicht vollständig erforscht. Lakoff & Johnson (1980) erklären, dass Metaphern im Alltag allgegenwärtig sind und daher kognitive Einheiten, die für die Strukturierung, Speicherung und Verarbeitung von Informationen verantwortlich sind, (Konzepte) darstellen. Sie untersuchen allerdings keine Körperteilmetaphern in Object- und Landschaftsbegriffen, weil diese isoliert und nicht systematisch in unserer Sprache sind (Lakoff & Johnson, 1980). Kraska-Szlenk (2014) zeigt hingegen, dass Muster in der metaphorischen Zuordnung von Körperteilen zu Objekten durch Sprachvergleich aufgedeckt werden können. Darüber hinaus stellt Ullmann (1963) fest, dass Metaphern, die auf einer offensichtlichen Ähnlichkeit beruhen, weit verbreitet sind. Als Beispiele nennt er ‚Fuß des Hügels' und ‚Tischbein'. Studien, die dieser Behauptung nachgehen, zeigen, dass die Dimensionen *Form*, *räumliche Ausrichtung* und *Funktion* eine entscheidende Rolle dabei spielen, die Ähnlichkeit zwischen einem Körperteil und einem Objekt- oder Landschaftsmerkmal zu bestimmen (Levinson 1994; Ibarretxe-Antuñano 2012; Tilbe 2017). Darüber hinaus offenbart Tilbe (2017), dass Sprecher mesoamerikanischer Sprachen mehr Körperteile auf Objekte übertragen als Sprecher der englischen Sprache. Außerdem fand er heraus, dass Sprachen sich darin unterscheiden, welche Dimension sie häufiger für diesen Prozess verwenden.

Ausgehend von den Beobachtungen von Tilbe (2017) untersuche ich die Hypothese, dass Sprachvariation durch die unterschiedlichen Präferenzen von Sprachen bezüglich der Priorisieung von Ähnlichkeitsdimensionen erklärt werden kann. Außerdem untersuche ich die Hypothese, dass eine Körperteilmetapher häufiger ist, wenn sie auf mehreren Dimensionen aufbaut. Diese Arbeit beinhaltet die erste systematische typologische Studie von Körperteilmetaphern in Objekt- und Landschaftsbegriffen. Dabei werden die folgenden Fragen untersucht:

1. Wie frequent verwenden Sprachen Körperteile, um Teile von Objekten und Landschaften auszudrücken?

2. Von den drei Dimensionen (Form, räumliche Ausrichtung, Funktion) wird eine häufiger verwendet als die anderen?

3. Wie viele Unterschiede gibt es zwischen den Sprachen in Bezug auf 1) und 2)?

Die Studie baut auf einer Liste mit 92 Körperteilmetaphern und entsprechenden Bildern auf. Es nahmen 13 Sprecher der folgenden Sprachen teil: Tschechisch, Marathi, Persisch, Griechisch, Vietnamesisch, Wolof, Mandarin, Khoekhoe, Ungarisch, Japanisch, Hebräisch, Türkisch und Indonesisch.

Die Ergebnisse des Sprachvergleichs zeigen, dass sich die Sprachen darin unterscheiden, wie häufig sie Körperteilbegriffe für Objekt- und Landschaftsmerkmale verwenden. Alle Sprachen in der Stichprobe verwenden Körperteilmetaphern, allerdings werden nur die Ausdrücke *Stuhl-/Tisch-/Bettbein* in der gesamten Sprachprobe verwendet. Darüber hinaus ergab die Analyse der drei Dimensionen, dass sich die Sprachen hinsichtlich ihrer Präferenzen für die unterschiedlichen Dimensionen unterscheiden. Die Präferenz für eine bestimmte Dimension erklärt allerdings nicht immer die Wahl eines bestimmten Körperteilbegriffs in einer Metapher. In einigen Fällen scheinen zusätzliche Faktoren die metaphorische Übertragung zu beeinflussen.

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1 Introduction

As humans, we tend to categorize the world around us by using different strategies or patterns. One of them is to extend the parts of our body to the outside world. This principle is used in expressions, such as *eye of the needle* or *mouth of the valley*. These instances are lexicalized 'body-part metaphors'. In the scope of this thesis, I investigate this type of metaphors throughout different languages to shed light on their cognitive foundation.

The term 'body-part metaphor' includes a variety of expressions. However, I focus on body-part terms which are metaphorically transferred to an object or landscape property. Therefore, the present investigation does not integrate other metaphors concerning the body, for example, *My head is boiling.* or *He is cold-blooded.*, which express emotional states.

I am interested in the fundamental question of whether body-part metaphors are a universal categorization principle or based on perceptual properties of individual body-parts. My study is motivated by the observation that the literature makes general claims about body-part metaphors, but as of yet, no systematic cross-linguistic study of this phenomenon has been conducted. Even though metaphors became extensively studied, after Lakoff & Johnson (1980) declared them to be essential for understanding our conceptual system, body-part metaphors in object and landscape terms were largely left out. This development was due to Lakoff & Johnson's claim that expressions, such as *leg of the table* and *foot of the mountain*, are idiosyncratic and isolated instances in our language. However, comparative studies reveal that other languages apply various body-part terms to landscapes (cf. Filippone, 2006). In addition, Kraska-Szlenk (2014) argues that the perception of body-parts is responsible for the mapping. The extension of the source domain 'body' to another target domain seems to yield evidence for the hypothesis that our cognition relies on our bodily experience and is influenced by our sensorimotor capacities. Nevertheless, Goschler (2005a) found counterexamples for this assumption. Furthermore, Atef-Vahid & Zahedi (2013) show that languages vary in terms of which body-part metaphors they realize. However, their explanation is that these differences result from cultural influences. Based on these observations, the first question of this thesis is: How frequently do languages use body-part terms to express parts of objects and landscapes? Additionally, I analyze the variation between languages with regard to this question.

Studies which examine universal principles put forward further hypotheses. Ullmann (1963) states that universal body-part metaphors exist and that they are based on an obvious similarity between the body-part and the corresponding object or landscape feature, as in *leg of the table* and *foot of the hill*. The classification system of the human body also reveals the principle of 'similarity'. Andersen (1978) and Enfield et al. (2006) assume that the similarity of shape, spatial alignment, and function is crucial for categorizing the human body into parts. These principles may also play a role in categorizing other features in our environment.

The investigations of each similarity dimension in object and landscape terms show that languages can differ in terms of how frequently they rely on one dimension compared to another. Levinson (1994) and Tilbe (2017) establish that Mesoamerican languages prefer to map body-part terms to objects in line with the shape dimension. English speakers, on the other hand, rely more on the function dimension (Tilbe, 2017). Furthermore, Ibarretxe-Antuñano (2012) reveals that Basque conceptualizes body-parts in various ways, and therefore, describes spatial alignments with different body-part terms. These findings are the basis for the second question

which is investigated in the present study: Of the three dimensions (shape, spatial alignment, function) is one used more frequently than the others? In addition, I further examine the variation between the different languages in relation to this question.

The aim of this thesis is to analyze body-part metaphors in object and landscape terms within a systematic typological study to provide insights into the cognitive foundation of the phenomenon. One of the few verifiable hypotheses in the literature, which accounts for the variation across languages, is that languages differ in terms of which dimension they prefer for the mapping of body-part terms to object and landscape features (cf. Tilbe 2017). This hypothesis is investigated in the present study. Furthermore, I examine the working hypothesis that a body-part metaphor is expressed in more languages if it relates to more dimensions.

To test my questions and hypotheses, I created a elicitation study in which I used a seed list of 92 body-part metaphors and corresponding pictures. For the study, 13 participants with different native languages were interviewed. The languages of my sample were: Czech, Marathi, Persian, Modern Greek, Vietnamese, Wolof, Mandarin Chinese, Khoekhoe, Hungarian, Japanese, Modern Hebrew, Turkish, and Bahasa Indonesia. The results of the body-part metaphor frequencies show that all languages use body-part terms to refer to object and landscape features. However, some languages express more body-part metaphors from the seed list than other languages. Furthermore, the analysis of the three dimensions demonstrates that languages vary in terms of which dimension they favor for the mapping. Nevertheless, in some cases, the preferences for the dimensions do not account for the choice of a particular body-part term which is applied to an object or landscape feature. This may be due to other factors that influence the mapping of body-part terms.

The study of body-part metaphors in a variety of languages is the first attempt to systematically examine the general claims in the literature concerning body-part metaphors. Furthermore, I aim to shed light on categorization strategies across languages which could reflect their cognitive foundation. The design of the study was exploratory. Therefore, my investigation does not claim to be exhaustive but rather examines certain hypotheses and reveals gaps in our understanding of the phenomenon. In addition, the results of this study provide a framework for the development of future research.

The thesis is structured as follows: Chapter 2 further elaborates the studies which were briefly outlined in this introduction. The chapter includes an overview of the studies which investigate the cognitive basis of metaphor (Section 2.1). In the second section (Section 2.2), I discuss universal principles in i) metaphors, ii) the categorization of the human body, and iii) the segmentation of the landscape. The last section of the theoretical overview discusses the different dimensions of similarity, namely shape, spatial alignment, and function, in more detail (Section 2.3). In Chapter 3, I outline the aims, method, result, discussion, and outlook of the typological study which was conducted in the scope of this thesis. The last chapter comprises a conclusion (Chapter 4).

The phenomenon 'body-part metaphor' is also described as 'meronymy' in the literature. On the one hand, the mapping is seen as a construction of a part-whole relation and is defined as 'meronymy'. On the other hand, in calling it 'metaphor', the aspect of the abstraction between a source domain and a target domain is highlighted. I discuss the different views in terms of defining the phenomenon at hand in the following section.

2 Theoretical Background

In this chapter, I discuss the theoretical background of the relation between metaphor and cognition (Section 2.1), the universality of metaphors (Section 2.2), and the different dimensions underlying the mapping of body-part terms to object and landscape features (Section 2.3). Firstly, I explain the divergent theoretical approaches relating to the definition of the above-mentioned phenomenon.

Metaphor has been extensively studied by different scholars,[1] and defined in some of the following ways:

- "A way of conceiving of one thing in terms of another." (Lakoff & Johnson, 1980, 36)
- "Word metaphors are words that are used as new vehicles for already familiar or newly experienced tenors." (Dirven, 1985)
- "Metaphors are typically (a) from more concrete to more abstract domains (*the heart of the theory*), (b) from better understood, better articulated, to less clearly articulated or less precise domains (*a column of smoke*)." (Levinson, 1994, 808)

Although this thesis uses the term 'body-part **metaphor**', certain scholars refer to the mapping of body-part terms to inanimate objects as 'meronymy' instead of 'metaphor'. The study of meronymy "is concerned with how parts and wholes are represented in language. Words for parts, such as *leg*, *stem*, and *edge*, are called meronyms" (Tilbe, 2017, 23). Therefore, the term 'meronymy' refers to the denotation of a part-whole relation. This discrepancy within the literature stems from a paper by Levinson (1994) who argues that the process of referring to an object feature with a body-part term is based on a geometrical algorithm. In this process, the object is recognized and mentally reconstructed in its geometrical form (cf. Levinson, 1994). The body-part terms are applied by this object-centric view. Therefore, according to Levinson (1994), the transfer of body-part terms to object features does not meet the criteria of metaphor. One of his arguments is that the transfer of a body-part term to an object property is not a complete process because not all body-part terms are used. Another argument he brings forward is that in some cases, an anthropomorphic or a zoomorphic view could underlie the mapping which makes the decision for either one difficult.

By examining Levinson's arguments, Heine (1997) comes to another conclusion. In his opinion, the metaphorical transfer is based on the emphasis of one salient part of the source concept compared to other parts which fade into the background or are ignored (Heine, 1997, 140). Therefore, it is not surprising that the process is incomplete and not all available body-part terms are mapped to an object. Moreover, Heine (1997) assumes that in most cases, the anthropomorphic model holds and is only replaced when it fails to apply. He concludes that metaphor is

> the only tool that takes care of the main features that characterize the transfer from body-part to inanimate part. [...] the ability to use the human body as a structural template to understand and describe other objects can be assumed to be universal; hence, we may expect this to be reflected in all languages. (Heine, 1997, 142f.)

[1] For a detailed overview of the historical approaches to metaphor see Jäkel (1999).

In this quote, two main assumptions are present: i) the process of mapping body-part terms to object features is based on an abstraction between a source and target domain, and ii) this process is universal.

Apart from object terms with the body as a source domain, this thesis also includes body-part terms which are extended to landscape properties. In this case, Burenhult & Levinson (2008) refer to the mapping as 'metaphor'. The aim of the present thesis is not to decide whether body-part metaphors should be defined as 'metaphor' or 'meronymy' but rather to explore the phenomenon at hand. Therefore, I decided to adopt the term 'body-part metaphor'. The following section elaborates investigations of metaphors in cognitive linguistics.

2.1 Metaphor and Cognition

In their book *Metaphors we live by*, Lakoff & Johnson (1980) ask the question of the cognitive foundation of our conceptual system. They observe that metaphors seem to shape our communication and thought. To underpin their arguments, Lakoff & Johnson (1980) use the examination of metaphors in everyday expressions through introspection. They discuss a variety of metaphors which they collected by paying attention to everyday conversations and analyze them to establish a new theory.

Based on their observations, they state that metaphor is pervasive in language, thought, and action (Lakoff & Johnson, 1980, 3). Furthermore, they suggest that the study of metaphors is important because metaphorical expressions represent cognitive units which are responsible for the structuring, storage, and processing of information, namely 'concepts'. The authors claim that one can gain a better understanding of our language and conceptual system by studying metaphors in our everyday life (Lakoff & Johnson, 1980, 7). Their argumentation is built on the declaration that the mind and the body are intertwined. Lakoff & Johnson's theory became a counter-movement to the predominant assumption in cognitive science that the body and the mind are separated. The approach to define the body and the mind as equally important was a contradiction to the common theories at that time.

Although Lakoff & Johnson (1980) discuss different kinds of metaphors, they do not integrate body-part metaphors in object and landscape terms into their theoretical investigation. They justify this exclusion in the following quote:

> [...] 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 a used part (or maybe two or three). (Lakoff & Johnson, 1980, 54)

By concentrating on the English language, Lakoff & Johnson (1980) fail to acknowledge a cross-linguistic view. However, I consider conventionalized metaphors as a promising basis for studying differences and similarities in various languages because they are integrated into the lexicon of a speaker and are not dependent on a spontaneous creative process. These so-called 'dead' metaphors are independent of speaker or context variation and can unveil trends or patterns in languages. In addition, other languages assign more than one body-part term to objects and landscapes compared to English. For example, German uses various terms for properties of a mountain: *Bergnase* 'nose of the mountain', *Bergrücken* 'back of the mountain', *Bergschulter* 'shoulder of the mountain', and *Fuß des Berges* 'foot of the mountain'. Even though

'foot of the mountain' seems to be an isolated instance in English, other languages use body-part terms more productively to map them onto a mountainous landscape (cf. Filippone, 2006). Lakoff & Johnson's statement hindered the investigation of body-part metaphors in object and landscape terms. In my view, it is necessary to compare body-part metaphors systematically in different languages in order to study how they are rooted in our conceptual system.

Nevertheless, Lakoff & Johnson (1980) establish a theory which explains the grounding, structuring, relations, and definition of concepts. Metaphor is not seen as a pure matter of language but rather as the underlying structure of our lexical knowledge. Lakoff & Johnson (1980) aim to offer a theory in which metaphor is the anchor for the investigation of our conceptual system. They call their approach 'Conceptual Metaphor Theory'. Example (1) illustrates the conceptual metaphor TIME IS MONEY which is manifested in everyday language.

(1) *I **spent** the weekend working.*

Lakoff & Johnson's approach paved the way for the 'Embodied Cognition Theory' which claims that the mind is embodied. The embodiment hypothesis assumes that our cognition depends on the perceptual experience we have throughout our body. Note that the hypothesis attempts to account for universal principles although it makes no clear predictions for variation between languages. However, the comparison of body-part metaphors, which refer to a mountain in English and German, indicates differences in terms of productive use of a certain metaphor across languages.

2.1.1 Body Metaphors and the Embodiment Hypothesis

It is a common assumption that the process of mapping the body to other abstract concepts counts as evidence for the embodiment hypothesis (Goschler, 2005a). In her investigation, Goschler (2005a) inquires this claim by analyzing empirical studies including research of body metaphors in everyday language, media, and scientific discourse. She examines studies which use either English or German corpora and comprise metaphors of computer terminology or diseases and their use in media contexts.[2] Based on the examples in these studies, Goschler (2005a) addresses the theoretical question of whether body metaphors support or contradict the embodiment hypothesis. The main question of her study is how body metaphors can be systematized to investigate the directionality and the grounding of metaphors (Goschler, 2005a).

Goschler (2005a) states that empirical evidence for the conceptual metaphor theory is often assumed to be equivalent with evidence for the embodiment hypothesis. This leads to the misunderstanding that embodiment is "the ultimate explanation for all kinds of mapping, metaphor, analogy or blending" (Goschler, 2005a). In addition, body metaphors are viewed as a case in point for an embodied experience which is omnipresent and unidirectional (Goschler, 2005a). In the context of her study, Goschler (2005a) uses the term 'unidirectional' to refer to the transfer of our concrete experience of the body to abstract concepts and not vice versa. Nonetheless, Goschler (2005a) also identifies expressions which are the other way around. Therefore, she presents three categories in which different body metaphors can be classified in: 1) body as the source domain, 2) body as the target domain, and 3) body as the source or the target domain.

[2]Goschler (2005a) uses data from the following studies: Goschler (2005b), Hänke (2004), Hänke (2005), Musolff (2004), Nerlich et al. (2002), Stibbe (1999), Stibbe (2001), and Wallis & Nerlich (2005).

In the first category, Goschler (2005a) examines examples, such as (2), in which the body and its state of health serve as a source domain for the description of a computer program.

(2) *Sie möchten sich (...) über den* ***Gesundheitszustand*** *von Windows informieren...*
'You want to inform yourself about the **state of health** of Windows..'

(Hänke, 2004, 79)

The result of Goschler's analysis is that the examples in the first category support the embodiment hypothesis. In these cases, perceptual features are used to structure more abstract things. Because the body is the source domain in this context, it could be argued that *concrete* experience is synonymous with *bodily* experience (Goschler, 2005a). Therefore, in this special case, the conceptual metaphor theory and the embodiment hypothesis concur (Goschler, 2005a). However, the second category, see (3-a), and the third category, see (3-b), show that the concert is not as clear. In example (3-a), the foot-and-mouth-disease is metaphorically described as 'war'. The second example (3-b) demonstrates an emotional state and it is not apparent whether the body is the source or the target domain (Goschler, 2005a).

(3) a. *...a powerful* ***enemy*** *... (whose)* ***foot soldiers*** *are beyond number and its capacity for harm beyond imagination* (Stibbe, 2001)
b. *My blood boiled.* (Goschler, 2005a)

The examples analyzed in Goschler (2005a) show different facets of the phenomenon 'body metaphor'. Although body metaphors with the body as a source domain underpin the assumption of the embodiment hypothesis, there are counterexamples in which the body is the target domain or the directionality between the source and the target domain is not distinctive. Goschler (2005a) discusses categories which either prove or negate the embodiment hypothesis. She concludes that the examples which were categorized in the first category need further empirical investigation. However, it is not apparent what the notion of embodiment would predict in terms of variation across languages. Moreover, it is not entirely clear how the embodiment hypothesis relates to the more general definition of the directionality of metaphors: more familiar to less familiar or more concrete to less concrete etc.

2.1.2 Language Comparison

The comparison of different languages can reveal patterns of conceptualized meanings. These patterns provide insights into cognitive processes linked to the production of a certain expression. Although Lakoff & Johnson (1980) disclaim the value of idiosyncratic metaphors, such as *foot of the mountain*, other languages assign body-part terms to different aspects of objects and landscapes in numerous ways. In my view, the integration of a cross-linguistic perspective is crucial for unveiling cognitive principles which determine the use of body-part metaphors. In the following, three comparative studies are discussed. In the first study, Kraska-Szlenk (2014) aims to validate the assumptions of the embodiment hypothesis on the basis of a cross-linguistic comparison of body metaphors in different domains. The second study by Filippone (2006) compares Iranian languages from a historical point of view and examines landscape features which

can be denoted with terms of the body-part domain 'head'. The third study by Atef-Vahid & Zahedi (2013) integrates a qualitative and quantitative approach and compares body metaphors in English and Farsi. Apart from their different methodological approaches, all studies display a variety of possible uses of extending the body domain to other concepts.

Kraska-Szlenk (2014) suggests that language comparison sheds light on frequent patterns which support the embodiment hypothesis. The aim of her investigation is to explore the body as a source domain for concepts in different target domains. The data of the study is based on representative examples from descriptive studies of non-European languages[3] and observations in her previous work. In addition to electronic corpora of Polish and Swahili, Kraska-Szlenk (2014) uses examples from several European languages and modern standard and dialectal Arabic. Furthermore, she cites data which was provided by her colleagues and from available dictionaries. The study is exploratory in nature and demonstrates selected patterns in semantic extensions of body-part terms. The domains that Kraska-Szlenk (2014) examines include emotions, knowledge and reasoning, social interactions and values, grammaticalization, and external domains. Kraska-Szlenk (2014) uses the framework of cognitive linguistics to integrate cognition and conceptualization, culture, and usage criteria in order to explain cross-linguistic similarities and differences. However, Kraska-Szlenk (2014) does not articulate a clear research question.

Kraska-Szlenk (2014) states that the examples of body-part metaphors underpin the assumption that language as a medium of communication commonly uses the body as a source domain rather than it being the target domain. The metaphorical transfer from the human body domain to corresponding parts of objects, therefore, is the most striking example of the manifestation of the embodiment hypothesis (Kraska-Szlenk, 2014). For her argumentation, Kraska-Szlenk (2014) uses selected examples of Polish where parts of a machine can be referred to by a limited set of body-part terms. For example, *ramię* 'arm', *noga* 'leg', or *stopa* 'foot' denote the corresponding parts of a crane or robot (Kraska-Szlenk, 2014).[4] The same is possible with food: The stem of a mushroom in Polish is *nożka* 'little leg' and the pieces of garlic are *ząbki* 'teeth' (Kraska-Szlenk, 2014). Moreover, she assumes that the body-part terms 'head' and 'eye' are commonly used to denote round objects, whereas the body-part terms 'arm' and 'leg' are extended to elongate objects. In her opinion, this body-part term transfer appears in various languages (Kraska-Szlenk, 2014). Further, she states that

> Only these body-parts which are perceptually salient, important (in everyday life or symbolically), and frequently talked (thought/written) about, have simple non-derived structure typically accompanied by a short phonological form. These are the basic-level terms from the psycholinguistic perspective and words which, due to their salience and high frequency of use, tend to develop polysemous meanings. As a result, the same body parts are consciously and unconsciously experienced more than others, of rarer use and less importance, which makes the former even more predisposed to serve as source concepts again and again, with still increasing frequency of appropriate body part terms. (Kraska-Szlenk, 2014)

Her argumentation is built on the assumption that body-part terms which are frequently used in a language can develop a wide range of meanings. However, to verify this argument, the

[3]The examples are extracted from studies by Basso (1967), Cablitz (2008), Heine (2011), Lillehaugen (2004), and Sharifian (2011).

[4]Another example of a language, which uses various body-part terms to map them to a certain object, is Mwan. Perekhvalskaya (2011) found that Mwan speakers can refer to the roof, door, inside, front part and backside of a house with corresponding body-part terms, namely *hair, mouth, belly, forehead,* and *buttocks*.

frequency of a body-part term and its occurrence in body-part metaphors need to be correlated. As of yet, this is not possible because there are no systematic records of body-part metaphors in a variety of languages. The observations by Kraska-Szlenk (2014) are based on a limited and preselected data sample and need to be systematically tested to make statements of statistical significance.

Furthermore, Kraska-Szlenk (2014) discusses the principle of unidirectionality of meaning which is manifested in cognitive linguistics. In the context of her study, this principle describes the transfer of more concrete and easily accessible source concepts to more abstract notions or less familiar ones (Kraska-Szlenk, 2014). She adopts the view of cognitive linguistics that the occasional reversal of this pattern is an exception and does not stand in contrast to the factor of frequency (Kraska-Szlenk, 2014).

In terms of the metaphorical transfer of body-part terms to objects, Kraska-Szlenk (2014) makes two crucial observations. First, the metaphorical extension is based on visual, spatial, and functional features that are associated with a body-part (Kraska-Szlenk, 2014). As an example, she cites the Swahili expression *mkono wa ndizi* (lit. 'hand/arm of bananas') which highlights the shape of a hand with its fingers. In contrast, *mkono wa kiti* (lit. 'arm of the chair') refers to the shape of the whole arm. Kraska-Szlenk (2014) states that the basis of similarity depends on different factors, such as i) relative position of the body-part, ii) visual features (e.g., size), and iii) location. The examples provided in (4) illustrate the different dimensions of similarity.

(4) a. relative position: *heart of the matter*
b. visual features: *eye of the potato*
c. location: *eyetooth* 'upper teeth' (Kraska-Szlenk, 2014)

In addition, Kraska-Szlenk (2014) observes the strategies which separate the terms from their lexical source: i) occurrence with modifiers (e.g., *eye of the needle*), ii) composition (e.g., *bottle neck*), and iii) derivation (e.g., *handle*). In a cross-linguistic comparison, she assumes that one language encodes a similarity with a body-part term alone, whereas another language uses a complex linguistic structure which is composed of the same body-part term (Kraska-Szlenk, 2014).

The results of Kraska-Szlenk's analysis show that language comparison uncovers different forms of metaphorical mapping of body-part terms. The three main hypotheses of her study which are relevant to this thesis include: 1) the similarity of relative position, visual features, and location plays a role in mapping body-part terms to objects, 2) 'head' and 'eye' are used to denote round objects, whereas 'arm' and 'leg' are extended to elongate objects, and 3) languages can differ in terms of the encoding of body-part metaphors. She assumes that body-part metaphors are based on our perception of the body. Although Kraska-Szlenk (2014) notices language variation, she leaves a thorough discussion of this matter to future studies.

In using an onomasiological approach, Filippone (2006) presents ways in which natural physical concepts have been designated in the Iranian languages. Her article is one of the few pursuits which discuss the relation between language and landscape. Filippone's aim is to explore how the terms for the 'head' and its parts are used diachronically to describe landscape features in the Iranian languages. Her investigation sheds light on the conceptualization and perception of

the natural surroundings by diachronically examine terms which relate to landscapes. For this purpose, Filippone (2006) compiles a corpus which is based on dictionary entries, glossaries, and additional information from Persian and Baloči native speakers.

Filippone (2006) also assumes that the process of transferring body-part terms to landscape features is based on similarity. Further, she describes the characteristics of this similarity: Similarity in shape, similarity in spatial configuration, and functional similarity. In her view, the terms for body-parts often coincide with other domains because humans perceive their body as an interface between themselves and their environment (Filippone, 2006). Based on this assumption, Filippone (2006) claims that the mapping of body-part terms to landscape properties is frequent in most languages.

In reaction to Lakoff & Johnson's statement, Filippone (2006) shares the comments which were discussed in Section 2.1: "one notices the circular argumentation which characterizes many theoretical studies in which the metalanguage and the investigated language coincide, and this is, in most cases, English" (Filippone, 2006). Similar to German, Filippone (2006) argues that Persian speakers use *head, shoulder, back, waist, neck, throat, breast, nose*, etc. to refer to a mountain. In addition, while examining the historical origins of expressions like *top of the mountain*, Filippone (2006) suggests that changes in the phonological structure and lexicon of a language hide the original form. Her results show that the origin of 'top' can be traced back to 'head' in some Iranian varieties. In other areas, the word *kalle* 'head, skull' underwent a grammaticalization process and is now also used as 'on, above' (Filippone, 2006). To investigate if such findings hold in other languages is an endeavor for future studies.

Filippone (2006) remarks that the similarity in shape, spatial alignment, or function "may lead to choose the same iconym and the same etymon in naming referents belonging to different domains" (Filippone, 2006). In her view, the basis of this phenomenon is not an authentic metaphorical transfer.[5] Because body-parts are basic cognitive concepts, they can be used as the source *or* the target domain. Therefore, the mapping is not necessarily unidirectional (Filippone, 2006).[6]

Even though she includes only one body-part domain in her study, Filippone's study provides further insights into the foundation of the transfer of body-part terms to landscape features. Similar to Kraska-Szlenk (2014), the hypothesis that body-part metaphors originate from a similarity in shape, spatial configuration, and function recurs in Filippone (2006). However, her study does not specify predictions in regard to variation between languages although Filippone (2006) proposes that the mapping of body-part terms to landscape features is a frequent pattern in many languages.

The differences in terms of which body-part metaphors appear in a specific language are studied by Atef-Vahid & Zahedi (2013). The aim of their study is to analyze how variation between languages can be explained within the cognitive framework. For their analysis, the authors use metaphors of the 'head' domain (including its parts: *hair, forehead, nose, lips, tongue,* and *face*), for example (5).

[5] A similar opinion is described in Levinson (1994), see Chapter 2.

[6] In this context, the term 'unidirectionality' refers to the transfer of body-part terms to the concrete domain of 'landscape'.

(5) *He sticks his nose in other people's business.*

The data is based on answers to an open-ended questionnaire. The participants were randomly chosen and not controlled for factors, such as age, gender, education, and social status. Additional data was collected from various dictionaries and books related to idioms and metaphors. The total number of metaphors was 100 (41 English and 59 Farsi) of which 81 utilized the targeted body-part terms. The main question underlying their study is: "How do the linguistically distant languages of Farsi and English conceptualize common ideas metaphorically using body parts?" (Atef-Vahid & Zahedi, 2013).

The conceptual metaphor theory suggests that the result of various processes of thought is not specific to one language. Atef-Vahid & Zahedi (2013) state that from a cross-linguistic perspective metaphorical expressions may have different manifestations because of the complexity of the cognitive process as well as for various linguistic and cultural reasons. Therefore, they choose a mixture of qualitative and quantitative analyses. For that purpose, Atef-Vahid & Zahedi (2013) establish five main categories:

1. Absence vs. presence
2. Alternative selection
3. Different selection
4. Similarity
5. Identicality

The results of their study show a wide range of variation between body-part metaphors in English and Farsi. They found that both languages use body-part metaphors. However, the conceptualization of these metaphors and their linguistic structure are not necessarily the same (Atef-Vahid & Zahedi, 2013). Only 8 % of the metaphors in the study fall into the fifth category (Identicality), whereas 45 % are assigned to the first category (Absence vs. presence). Therefore, the majority of metaphors in Farsi and English can be described as language-specific. Table 2.1 displays examples of the metaphors and their categorization.

	English	**Farsi**
1. Absence vs. presence	*He's giving her lip service.* 'Only words but no action'	no corresponding expression
2. Alternative selection	*It happened right under your **nose**.*	*It happened in front of your **eyes**.*
3. Different selection	*Keep your hair on.*	*Keep your cold-bloodedness (coolness).*
4. Similarity	*I bit my tongue off.*	*I bit my tongue.*
5. Identicality	*We need to discuss the matter face to face.*	*We need to discuss the matter face to face.*

Tab. 2.1: Overview of the basic categorization scheme and examples in Atef-Vahid & Zahedi (2013).

The authors explain the difference between the two languages with the fact that they are linguistically distant and spoken by people who do not share the same culture (Atef-Vahid & Zahedi, 2013). To underpin their argument, they state that in English, for example, *hair* is

used in metaphors which denote 'frustration', whereas in Farsi, the term refers to the concept of 'precision' (Atef-Vahid & Zahedi, 2013). Note that this is not a satisfying example because the English term 'hair-splitting' also relates to the concept of 'precision'.

Atef-Vahid & Zahedi (2013) conclude that "limitations in terms of availability, semantic domain, and range, and linguistic manifestation of metaphors and the accuracy and appropriateness of their application vary from one language to another." They argue that the use of a certain body-part metaphor in one language compared to another is influenced by many different factors. In addition, they state that a speaker is affected by her cultural and/or religious environment although she uses the same cognitive processes (Atef-Vahid & Zahedi, 2013). However, the authors claim that there is an inherent grounded experience which employs a universal cognitive grid of human conceptualization.

Their attempt to justify variation across languages with cultural differences seems to be rather vague. Further, the assumption that body metaphors rely on a grounded experience does not make verifiable predictions for neither the choice of a particular metaphor nor the productivity of body metaphors. The study by Atef-Vahid & Zahedi (2013) demonstrates the need for a quantifiable hypothesis to account for language variation in terms of the occurrence of body-part metaphors.

In sum, the hypotheses and observations regarding the study of body-part metaphors, which were discussed in this section, indicate that languages seem to differ in terms of how productively they map body-part terms to landscapes, for example, mountains (cf. Lakoff & Johnson 1980; Filippone 2006). Furthermore, the theoretical discussion of the embodiment hypothesis showed that it does not make verifiable predictions for the realization of body-part metaphors (Goschler, 2005a). In addition, Kraska-Szlenk (2014) assumes that the body-part terms 'head' and 'eye' refer frequently to round objects, whereas 'hand' and 'arm' refer to long objects. In addition, she observes that body-part metaphors can be realized with different linguistic structures in a diverse set of languages (Kraska-Szlenk, 2014). The root of body-part metaphors seems to be the perception of similarity in shape, spatial alignment, and function between a body-part and an object or landscape feature (cf. Kraska-Szlenk 2014; Filippone 2006). Filippone (2006) claims that the extension of body-part terms to landscape properties is a frequent pattern in a variety of languages. Although there might be a cognitive grid, Atef-Vahid & Zahedi (2013) suggest that the choice for a certain body metaphor is influenced by the cultural background of the speaker. However, both approaches do not specify reasons for language variation.

2.2 Semantic Universals

Is it possible to find universal body-part metaphors in the languages of the world? This section discusses literature which investigates universal patterns in metaphor (Section 2.2.1), the categorization of the human body (Section 2.2.2), and the segmentation of the landscape (Section 2.2.3). The studies shed light on promising representatives for semantic universals and categorization principles which might be used across languages to segment the human body or the landscape into parts.

2.2.1 Metaphors

Ullmann (1963) examines studies which investigate semantic universals and gives examples for principles which tend to be universal. He defines semantics as "the study of specific laws of linguistic development" (Ullmann, 1963, 172). Ullmann (1963) aims to identify semantic features and processes which could be investigated on a cross-linguistic scale to find semantic universals. He uses studies from different authors, reports of colleagues, literature, and his own observations for his investigation. His data is merely an overview and he does not claim that the list of possible semantic universals is complete (Ullmann, 1963, 201). By analyzing studies which search for semantic universals he points out that most of them draw far-reaching conclusions based on only a small set of languages. The result is that so-called semantic universals might be of statistical variance (Ullmann, 1963, 174). He states that an analysis should be based on extensive and representative data to determine whether or not semantic universals exist (Ullmann, 1963, 173). In his view, the occurrence of a certain semantic universal in a given language may only be a probability.

He introduces three categories in which he classifies the processes and features with universal tendencies. The first category includes 'semantic universals'. These processes and features should occur in a wide range of languages in a given data set (Ullmann, 1963, 174). However, the prove that these expressions are omnipresent in every language is not (yet) possible. It is more likely that the majority of semantic universals are of the second category: 'statistical variance'. Expressions in this category are not present in every language, but their occurrence may be predicted to some extend (Ullmann, 1963, 174). The last category which is presented in Ullmann (1963) includes 'parallel developments'. The category comprises expressions which "are too widespread to be due to mere chance, but not widespread enough to be statistically significant" (Ullmann, 1963, 174). This means that one might find a similar expression in a variety of languages although it is not necessarily a semantic universal. Nonetheless, when investigated with a large data set, these tendencies can become statistically significant. This category is of special interest for the present thesis because it comprises different types of metaphor and metonymy.

Some of these parallel developments, which have the potential to be semantic universals, are difficult to investigate. Ullmann (1963) elaborates these difficulties by looking at examples of the figurative use of verbs, like *holding* and *grasping* in the sense of 'understanding': English *grasp, catch*, French *comprendre, saisir*, Italian *capire*, German *begreifen* (Ullmann, 1963, 189). In his opinion, these parallel developments can be due to translations from other languages or loan-translations. He proposes "to collect instances of the same metaphor from widely different languages which cannot possibly have influenced each other" (Ullmann, 1963, 189). His position is implemented in the present study which investigates a diverse set of 13 languages. Although he discusses some examples in detail, the phenomenon of body-part metaphors in object and landscape terms seems to be obvious for him:

> Since metaphor is based on the perception of similarities, it is only natural that, when an analogy is obvious, it should give rise to the same metaphor in various languages; hence the wide currency of expressions like the "foot of a hill" and the "leg of a table". (Ullmann, 1963, 188f.)

Ullmann (1963) argues that a striking similarity leads to the same metaphor in many lan-

guages. Note that the two examples of the body-part metaphors *foot of a hill/mountain* and *leg of a table* occur repeatedly in different approaches (Ullmann 1963; Lakoff & Johnson 1980; Filippone 2006; Ibarretxe-Antuñano 2012). However, he does not specify what determines the obvious similarity between a human foot and the 'foot' of a hill.

In addition, Ullmann (1963) examines the anthropomorphic view which is applied in different metaphors. He states that the anthropomorphic model can determine concrete and abstract experiences: "we talk of the neck of a bottle, the mouth of a river, the eye of a needle, the brow of a hill, and also of the heart of the matter, the lungs of a town, the sinews of war, etc." (Ullmann, 1963, 191). Even though the direction of the mapping from our body to the outside world may be more frequent, he acknowledges that examples of the opposite direction also occur, as in "muscle (from the Latin musculus, literally 'little mouse'), polypus, apple of the eye, spine, pelvis, and others" (Ullmann, 1963, 191). He raises the questions of whether or not both processes are semantic universals and which direction is the most frequent.

Ullmann (1963) elaborates common features and processes which are assumed to have a universal tendency. His hypothesis is that body-part metaphors, such as *foot of a hill* and *leg of a table*, are widespread in different languages because they are based on a striking similarity. However, this seems to be more of a general assumption and needs further specification. Moreover, Ullmann (1963) does not discuss predictions about variation between languages in terms of the occurrence of these body-part metaphors.

2.2.2 Categorization Principles in Body-Part Nomenclature

In this section, I discuss two studies which examine the categorization of the human body. The human body seems to be the perfect blueprint for the investigation of universal categorization principles. The studies provide insights into the salience of certain body-part terms and different strategies to name the parts of our body.[7] Because body-part terms are used to denote object and landscape properties, the same categorization principles might play a role in the mapping of body-part terms to objects and landscapes.

Andersen (1978) presents a categorization scheme of the human body which is built on data from secondary sources (cf. Brown 1976 and Buck 1949)[8] and additional information from colleagues about the following languages: Huastec and other Mayan languages, Pocomchi, Czech, Modern Hebrew, Finish, Mogham, and Hausa. The aim of her study is to determine that the regularity of structure is largely the same across languages and that it derives from perceptual properties, such as shape, size, and spatial orientation (Andersen, 1978). On the one hand, she observes cultural influences and patterns which seem to be due to mere chance (Andersen, 1978, 345). On the other hand, Andersen (1978) distinguishes organization principles which may reveal cognitive abilities in recognizing perceptual properties.

[7] Languages, such as Modern Greek, Wolof, and Czech, use the same word for either 'hand' and 'arm', namely χέρι, *loxo*, *ruka*, as shown in the data of this study. These co-lexification patterns are investigated in cross-linguistic studies, for example, 'hand' and 'arm' (Brown, 2013b), 'hand' and 'finger' (Brown, 2013a), and other limb terms (Pattillo, 2014).

[8] The data in Brown (1976) include the following languages (cf. Andersen, 1978): twelve American Indian languages (e.g., Huastec, Navaho, Quechua, Tarascan); ten European (e.g., English, French, German, Russian, Serbio-Croatian, Spanish); five sub-Saharan African (e.g., Ibo, Swahili); four Mideastern and Western Asian (e.g., Arabis, Farsi, Urdu); five Southeast Asian (e.g., Malay, Thai); Chinese; two Micronesian (Ponapean and Turkese).

Andersen (1978) establishes three common patterns which seem to be based on general organizing principles.

1. Natural categories tend to be organized into hierarchical structures of a certain number of levels (usually five).

2. There is a cognitively based organization of spatial dimensions that are reflected in languages by universal marking relations and dominance hierarchies:

   (a) extension

   (b) perceptual salience

   (c) natural directions

3. Visually perceptible properties of objects, especially properties of shape, play a major role in forming categories. More particularly, the shape features round and (secondarily) long are especially salient and are therefore likely to be involved in classifying objects.

Note that again, the similarity in shape and spatial alignment is described as a determining factor in the conceptualization process. In addition, Andersen (1978) also identifies the shapes 'long' and 'round' as especially salient. Therefore, she assumes that they are commonly used for the metaphorical transfer to objects.

The result of her analysis are universals in body-part nomenclature, such as a term for 'head' which is possessed by the 'body' (Andersen, 1978, 352). Furthermore, she states that all languages have a word for 'eye', 'nose', 'mouth' (Andersen, 1978, 352). Overall, Andersen (1978) distinguishes nine universals that underlie the naming patterns of body-parts. For example, in the case of polysemy and derivation, these patterns are based on structural similarity.[9] For co-lexification patterns, Andersen (1978) names spatial contiguity as the determining factor.

Andersen (1978) concludes her investigation with the following note:

> As in other domains like plants and animals, regularities in the lexical structure of human body-part terms across languages suggest basic modes of cognition that human beings share. [...] these regularities are based in good part on the perceptual salience of certain shapes and certain spatial dimensions. (Andersen, 1978, 364)

She argues that the categorization of body-part terms is based on cognitive principles which process perceptual properties. These categorization rules for the human body may also be applied to the categorization of objects and landscapes with body-part terms. The universals established by Andersen (1978) provide a first glimpse of the underlying categorization strategies in diverse languages. However, Andersen's analysis is mainly based on secondary sources.

More recent investigations in linguistic fieldwork use elicitation of body-part terms, e.g., color books or pictures. An overview of results of different studies is provided by Enfield et al. (2006). For their inquiry, they introduce a body coloring task and guides how to study body-part terms in a fieldwork setting. Studies in various languages, including Jahai (Indonesia), Lao (Laos), and Kuuk Thaayorre (Australia), were conducted with these materials (cf. Enfield et al., 2006).

[9] This is also observed in the data of the present study: *finger* or *toe* are formed with a combination of the meaning 'finger' and 'hand/foot', as in Persian انگشت دست *angošte dast* 'finger' (lit. 'finger hand') and انگشت پا *angošte pā* 'toe' (lit. 'finger foot').

The questions of their investigation are the following: "How do languages conventionally segment the body into parts? Does the set of body part terms constitute a structured system in all languages? Is there a universal, cross-linguistically consistent way of categorizing the body?" (Enfield et al., 2006).

The authors remark that visual properties have been claimed to be the basis of body-part classification (Enfield et al., 2006). Nevertheless, a sharp discontinuity (separated by a joint) of two body-parts, such as the leg and the foot, does not always result in a differentiating term for both parts in a language, e.g., Savosavo. Other languages, e.g., Yélî Dyne, use the knee joint as a discontinuity mark. In contrast to Andersen (1978), they declare that further information is necessary to distinguish whether a term is ambiguous or not. Secondary sources, such as dictionaries, lack this requirement (Enfield et al., 2006).

The result of their comparison between different languages is that apart from the shape and spatial alignment, the *function* of a body-part is another determining factor for the categorization of our body (Enfield et al., 2006). They imply that the function of an ear, for example, is equally valuable for its meaning: "Just as important as the shape, location, and visually perceivable boundaries of an ear are what it does" (Enfield et al., 2006). In their view, shape and function are related. However, Enfield et al. (2006) refer to Tversky et al. (2002) who claims that function plays only a secondary role and is construed by appearance. While this may be true for external body-parts, inner body-parts like the liver or appendix are not as visually accessible.

> Any given body part term may be linked to perceptual imagery but must denote conceptual or descriptive content, whether the body part it denotes is perceptually well-bounded (such as a fingernail), less well-bounded (such as the cheek), out of sight (such as the spleen) or not perceptually accessible in any way (such as Punjabi *kɔDDi* 'organ in chest cavity deemed to be responsible for sickness'; Majid, this volume). (Enfield et al., 2006)

In terms of the possibilities of perceptual accessibility, they argue that a body-part term always designates a conceptual structure and is not necessarily based on a perceptual aspect. Although the human body seems to be a basic pre-linguistic source for conceptual structure, the results of their cross-linguistic analysis show that languages differ in terms of their categorization principles (Enfield et al., 2006).

The studies by Andersen (1978) and Enfield et al. (2006) examine patterns in the categorization of the human body. Again, the similarity in shape and especially the properties 'round' and 'long' are assumed to influence the mapping from body-part terms to objects (cf. Andersen, 1978). Furthermore, Andersen (1978) suggests that the visual perception of body-parts makes them more salient. However, Enfield et al. (2006) disagree with this suggestion and present counterevidence. Apart from the shape dimension, both authors found additional factors which determine the categorization of the human body, namely spatial continuity and function (cf. Andersen 1978; Enfield et al. 2006). If universal categorization patterns underlie the segmentation of the human body, it seems inevitable to assume that similar processes play a role in the categorization of our environment. In terms of language variation, Enfield et al. (2006) remark that ethnographic importance of a certain term can influence its usage and interpretation. Nevertheless, the inference of cultural effects does not provide verifiable predictions.

2.2.3 Segmentation of the Landscape

In their introductory article of an edited volume with the topic 'Language and landscape', Burenhult & Levinson (2008) analyze terms for landscapes and place names in nine genetically, typologically, and geographically diverse languages. The basis of their data is a collection of articles presenting the linguistic categorization of the physical environment in the languages Tzeltal (Mayan, Mesoamerica), Jahai (Mon-Khmer, Malay Peninsula), Marquesan (Austronesian, Polynesia), Lao (Tai, Mainland Southeast Asia), Yélî Dnye (isolate, Island Melanesia), Lowland Chontal (isolate, Mesoamerica), Seri (isolate, Mesoamerica), Kilivila (Austronesian, Island Melanesia), and ǂAkhoe Hai‖om (Khoisan, southwestern Africa).[10] The descriptions of the languages are based on fieldwork data. The central questions of the article are: "How is landscape divided into categories, and how are these categories named? Are there cross-linguistic differences in how the landscape is divided into categories?" (Burenhult & Levinson, 2008). The aim of Burenhult & Levinson (2008) is to show that the segmentation of our surrounding into parts – similar to the categorization of the human body – is imposed by our conceptual categories.

Burenhult & Levinson (2008) compare landscape terms with object terms, which seem to behave similarly, and present arguments as to why to treat them differently:

1. the ambiguity between objects and places, like *The forest is huge.* and *The ruin is in the forest.*

2. objects can be converted into places, as in *the table* and *on the table*

These examples show that landscapes can refer to either an object or a place and vice versa. But only objects can be converted into places.

The results of their analysis show that although the earth's surface is objectively a continuous surface, the segmentation of its parts can be done in different ways. As an example, the authors describe the conceptualization of a valley which can be perceived as i) a concave fold between mountain ranges, ii) the flat bottom of such a fold, or iii) the entire drainage area right up to the flanks (Burenhult & Levinson, 2008). In addition, the analyzed languages in Burenhult & Levinson (2008) show a cross-linguistic variation in terms of the denotation of landscape terms. One example is Yélî Dnye, which uses the term *mbu* for describing surfaces of varying magnitude: mountains, hills, and even crab mounds on the beach (Burenhult & Levinson, 2008). Only the feature 'conical shape' is encoded in the word. A term for *valley* is absent in Yélî Dnye as well as in Lao, "the closest equivalent terms meaning things like 'gradient' or 'bottom of inclined plane'" (Burenhult & Levinson, 2008). Additionally, Yélî Dnye lacks equivalents for the terms 'mountain', 'cliff', and 'river'.

Furthermore, in comparing the categorization strategies in the different languages, Burenhult & Levinson (2008) establish supplementary differences in terms of how common they use body metaphors. This categorical feature appears only in Jahai, Marquesan, and Tzeltal.

> Lexically more overt systems are those employing metaphor to map landscape features (see especially the accounts of Jahai, Marquesan and Tzeltal). Such systems draw on source

[10]The date comprises descriptions by the following authors: Brown (2008), Burenhult & Levinson (2008), Cablitz (2008), Enfield (2008), Levinson (2008), O'Connor & Kroefges (2008), O'Meara & Bohnemeyer (2008), Senft (2008), and Widlok (2008).

> domains like body and kinship to create partonymic and taxonomic relationships within and between landscape categories, sometimes abstracting away from the individual features themselves to a point where the semantic content of labels becomes restricted to a minimum. (Burenhult & Levinson, 2008)

They argue that the body is used as a source in a part-whole relation for denoting landscape properties. The result of their study is that landscape terms form a coherent domain in at least some languages. Therefore, the landscape is not an automatically given ontology (Burenhult & Levinson, 2008).

Burenhult & Levinson (2008) show that languages differ in terms of how they model the natural surroundings and what they consider to be the essence of its features. The differences in terms of the categorization of the landscape in various languages, presented by Burenhult & Levinson (2008), contribute further insights into the strategies that languages use to segment their environment. Even though perceptual salience is assumed to be a motivation for the categorization schemes in different languages, Burenhult & Levinson (2008) do not focus on the underlying parameter, but rather concentrate on their interplay and the levels they are processed in. In addition, apart from cultural factors, they do not establish a hypothesis regarding language variation.

To summarize, the preceding sections revealed hypotheses concerning universal features and processes which relate to the phenomenon 'body-part metaphor'. Ullmann (1963) assumes that the metaphors *foot of a hill* and *leg of a table* are commonly used in a variety of languages because they are based on an obvious similarity. In addition, the hypothesis that the similarity in shape and particularly the features 'round' and 'long' evoke the metaphorical transfer of body-part terms to objects is supported by Andersen (1978). The comparison of categorization principles underlying the body-part nomenclature in different languages shows that languages differ in terms of how they categorize the body (cf. Andersen 1978; Enfield et al. 2006). However, Andersen (1978) assumes that visually perceptible body-parts might be more salient. Another hypothesis is that the function of a body-part also influences its categorization (cf. Enfield et al., 2006). Furthermore, Burenhult & Levinson (2008) suggest that languages differ in terms of how they segment the landscape and establish the hypothesis that some languages use body-part terms to denote landscape features, whereas others do not use this segmentation principle.

2.3 The Dimensions of Similarity

The analysis of different categorization patterns in the previous sections revealed the influence of similarity in general and the impact of the dimensions of shape, spatial alignment, and function in particular. In this section, I examine each dimension individually to shed light on their influence of mapping body-part terms to object and landscape features in different languages. First, I present the study by Levinson (1994) which investigates the importance of the shape and space dimension in object descriptions in the Mesoamerican language Tzeltal (Section 2.3.1). The second study by Ibarretxe-Antuñano (2012) analyzes expressions relating to the space[11] dimension in Basque (Section 2.3.2). Lastly, I discuss the PhD thesis by Tilbe (2017) who compares the differences in terms of the use of the function and shape dimension in

[11] In this thesis, I use *space* and *spatial alignment* synonymous if I refer to the dimensions of similarity.

English and two Mesoamerican languages (Section 2.3.3). Note that it is not always clear which dimension is primary for the mapping of body-part terms to object and landscape features. The dimensions are often interrelated.

2.3.1 Shape

Levinson (1994) aims at illustrating the relationship between language and vision in the area of shape and spatial representations. The language under investigation is Tzeltal, a Mayan language spoken in Mesoamerica. The data analyzed in Levinson (1994) is based on elicitation of object parts and spatial tasks, field-notes, and searches in a Tzeltal text corpus. Levinson (1994) examines the transfer from body-part terms to inanimate objects in the language and argues that this process is based on a precise geometrical algorithm rather than a metaphorical mapping (cf. Chapter 2). The central research questions are: "In what sense is this [the mapping of body-part terms onto parts of inanimate objects] a 'metaphorical' process? What is the relation of the volumetric analysis reflected in the language to the volumetric analysis involved in visual object recognition?" (Levinson, 1994).

Levinson (1994) states that Tzeltal, as many Mesoamerican languages, relies more on shape discrimination compared to other languages, e.g., English. The verbal roots in Tzeltal encode shape and position. Therefore, the shape information is added to the locative description of the object (Levinson, 1994). By comparing a linguistic description and a drawing of a coffee table scene, Levinson (1994) points to the crucial distinction between the visual and linguistic depiction: A drawing represents shape, relative sizes, and distances, whereas, in languages like English, these relations are not present in a verbal description of the picture (Levinson, 1994). But if a language, like Tzeltal, has distinctive roots for different shapes and contours of the objects, the gap between vision and language can be bridged. Thus, Tzeltal uses body-part terms to describe i) specific areas of the objects, and ii) the relation of an object to the ground on which it is standing, as illustrated in (6).

(6) waxal ta x-chikin mexa te p'ine
standing-of-vertical-cylinder at its-ear table the pot
'the pot is standing at the corner of the table' (Tzeltal: Levinson 1994, 800)

The description of specific object areas indicates that "there is linguistic access not only to the output of the visual process of object recognition but also to the internal volumetric analysis upon which such recognition depends" (Levinson, 1994). This observation reveals that Tzeltal speakers not only recognize an object but simultaneously analyze its internal alignment. Therefore, the transfer of body-part terms to objects is not metaphorical but rather a generative process (Levinson, 1994). Even though these metaphors are likely to be 'dead' in Tzeltal, it is possible for speakers to name novel objects in line with the same scheme:

> [...] the terms are applied as if the objects were novel entities encountered in an orientationless void, for example, weightless in outer space! Moreover, the process is "bottom-up," invoking no world knowledge, and thus excluding comparison (metaphorical or otherwise) to other entities. Rather the terms are applied on the basis of the internal geometry of the object itself. Only at the margins of the system, when the internal geometry of objects leaves arbitrary decisions open, is an external reference frame or functional knowledge secondarily involved. (Levinson, 1994)

Levinson (1994) argues that new objects are analyzed in an empty space without connecting them to the outer world. He suggests that this is a productive pattern in Tzeltal. However, before a body-part term can be mapped to an object, the modal axis (main internal coordinate of an object, cf. Marr 1982) must be distinguished. The description of novel objects in Tzeltal reveals a pattern-matching, not a metaphorical mapping. An example of object parts which are named after body-part terms is given in Figure 2.1. In this example, the base of the object is referred to with *y-it* 'its-buttocks'. The body-part term is used to describe the lowest part of the object, and therefore, the 'where' information in relation to the ground is included (Levinson, 1994).

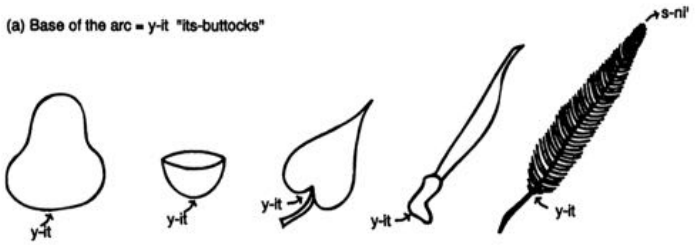


Fig. 2.1: Names of object parts in line with the modal axis and the space dimension in Tzeltal (Levinson, 1994). The term *y-it* 'its buttocks' is mapped to corresponding object features.

Figure 2.2 displays another example in which a body-part term is used to denote object features. In this case, the body-part term *s-ni'* 'its nose' refers to the properties of the object which have the same shape as the body-part.

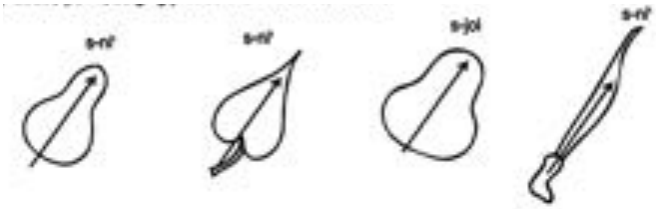


Fig. 2.2: Names of object parts in line with the shape dimension in Tzeltal (Levinson, 1994). The term *s-ni'* 'its nose' is mapped to corresponding object features.

The result of Levinson's analysis is that Tzeltal relies on an object-centric orientation when assigning body-part terms to object features. The advantage of this account is that it leads to exact predictions of the relation between the parts and the object (Levinson, 1994). He concludes that "[y]ou can't say the equivalent of 'Watch out for that snake ON THE TOP of that stone' without deciding on the geometrical properties of the stone, since the relevant term might be *s-pat* ['its back'], *y-elaw* ['its face'], *s-ni'* ['its nose'] or *s-jol* ['its head']" (Levinson, 1994). This means that a Tzeltal speaker always expresses both: Space and shape properties.

Based on the study by Levinson (1994), two essential hypotheses can be established. First, languages, such as Tzeltal, use an object-centric approach to map body-part terms to object features. Further, he suggests that the transfer of body-part terms to objects is based on a geometrical algorithm, not metaphor. Second, the similarity in shape and spatial alignment between an object and a body-part seems to be pivotal in certain languages, e.g., Tzeltal.

Levinson (1994) assumes that the influence of high-prestige languages during various periods of imperial extension could have led to changes in the systems in the Mesoamerican area. However, he does not specify how this variation could be verified.

2.3.2 Space

In her investigation, Ibarretxe-Antuñano (2012) analyzes conceptual metaphors with body-parts as the source domain in Basque. The study includes metaphors using *buru* 'head', *begi* 'eye', *oin* 'foot', *gibel* 'liver', *bihotz* 'heart', and the culture-specific concept *gogo* which is used to describe emotions (e.g., *gogoalai* 'jovial') and characteristics associated with the mind (e.g., *gogo argi* 'bright mind') (cf. Ibarretxe-Antuñano, 2012). Ibarretxe-Antuñano (2012) compares the extension of these body-part terms related to the domains of space, intellect, and emotions in Basque with similar expressions in English. One of the questions which is investigated by Ibarretxe-Antuñano (2012) is how the description of spatial alignment interacts with the use of body-part terms. The data used in the analysis is based on data from different Basque corpora and several dictionaries. Ibarretxe-Antuñano (2012) illustrates meaning extensions of the body-part terms with selected examples. Her aims are two-fold: First, she investigates whether or not the exploration of conceptual metaphors supports the description of the lexico-semantic system in a given language. Second, Ibarretxe-Antuñano (2012) aims to discuss the influence of culture in regard to the assumption that all metaphors are universal because they share a common embodied grounding.

In her analysis, Ibarretxe-Antuñano (2012) describes the relation between space and the external body-part term *buru* 'head' and uncovers the nuances of the expression in (7).

(7) Mendiburu-ra igo ginen
mountain.head-ALL ascend.PFV AUX
'We climbed to the top of the mountain.' (Basque: Ibarretxe-Antuñano 2012, 258)

This example illustrates the mapping of *buru* to the top part of the mountain in an anthropomorphic orientation. This principle is also used in other conceptual metaphors: CONTROL IS UP, HIGH STATUS IS UP, IMPORTANT IS UP (Ibarretxe-Antuñano, 2012). However, Ibarretxe-Antuñano (2012) establishes that the term for 'head' also appears in a zoomorphic orientation, for example, *a head-on collision between two trains* (Ibarretxe-Antuñano, 2012). The various meanings of *buru* in Basque are presented in the following quote:

> If the word *buru* goes with *mendi* 'mountain' as in (2)[(7)], its interpretation is 'top' if it co-occurs with *hitz* 'word', it means 'beginning', and if it appears with *aste* 'week' or *hil* 'month' its meaning is 'end'. In other words, *buru* seems to lexicalize only the meaning 'extreme, end' and it is the neighboring words and contexts that allow *buru* to have more fine-grained interpretations. [...] Apart from the 'extreme' spatial meaning, Basque *buru* develops another one; in some contexts, *buru* also means 'center' as illustrated in (3)[(8)]. (Ibarretxe-Antuñano, 2012)

The following examples illustrate the different meanings connected to *buru*.

(8) *Azaburu* (cabbage.head) 'heart of the cabbage'
Bideburu (road.head) 'crossroads'
Kipulaburu (onion.head) 'the heart of the onion'
Artaburu (corn.head) 'ear of corn' (Basque: Ibarretxe-Antuñano 2012, 260)

Another conceptual metaphor IMPORTANT IS CENTER, which is expressed with *buru*, is shown in (9). Although one may expect the coat of arms to be at the roof of the house, it is attached in the middle of the house facade (Ibarretxe-Antuñano, 2012).

(9) Etxe-buru-an harmarria dago
house-head-LOC coat.of.arms-ABS is
'There is a coat of arms at the 'head' of the house facade.'

(Basque: Ibarretxe-Antuñano 2012, 260)

Apart from *buru*, Ibarretxe-Antuñano (2012) discusses the use of *begi* 'eye'. Examples of different conceptualizations of *begi* are illustrated in (10). Basque makes two distinctions in terms of what *begi* can refer to: holes (10-a) and hooks (10-b). Furthermore, the examples referring to holes in (10-a) can also be expressed with *aho* 'mouth', whereas the examples referring to hooks in (10-b) cannot (Ibarretxe-Antuñano, 2012). Therefore, *erlategiaren begia* and *erialegiaren ahoa* both mean 'hive entrance' (Ibarretxe-Antuñano, 2012). In contrast, *orratzaren ahoa* refers to the pointing end of the needle instead of referring to the hole of the needle, as in English (Ibarretxe-Antuñano, 2012).

(10) a. 'hole'
erlategiren begia 'hive entrance'
ogibegi 'holes in bread'
gaztabegi 'holes in cheese'
b. 'hook'
orratzaren begia 'eye of a needle'
aitzurbegi 'hoe hole' (Basque: Ibarretxe-Antuñano 2012, 261)

The comparison of English and Basque by Ibarretxe-Antuñano (2012) shows that Basque has other oppositions between body-parts. The body-parts 'head' and 'foot' often appear in descriptions of an upper and lower part in English. However, in Basque, *buru* 'head' and *begi* 'eye' form an opposition. Even though *begi* seems to appear in similar metaphors for direction, see (11) and (12), Ibarretxe-Antuñano (2012) assumes that the figure-ground relation is reversed, as illustrated in Figure 2.3.

(11) *Itsaspegi* (sea.eye) 'looking/facing towards the sea'
Bguzki begi(-an) (sun-eye(-LOC)) 'looking/facing towards the sun'

(Basque: Ibarretxe-Antuñano 2012, 262)

(12) Mendi-ari buru-z abiatu ginen
mountain-DAT head-INST go.PFV AUX
'We went towards the mountain.' (Basque: Ibarretxe-Antuñano 2012, 262)

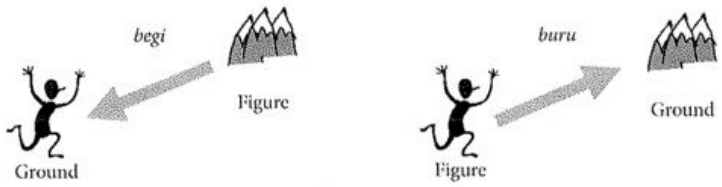


Fig. 2.3: Schematized representation of the different directions realized with *buru* 'head' and *begi* 'eye' in Basque (Ibarretxe-Antuñano, 2012, 262).

The use of the body-part terms *begi* and *buru* in Basque demonstrates that the reference to the spatial alignment of a body-part can differ (Figure 2.3). If the expression in (12) is used with *buru* the person (figure) moves towards the mountain (ground). In contrast, when (12) is expressed with *begi* the mountain becomes the figure which moves towards the person (ground). Note that the different uses could also account for different models of orientation. In this case, *begi* could be used in an egocentric orientation, whereas *buru* is used in an object-centric model.

The last body-part term which is examined by Ibarretxe-Antuñano (2012) is *oin* 'foot'. She considers the expression *foot of the mountain*, see (13).

(13) mendi-aren oin-ak
mountain-GEN foot-ABS.PL
'the feet of the mountain'
(lit. 'the area that supports or functions as the basis for the whole mountain')

(Basque: Ibarretxe-Antuñano 2012, 263)

Ibarretxe-Antuñano (2012) states that the expression activates another notion in Basque: Instead of the meaning 'lower-part' of the mountain (as in English or German), Basque speakers interpret it as 'support' of the mountain. Therefore, Basque speakers map the body-part term in relation to the function dimension instead of the space dimension to the landscape feature.

The results of Ibarretxe-Antuñano's analysis reveal the different conceptualizations of body-part terms in Basque. Similar to Kraska-Szlenk (2014), her hypothesis is that the expressions referring to object and landscape terms are routed in bodily experience. In her view, the variation of conceptualizations in English and Basque can be explained by cultural influences. This hypothesis is in line with the arguments in Atef-Vahid & Zahedi (2013). However, as stated before, this approach does not lead to verifiable predictions.

2.3.3 Function

Tilbe (2017) investigates the realization of part-whole assignments in the Mesoamerican languages Zapotec and Tseltal[12] in comparison with English. He explores the relation between meronymy and mereology in these languages.[13] The aim of his study is to assess the different categorization strategies within the three languages in terms of the denotation of object parts. Tilbe (2017) suggests that instead of using abstract geometrical terms, such as English 'front'

[12]Note that although Levinson (1994) uses another spelling *Tzeltal*, both spellings are accepted.

[13]Tilbe (2017) defines mereology as the study that "is concerned with part-whole structures that are represented in cognition, and how these representations come about" (Tilbe, 2017, 23).

or 'side', the Mesoamerican languages tend to use body-part terms to refer to object parts. The central question of Tilbe (2017) is whether the languages differ in terms of which parameter (shape vs. function) they rely on more frequently when naming object features. The hypothesis is that "[i]f speakers of certain languages compute their representations of part-whole structures in fundamentally different ways, this should result in measurable differences in cognitive processing" (Tilbe, 2017, 2).[14] In a series of verbal and non-verbal tasks conducted in a field-work setting, Tilbe (2017) examines the preferences for the dimensions of similarity in Zapotec, Tseltal, and English.

Tilbe (2017) describes the differences between the two dimensions – shape and function – as follows: Shape is automatically processed before the object recognition is completed, whereas the retrieval of function comes from encyclopedic knowledge (Tilbe, 2017, 15f.). Therefore, in the case of the function dimension, the object or its parts must be identified before they are processed (Tilbe, 2017, 15). Tilbe (2017) defines the cognitive model of comprehending an object or its parts and the linguistic output as a meronym which is not embedded in any context.[15] The main process of the perception is through the visual and/or tactile modalities.

> From these precepts [mental representations of stimuli], a holistic structure for the object can be apprehended, and also what its parts are like and how they relate to each other spatially. The inferences drawn from percepts of different modalities are integrated into a more abstract, presumably amodal representation of the object in central cognition, and it is to this amodal representation that linguistic labels may be attached. (Tilbe, 2017, 18)

He argues that the perceptual properties of an object are integrated into an amodal representation which also includes the lexicon entry. Tilbe (2017) states that cognitive principles which activate the recognition of object parts interact with the structure of the object. By referring to Enfield et al. (2006), he notes that the identification and boundaries of parts can vary between different languages (Tilbe, 2017, 23). While some boundaries are obvious because they highlight an existing discontinuity, others are more arbitrary and the degree of speaker specific variation in these cases is higher. However, spatial alignment of objects may be based on an imaginative, non-verbal cognitive representation (Tilbe, 2017, 23). To test his hypotheses, Tilbe (2017) conducts several experiments with different groups of speakers. Because of the scope of this thesis, I concentrate on two tasks: i) the 'Picture Book Elicitation', and ii) the 'Shape-Function Triads'.

The 'Picture Book Elicitation' task uses a set of pictures of animals, plants, and artifacts. The speakers were asked to color all parts of an object. An example of a drawing by a Zapotec speaker is given in Figure 2.4.

In Zapotec, the upper part of the cap of a mushroom is referred to as *ique* 'head' and *xa'na* 'butt' is the underside of the cap. The only non-body-part term used for describing a part of the mushroom is *xcu* 'root'. In comparison, Tseltal additionally uses abstract terms, such as *s-bah* 'its top', to describe a part of the mushroom. On the other hand, the majority of English speakers do not use body-part terms to characterize the mushroom. The results of the task show that Zapotec speakers commonly express body meronyms to refer to inanimate objects (Tilbe,

[14] The assumption that languages prefer a certain dimension for denoting part-whole relations is supported by the findings in Levinson (1994).

[15] Tilbe (2017) chooses the term 'meronymy' instead of 'metaphor' for the transfer of body-part terms to object features (see Chapter 2).

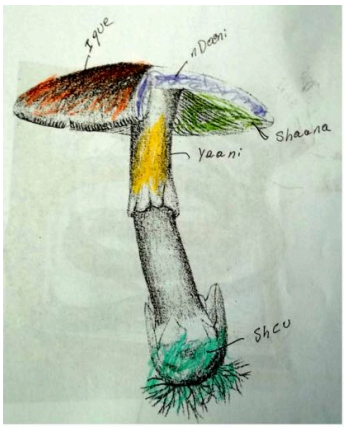


Fig. 2.4: An example of the 'Picture Book Elicitation' task performed by a Zapotec speaker (Tilbe, 2017, 54).

2017, 60). In comparison, the Tseltal speakers use body and non-body meronyms equally and the English speakers predominantly realize only non-body meronyms (Tilbe, 2017, 60).

In the 'Shape-Function Triads' task, the participants were asked to eliminate the incongruent picture of a set of three pictures which depict artifacts, plants, or animals (Tilbe, 2017, 97). In doing so, the participants judged the pictures based on the red colored part of the object (Tilbe, 2017, 98). The example in Figure 2.5 shows a match (top), pin (left), and lighter (right).

Fig. 2.5: Experimental stimuli (Trail 7) of the 'Shape-Function Triads' task (Tilbe, 2017, 98).

The hypothesis behind the task is that Tseltal and Zapotec speakers group the pictures according to the shape dimension instead of eliminating the object with a different function, as an English speaker would do (Tilbe, 2017, 106). In the trial (Figure 2.5), English speakers would group the lighter and the match together, whereas the Tseltal and Zapotec speakers would eliminate the lighter. Tilbe's results show that Tseltal and Zapotec speakers categorize the pictures according to the shape dimension more often than English speakers (Tilbe, 2017, 130). However, each language behaves differently compared to the other two (Tilbe, 2017, 131). Tseltal speakers use the shape dimension significantly more often than the Zapotec speakers

(Tilbe, 2017, 131).

Tilbe (2017) concludes that "[t]he differences between these languages is more accurately understood as different strengths of preferences for particular strategies, while the strategies themselves are largely shared" (Tilbe, 2017, 188). Tilbe's study demonstrates that languages differ in terms of how frequently they use body-part terms to refer to object parts.[16] In addition, Tilbe (2017) sheds light on the different preferences for a certain dimension in three different languages. The study does not only account for the origin of body-part metaphors in terms of the perception of the perceptual properties of objects. Tilbe (2017) also provides a hypothesis that could explain language variation, namely that languages have different preferences in terms of which dimension of similarity they prioritize.

In summary, the preceding sections presented studies which investigated body-part metaphors and their relation to the three dimensions of similarity. The observations by Levinson (1994) establish the hypothesis that languages can rely on an object-centric model to map body-part terms to object features. Furthermore, Levinson's results indicate that some languages seem to favor the shape and the space dimension for mapping body-part terms to object properties. Ibarretxe-Antuñano (2012) presents different conceptualizations of body-parts in terms of their spatial alignment. Similar to Kraska-Szlenk (2014), she assumes that body-part metaphors are grounded in a bodily experience. However, neither of them put forward an valid explanation concerning the variation across languages, except cultural influences. The only hypothesis which made verifiable predictions about differences between languages is proposed by Tilbe (2017). He suggests that languages differ in terms of which dimension they prefer when mapping body-part terms to object properties. Moreover, Tilbe's 'Picture Book Elicitation' task showed that language variation can also be found in the use of body-part terms for object features.

In Chapter 2, I discussed the theoretical background and crucial observations concerning body-part metaphors (or meronyms). The theoretical discussion revealed that the basis of body-part metaphors and the reasons for their various appearances in different languages is still unclear. This was reflected in the variety of hypotheses relating to body-part metaphors which were found in the literature. In the following chapter, I present my cross-linguistic study of object and landscape terms.

3 A cross-linguistic Study of Body-Part Metaphors

In this chapter, I describe the cross-linguistic study of body-part metaphors in object and landscape terms which was conducted in the scope of this thesis. First, I summarize the aims of the study in Section 3.1. Second, a description of the methodological approach is given (Section 3.2). In Section 3.3, I present the results of my analysis of the body-part metaphors and the three dimensions of shape, space, and function. The discussion in Section 3.4 relates the findings of the study to the main research questions and hypotheses. While conducting the study, I noticed potential improvements and biases. These are elaborated in Section 3.5 together with further research possibilities.

[16] Tilbe's finding supports the observations in Burenhult & Levinson (2008).

3.1 Aims

The present study explores body-part metaphors in a wide range of languages. It is, to my knowledge, the first systematic typological study of the phenomenon. The aims of the study are threefold: i) to discover frequent patterns in mapping body-part terms to object and landscape properties, ii) to investigate the underlying dimensions of this mapping, and iii) to compare the variance of the patterns and preferences for specific dimensions in a diverse set of languages.

The discussion of the theoretical background in Chapter 2 showed that numerous assumptions concerning body-part metaphors are established in the literature. On the one hand, body-part metaphors are assumed to be isolated instances (cf. Lakoff & Johnson, 1980). On the other hand, Kraska-Szlenk (2014) and Filippone (2006) suggest that the mapping of body-part terms to object or landscape features is a frequent pattern in most languages. Furthermore, some scholars claim that body(-part) metaphors are based on a bodily experience and provide evidence for the embodiment hypothesis (cf. Goschler 2005a; Kraska-Szlenk 2014; Ibarretxe-Antuñano 2012). However, this assumption does not provide verifiable hypotheses and predictions about variance across languages. Other scholars support the hypothesis that body-part metaphors are based on a universal categorization principle (cf. Filippone 2006; Levinson 1994; Tilbe 2017). A common suggestion in the literature is that body-part metaphors are based on the perception of similarity in general and in particular, the similarity of shape, spatial alignment, and function (cf. Filippone 2006; Kraska-Szlenk 2014; Levinson 1994; Tilbe 2017). Especially, the body-part terms 'head' and 'eye' are hypothesized to be frequently used to denote round objects, whereas 'leg' and 'arm' commonly refer to elongate object parts (cf. Andersen 1978; Kraska-Szlenk 2014). Moreover, the hypothesis that visual more perceptible body-part terms are more salient than others is suggested by Andersen (1978). In addition, Ullmann (1963) establishes that certain body-part metaphors are widespread in various languages, e.g., *foot of a hill* and *leg of the table*, because they depend on a striking similarity. In terms of variation across languages, some authors observe different preferences in individual languages. One hypothesis is that languages differ in terms of how productively they use body-part metaphors (cf. Burenhult & Levinson 2008; Levinson 1994; Tilbe 2017). Additionally, Levinson (1994) showed that a language can rely on an object-centric instead of an anthropomorphic model. However, most of them do not establish verifiable predictions about the basis or diverse occurrences of body-part metaphors in different languages. If the authors account for language variation, they either expect culture to be the determining factor (cf. Atef-Vahid & Zahedi 2013; Kraska-Szlenk 2014; Burenhult & Levinson 2008; Ibarretxe-Antuñano 2012) or historical changes (cf. Levinson 1994; Filippone 2006). In addition, as of yet, these differences are not fully explored in a systematical approach.

Therefore, the present study aims to answer the following questions to get a better understanding of the basis, frequency, and variety of body-part metaphors:

1. How frequently do languages use body-part terms to express parts of objects and landscapes?

2. Of the three dimensions (shape, function, and spacial alignment) is one used more frequently than the others?

3. How much variation do we find between languages with respect to 1) and 2)?

One of the few verifiable hypotheses in the literature which can explain cross-linguistic differences is Tilbe's (2017) suggestion that different languages have different preferences regarding the prioritization of the dimensions of similarity. In the present study, I investigate this hypothesis in more detail (Section 3.3.2). Another working hypothesis of this study is that a body-part metaphor is frequently expressed in a wide range of languages if it relates to more dimensions (Section 3.3.3).

3.2 Method

The study was designed as a elicitation study which aimed to find out whether a certain body-part metaphor exists in a language or not. The elicitation provided the opportunity for the participants to come up with body-part metaphors specific to their native language and avoided a pure translation of body-part metaphors. In the following sections, I describe the individual components of the study (Section 3.2.1), details about the participants who took part in the study (Section 3.2.2), and the languages they spoke (Section 3.2.3). Furthermore, I present the procedure of the study in Section 3.2.4.

3.2.1 Material

The material of the present study consisted of a seed list of 92 body-part metaphors and corresponding pictures.[17] First, I describe the content of the seed list in the following paragraph. Second, I outline the preparation of the pictures.

The 92 body-part metaphors in the seed list were collected through observations of oral communications, reading, and literature review. I started by assembling all body-part metaphors I knew in my native language German (34 metaphors) and my second language English (7 metaphors). Some body-part metaphors were brought to my attention in conversations with friends, others while reading books.[18] Furthermore, I compiled 32 body-part metaphors which were examples in the following studies: Blust 2009 (Malay), Blust 2011 (Indonesian, Japanese, Vietnamese), Filippone 2006 (Persian), Gaby 2006 (Thaayorre), Ibarretxe-Antuñano 2008 (Basque), Ibarretxe-Antuñano 2012 (Basque), Kraska-Szlenk 2014 (Swahili), Levinson 1994 (Tzeltal), Rice 2012 (Athapaskan), Talento 2014 (Swahili), and Werning 2014 (Egyptian). My goal was to investigate as many body-part metaphors as possible. Therefore, I included 14 body-part metaphors which were expressed by a Wolof speaker in the first interview in the seed list.[19] Example (14) shows a selection of body-part metaphors of the seed list.

(14) *Knoblauchzehe* 'garlic clove' (lit. 'garlic toe') (German)
Blattrippe 'leaf vein' (lit. 'rib of the leaf') (German, English)
mata panah 'tip of the arrow' (lit. 'eye of arrow') (Malay) (Blust, 2009)
ear of a corn (English)
boppu escalliers 'head of the staircase' (Wolof)
Flussmündung 'mouth of the river' (German, English)
ngok pungk 'wave' (lit. 'water knee') (Thaayorre) (Gaby, 2006)

[17] The entire list is given in Appendix A and all pictures are given in Appendix B.
[18] I am still looking out for them and collected 7 new body-part metaphors in the meantime.
[19] Note that the body-part metaphors in my study are mostly Eurocentric apart from the examples given in the literature and the additional body-part metaphors in Wolof.

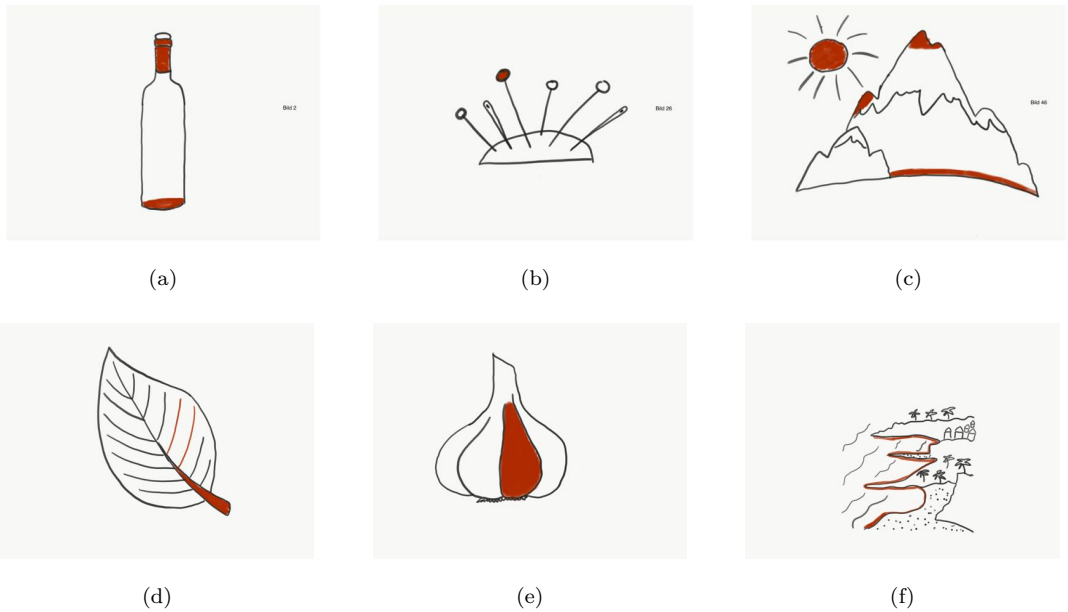
The body-part metaphors were composed of 25 different body-part terms. Table 3.1 displays the distribution of each body-part term throughout the 92 body-part metaphors. The high number of body-part metaphors with the body-part term 'eye' is due to the examples given in Blust (2009) and Blust (2011) (7 'eye' metaphors in Blust 2009 and 3 in Blust 2011). Note that the body-part metaphors in the seed list were not balanced for body-parts.

Tab. 3.1: Frequencies of body-part terms as components of the metaphors which are included in the seed list.

Body-part term	Frequency
eye	16
head	9
heart	6
leg	6
mouth	6
arm	5
butt	4
ear	4
foot	4
neck	4
back	3
body	3
face	3
hand	3
nose	3
skin	3
vein	2
knee	1
rib	1
shoulder	1
sole	1
throat	1
toe	1
tongue	1
tooth	1

In addition to the seed list, I created corresponding pictures of the body-part metaphors. The intention was that the participants would not simply translate a metaphor into their native language, but rather describe the pictures and use the metaphors on their own accord. The set of pictures consisted of 53 drawings. In some cases, more than one body-part metaphor was displayed in a picture (see Figure 3.1). The drawings were designed with the app 'Adobe Sketch' (Version 4.6.2, Adobe Systems, Inc.) on an iPad Pro (10.5). Figure 3.1 illustrates six drawings of the set. The drawing (a) represents the body-part metaphors *neck/butt/mouth of the bottle* 'neck/bottom/opening of the bottle'. The picture in the upper middle (b) depicts the body-part metaphor *pinhead*. The third picture of the upper row (c) shows the body-part metaphors *head/nose/foot of the mountain* 'top/ledge/foot of the mountain' and *face of the sky* 'sun'. In the left picture of the second row (d), the body-part metaphor *vein of the leaf* is displayed. Picture (e) presents the body-part metaphor *toes of the garlic* 'garlic clove' and picture (f) illustrates the body-part metaphor *face of the ocean* 'coast'. The corresponding parts

of the metaphors were colored in red to highlight them.



(a) (b) (c)

(d) (e) (f)

Fig. 3.1: Drawings of different body-part metaphors based on the seed list: (a) *neck/butt/mouth of the bottle* 'neck/bottom/opening of the bottle', (b) *pinhead*, (c) *head/nose/foot of the mountain* 'top/ledge/foot of the mountain' and *face of the sky* 'sun', (d) *vein of the leaf*, (e) *toes of the garlic* 'garlic clove', and (f) *face of the ocean* 'coast'.

3.2.2 Participants

In total, 15 participants took part in the elicitation study. However, the data of two participants had to be excluded due to their bilingual background. They especially had difficulties with the body-part metaphors in landscape terms because they did not grow up in the natural surroundings of their heritage language. The remaining 13 participants were native speakers of 13 different languages (cf. Section 3.2.3). They had learned the language from their early childhood on and were educated in the language. The 13 participants were fluent in writing and speaking. Furthermore, they could distinguish body-part metaphors in the landscape pictures. The participants were living in Berlin at the time of the conduction of this study and moved there between the years of 2012 to 2017. Apart from their mother tongue, most of them were also fluent in one to two languages, such as English or German. All data that I report is based on these participants. The participants were recruited by contacting them individually. They were either students, PhD/PostDoc students at the Humboldt-Universität zu Berlin or acquaintances. The participants were between 21 and 44 years old (M=32.5, SD=7.07). 8 participants were women and 5 were men.

3.2.3 Language Sample

The native languages of the participants are Czech, Marathi, Persian, Modern Greek, Vietnamese, Wolof, Mandarin Chinese, Khoekhoe, Hungarian, Japanese, Modern Hebrew, Turkish, and Bahasa Indonesia.

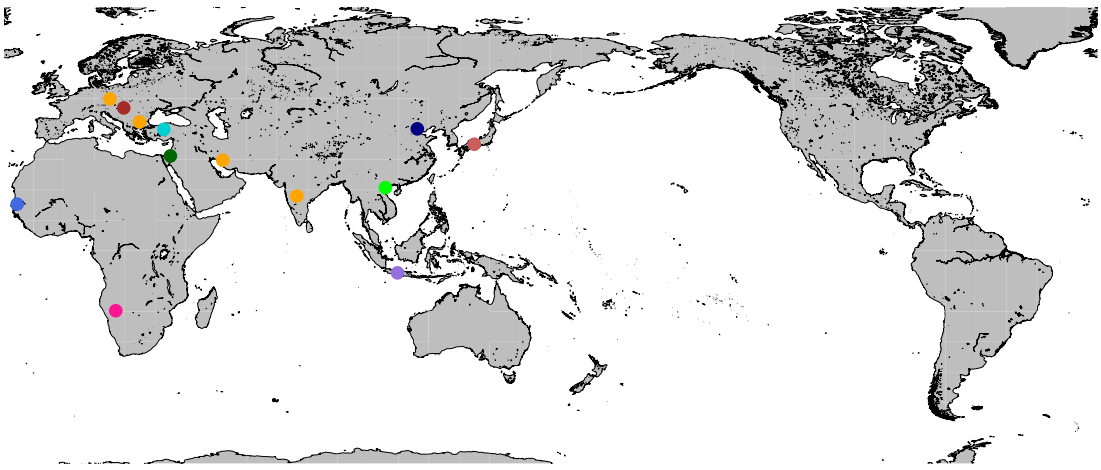


Fig. 3.2: Overview of the language sample in the cross-linguistic study. Each dot depicts one language and the coordinates are based on Hammarström et al. (2018). The color of the dot represents the language family (orange: Indo-European (Czech, Marathi, Persian, Modern Greek), turquoise: Turkic (Turkish), blue: Atlantic-Congo (Wolof), green: Austroasiatic (Vietnamese), red: Japonic (Japanese), dark blue: Sino-Tibetan (Mandarin Chinese), purple: Austronesian (Bahasa Indonesia), pink: Khoe-Kwadi (Khoekhoe), brown: Uralic (Hungarian), dark green: Afro-Asiatic (Modern Hebrew)).

Figure 3.2 displays the language families of the investigated languages. The classification of the languages is based on Hammarström et al. (2018). Each dot represents one language and the color of the dot depicts which language family the language belongs to. In total, 10 different language families are represented in the data set:

- Indo-European: Czech, Marathi, Persian, Modern Greek
- Turkic: Turkish
- Atlantic-Congo: Wolof
- Austroasiatic: Vietnamese
- Japonic: Japanese
- Sino-Tibetan: Mandarin Chinese
- Austronesian: Bahasa Indonesia
- Khoe-Kwadi: Khoekhoe
- Uralic: Hungarian
- Afro-Asiatic: Modern Hebrew

Note that the language sample is not genetically, typologically, and geographically balanced. Most of the languages in the data set are spoken on the Asian continent (Marathi, Persian, Vietnamese, Mandarin Chinese, Japanese, Modern Hebrew, Turkish, Bahasa Indonesia). The remaining languages are spoken in Europe (Czech, Modern Greek, Hungarian) and

Africa (Khoekhoe, Wolof). My data lacks languages from the American and Australian continents and wider Oceania. An overview of the general information about each language is given in Table 3.2. The data is based on Campbell (2003), except for the information about Khoekhoe which is given in Güldemann & Vossen (2000) and Haacke (2013).

Tab. 3.2: Overview of the number of speakers and the grammatical features of the languages in the sample.

Language	**Speakers (in million)**	**Official language in**	**Word Order**	**Structural Features**
Czech	12	Czech Republic	SVO	three grammatical genders; seven cases; mostly agglutinative
Marathi	70	India	SVO	three grammatical genders
Persian	30	Iran	SOV	no grammatical gender; agglutinative
Modern Greek	12	Greece	SVO	three grammatical genders; fusional
Turkish	60	Turkey	SOV	no grammatical gender; agglutinative
Wolof	3	Senegal	SVO	no grammatical gender
Vietnamese	70	Vietnam	SVO	six phonemic tones; isolating
Japanese	120	Japan	SVO	no grammatical gender; nouns are invariable; agglutinative
Mandarin Chinese	885	People's Republic of China	topic-prominent	four phonemic tones; no inflection; extensive use of classifiers; isolating
Bahasa Indonesia	170	Indonesia	SVO	roots are disyllabic; no grammatical gender; extensive use of classifiers
Khoekhoe	0.25	Namibia	SOV	two grammatical genders; uses clicks
Hungarian	15	Republic of Hungary	SVO	no grammatical gender; agglutative
Modern Hebrew	4	Israel	SVO	two grammatical genders; fusional

* The data is based on Campbell (2003), Güldemann and Vossen (2000), and Haacke (2013).

In some cases, the languages differ in terms of their categorization of the body. Some languages, such as Wolof, Czech, and Marathi, colexify the body-parts 'hand' and 'arm', others the body-parts 'foot' and 'leg' (Wolof, Czech, Modern Greek, Persian, Hungarian, Japanese, Bahasa Indonesia). Furthermore, a few languages in the sample have more than one term to refer to the same body-part. For example, some languages use different terms with the meaning 'mouth': Vietnamese uses *miệng* and *mồm*, Mandarin Chinese has 嘴 *zuǐ* and 口 *kǒu*, Khoekhoe utilizes *am!nâs* and *ams*, and Czech has *pusa* and *ústa*. However, for the realization of body-part metaphors most of them, except Khoekhoe, use only one term: Vietnamese *miệng*, Mandarin Chinese 口 *kǒu*, Czech *ústa*.

3.2.4 Procedure

The study was conducted in an urban fieldwork setting in Berlin. The participants were interviewed individually. Most of the interviews were performed in a quiet office space at the Humboldt-Universität zu Berlin. Nobody else was in the office while the interviews were conducted. In three cases, I met with the participants in their homes where we did the interview in a quiet room. The metalanguage which was used to conduct the study was either German or English depending on the preferences of the participant. After the participants read and filled out a consent form, the interview started. The instructions were given verbally.

The interview was recorded on a Samsung Galaxy A3 smartphone with an MP3-recorder app (Version 3.4.1, Google Commerce Ltd.). The pictures were presented on a Samsung Galaxy Tab 4 (8 inch). Participants were equipped with a blank paper and a pen. For my notes, I used

the seed list, whereby I made sure that the participants could not read from it.

Before starting with the body-part metaphors, I presented the participants with a line drawing of a human body and asked them to write down the body-part terms in their native language on a pre-printed list. This introduction activated all body-parts in the minds of the participants. Moreover, it gave me insights into how each language categorizes the body. If body-part terms (other than those that the participants wrote down in the introductory task) were mentioned to describe a feature of an object or landscape during the interview, we would extend the body-part term list.

After this introductory task, we began with the first picture which was the picture of a bottle and the corresponding body-part metaphors *neck/butt/mouth of the bottle* 'neck/bottom/opening of the bottle' (Figure 3.1 (a)). I presented each picture by pointing to the highlighted part and by asking whether or not the participant could refer to this part with a body-part term in her/his native language. In addition, I pointed out that the participant could always indicate if s/he refers to another (not highlighted) part of the picture with a body-part term. This led to 62 additional body-part metaphors which were not included in the original seed list.[20]

When a body-part metaphor existed, the participant wrote it down on the sheet of paper, for example, *az üveg nyaka* 'the neck of the bottle' (Hungarian). Moreover, if a language had another script system, the participant wrote down an additional transcription in Roman script, e.g., 瓶颈 *píng jǐng* 'neck of the bottle' (Mandarin Chinese). When a participant was not sure whether or not a certain body-part metaphor really exists in her/his native language, s/he wrote it down, but I did not include these doubtful cases in my analysis. If no body-part metaphor existed, we went to the next picture. The interviews lasted between one and one and a half hours.

In the follow-up phase, I listened to the recordings and transferred the answers of the participants into an Excel sheet which is the basis for my analysis. In some cases, especially when a language uses another script, I contacted the participants again and asked them to proofread my Excel sheet. However, I am solely responsible for any errors.

3.3 Results

In this section, I describe the results of my analysis. First, I examine the occurrence of body-part metaphors in the language sample (Section 3.3.1). In addition, the body-part terms are analyzed in terms of how often they appear in the data set. Furthermore, I investigate the variance between the languages in terms of which body-part metaphors they realize, and which body-part terms are more frequent in a certain language. Second, I analyze the overall use of body-part metaphors relating to the dimensions of shape, space, and function in the language sample (Section 3.3.2). To answer the question of whether a dimension is used more frequently than another, I analyze the total number of body-part metaphors which relate to each dimension. Moreover, the variance between the languages in terms of their use of body-part metaphors which are categorized in a certain dimension is evaluated. Third, I present the result of the correlation between the number of dimensions in which a body-part metaphor is categorized and its frequency (Section 3.3.3).

[20]The additional body-part metaphors were not included in the analysis but are available in Appendix D.

3.3.1 Analysis of the Body-Part Metaphors

The analysis of the body-part metaphors is based on the answers of the participants within the elicitation. Due to different grammatical structures of the languages, individual encodings of the metaphors were generalized: The examples in (15) illustrate different realizations of the body-part metaphor *hand of the door* 'doorknob' which occurs in form of a compound (Vietnamese), in combination with a verb (Persian, Mandarin Chinese)[21], derivation (Modern Hebrew), and genitive construction (Turkish). These cases were all counted as occurrences of the body-part metaphor *hand of the door* 'doorknob' with the component *hand*.

(15) a. tay cửa
arm/hand door
'doorknob' (lit. 'hand of the door') (Vietnamese)

b. dast-gir-eye dar
hand-grab-GEN door
'doorknob' (lit. 'handgrip of the door') (Persian)

c. 门把手
mén bǎ shǒu
door grab hand
'doorknob' (lit. 'handgrip of the door') (Mandarin Chinese)

d. ידית של דלת
yadit šel delet
hand.DIM of door
'doorknob' (lit. 'small hand of the door') (Modern Hebrew)

e. kapı-nın kolu
door-GEN hand
'doorknob' (lit. 'hand of the door') (Turkish)

Furthermore, if a language colexified a certain body-part, e.g., in Wolof *tank* means 'leg' or 'foot', I categorized *tank* as 'leg' in metaphors such as *tanku table* 'leg of the table' and as 'foot' in *tanku mon.tañ* 'foot of the mountain'. If a body-part metaphor from the seed list was mentioned by a participant, it counted as an occurrence of this metaphor in the respective language. Note that I refer to 'the language x' instead of 'the speaker of the language x' in the following. However, because I interviewed only one speaker of each language, this does not mean that language 'x' generally uses a certain body-part metaphor.

The analysis of the body-part metaphors is divided into two parts. In the first part, I examine the occurrences of body-part metaphors and the frequencies of body-part terms in the overall language sample. The second part includes the analysis of variation between languages in terms of the occurrences of body-part metaphors and body-part terms.

Figure 3.3 illustrates the number of languages in which a body-part metaphor is realized. One dot represents a body-part metaphor and on the horizontal axis, the number of languages in which the metaphor occurs is shown. Note that the analysis of the occurrences of body-part metaphors is based on the metaphors in the seed list. If a body-part metaphor was expressed

[21] Note that in both languages, the expression could also be a phrase with the literal meaning 'the door grabs the hand'. One would need to collect more data to understand these expressions properly and to determine whether or not their categorization as body-part metaphors is correct.

with another body-part term in a language, it counted as an occurrence of the original body-part metaphor in the seed list.

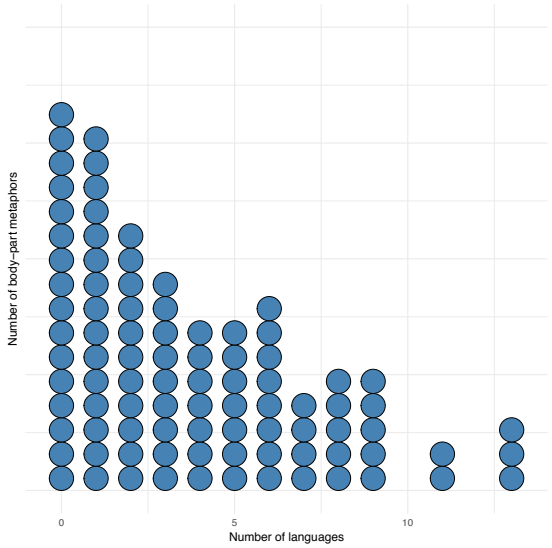


Fig. 3.3: Number of body-part metaphors realized in the 13 languages of the sample. The horizontal axis shows the number of languages in which a body-part metaphor occurs. One dot represents one body-part metaphor of the seed list.

Of the 92 body-part metaphors in the seed list, 16 body-part metaphors (17.39 % of the seed list metaphors) are not realized in any of the languages. Almost half of the nonexistent metaphors use the body-part term 'eye' (e.g., *eye of the knife* 'knife point', *eye of the ladder* 'rung', and *eye of the ship* 'window of the ship'). However, 76 metaphors (82.61 % of the seed list metaphors) occur in at least one language.

Three body-part metaphors are present throughout the entire set of languages (3.26 % of the seed list metaphors), namely *leg of the chair*, *leg of the table*, and *leg of the bed*. The body-part metaphors *saw tooth* and *mouth of the bottle* 'bottle opening' (2.17 % of the seed list metaphors) appear in 11 out of 13 languages. The third most commonly used body-part metaphors (5.43 % of the seed list metaphors) are: *head of the bed*, *arm of the chair* 'armrest', *pinhead*, *ear of the jug* 'handle of the jug', and *mouth of the jug* 'opening of the jug'.

Figure 3.3 also demonstrates that 15 metaphors occur in one language (16.3 % of the seed list metaphors). Examples of these language-specific metaphors are given in (16). Some of them refer to landscape properties, whereas others describe objects, such as a bunch of bananas (16-d) or the roof of a house (16-e).

(16) a. okyanus-un kolu
ocean-GEN arm
'estuary' (lit. 'arm of the ocean') (Turkish)

b. muka gunung
face mountain
'surface of the mountain' (Bahasa Indonesia)

c. दरीचा पायथा

darī-c-ā pāy-thā
valley-GEN-M foot-derivative
'bottom of the valley' (lit. 'foot of the valley') (Marathi)

d. loxo-∅ banana
hand-GEN banana
'bundle of banana' (lit. 'hand of banana') (Wolof)

e. đầu nhà
head house
'roof' (lit. 'head of the house') (Vietnamese)

The analysis of the frequencies of body-part metaphors indicates that the number of body-part metaphors which occur in many languages is lower than the number of body-part metaphors which occur in only a few languages. Therefore, most body-part metaphors appear in one to four languages (42 metaphors, 45.65 % of the seed list metaphors) and only a few body-part metaphors are expressed in more than nine languages of the sample (10 metaphors, 10.87 % of the seed list metaphors).

The analysis of the frequencies of body-part terms which occur in the different metaphors reveals preferences for body-part metaphors with particular body-part terms. Table 3.3 shows the compiled distribution of the body-part terms used for the different metaphors of the languages of the sample. In this case, the analysis is based on the explicitly expressed body-part metaphors in each language, not the original metaphors in the seed list.

Tab. 3.3: Overall frequencies of body-part terms which are used in the metaphors in the language sample.

Body-part term	Frequency
leg	54
head	45
mouth	33
eye	25
arm	22
hand	22
neck	17
back	15
foot	15
body	13
skin	13
tooth	13
ear	9
vein	8
butt	7
heart	7
sole	6
face	5
nose	5
lip	3
shoulder	3
heel	2
spine	2
tongue	2
belly	1
forehead	1
tendon	1

In total, 27 different body-part terms were mapped to object and landscape properties. The most frequent body-part term is 'leg' which appears in the commonly used body-part metaphors, *leg of the table*, *leg of the chair*, and *leg of the bed*. Other frequently occurring limb terms, such as 'hand' and 'arm', appear in metaphors like *arm of the chair* 'armrest' (occurs in 9 languages), *arm of the pullover* 'sleeve' (occurs in 7 languages), and *hand of the door* 'doorknob' (occurs in 5 languages). The term 'head' is the second most common body-part term, followed by its parts 'mouth' and 'eye'. These terms occur in, e.g., *head of the bed* (occurs in 9 languages), *mouth of the bottle* 'bottle opening' (occurs in 11 languages), and *eye of the storm* (occurs in 6 languages). Other parts of the 'head', like 'ear', 'nose', 'face', 'lip', 'tongue', and 'forehead', are not as frequent. In addition, some internal body-part terms, for example, 'heart', 'vein', and 'tooth', are commonly used, whereas other inner body-part terms, such as 'tendon' and 'tongue', appear less frequently. In comparison to Table 3.1, some body-part terms from the original body-part metaphors in the seed list do not appear at all. The body-part terms 'knee', 'rib', 'throat', and 'toe' were not used by any participant to refer to the parts in the pictures. However, new body-part terms which were not part of the original seed list occurred in the data set: 'belly', 'forehead', 'tendon', 'heel', 'spine', and 'lip'. Example (17) illustrates corresponding body-part metaphors. However, all of these metaphors refer to the same parts in a picture which were described by other body-part metaphors in the seed list.

(17) a. lahana-nın göbeği
cabbage-GEN belly
'stalk of the cabbage' (lit. 'belly of the cabbage') (Turkish)

b. čelo postel-e
forehead bed-GEN
'head of the bed' (Czech)

c. gân lá
tendon leaf
'leaf vein' (lit. 'leaf tendon') (Vietnamese)

d. patk-a chleb-a
heel-DIM bread-GEN
'end piece of the bread' (lit. 'heel of the bread') (Czech)

e. a könyv gerinc-e
ART book spine-POSS.3SG
'the book spine' (Hungarian)

f. στο χείλος του γκρεμού
sto hilo-s tou gkrem-o-u
on lip-M of brink-N-GEN
'at the edge of the abyss' (lit. 'on the lip of the brink') (Modern Greek)

The analysis of the body-part terms suggests that body-part metaphors with a certain body-part term occur in more languages. Nevertheless, there are counterexamples for this assumption. The body-part metaphor *leg of the tree* 'root' is only expressed in Wolof, Persian, and Hungarian. The body-part metaphor *head of the staircase* appears in Wolof, Vietnamese, and Persian. Example (18) illustrates the body-part metaphor *mouth of the doorway* 'crack of the door' which is realized in two languages (Japanese, Turkish).

(18) a. 𠮟口

mén kǒu
door mouth
'crack of the door' (lit. 'mouth of the doorway') (Japanese)

b. kapı-nın ağzı
door-GEN mouth
'crack of the door' (lit. 'mouth of the doorway') (Turkish)

In the following, I analyze the variation across languages in terms of the use of body-part metaphors and body-part terms. Figure 3.4 illustrates the variation of the total number of body-part metaphors in each language. The body-part metaphors were analyzed as occurrences of the original body-part metaphors in the seed list although some of them were expressed with another body-part term in a certain language.

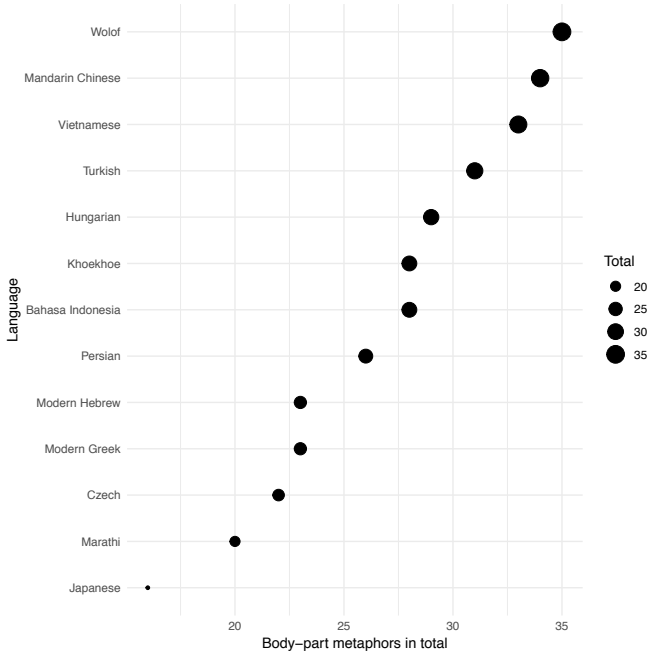


Fig. 3.4: Total number of body-part metaphors based on the metaphors in the seed list in each language. On the horizontal axis, the total number of occurrences is displayed. The vertical axis shows each language. The size of the dots represents the total number of body-part metaphors that are expressed in each language.

The graph displays a growing curve in which each dot represents the number of body-part metaphors in a language (Figure 3.4). Wolof uses twice as many body-part metaphors of the 92 body-part metaphors in seed list (35 metaphors, 38.04 % of the seed list metaphors) as Japanese (16 metaphors, 17.39 % of the seed list metaphors). Note that the high number of body-part metaphors in Wolof is due to the design of the seed list in which I included the additional body-part metaphors from the first interview with the Wolof speaker (14 metaphors). However, Mandarin Chinese has the second highest number of body-part metaphors with 34 metaphors (36.96 % of the seed list metaphors). This number is still twice as high as the total occurrences of body-part metaphors in Japanese. The third largest number of body-part metaphors is found

in Vietnamese with 33 metaphors (35.87 % of the seed list metaphors).

On the other hand, the second lowest frequency of body-part metaphors has Marathi (20 metaphors, 21.74 % of the seed list metaphors), followed by Czech (22 metaphors, 23.91 % of the seed list metaphors), and Modern Greek (23 metaphors, 25 % of the seed list metaphors).

The comparison of the body-part metaphors which occur in each language uncovers further differences between the languages of the sample. Note that the basis of this analysis are the body-part metaphors which were explicitly expressed by the participants, not the original body-part metaphors in the seed list.

Wolof, for example, uses five body-part metaphors referring to parts of a tree.[22] The body-part terms *bët* 'eye', *loxo* 'arm', *taat* 'butt', *tank* 'leg', and *ndigg* 'waist' are assigned to the corresponding parts of a tree. Another characteristic of Wolof is its use of the body-part term *bopp* 'head'. The term can also refer to 'corners', as shown in example (19).

(19) a. bopp-u kër
head-GEN house
'corner in the house' (lit. 'head of the house')

b. bopp-u table
head-GEN table
'corner of the table' (lit. 'head of the table')

c. bopp-u coñ
head-GEN street
'street corner' (lit. 'head of the street') (Wolof)

In comparison, Persian refers to various structures of the mountain with body-part terms. The body-part terms پشت *posht* 'back', پا *paa* 'foot', سر *sar* 'head', and گردن *gardan* 'neck' refer to corresponding parts of the mountain. Most of the languages in the sample refer to either the 'foot' or the 'back' of the mountain ('foot': Wolof, Marathi, Vietnamese, Modern Greek, Mandarin Chinese, Hungarian; 'back': Modern Greek, Mandarin Chinese, Hungarian, Turkish, Bahasa Indonesia). Note that only Modern Greek, Mandarin Chinese, and Hungarian can refer to both, 'foot' and 'back', see example (20). Interestingly, Modern Greek realizes the metaphor *foot of the mountain* with the body-part term 'forefoot' and Hungarian expresses both metaphors with two different grammatical forms. In contrast, Czech and Japanese extend no body-part term to parts of the mountain.

(20) a. πλάτη / πρόποδες του βουνού
plat-i / pro.pod-es tou voun-o-u
back-N / front.foot-M of mountain-N-GEN
'back/foot of the mountain' (Modern Greek)

b. 山脊 / 脚
shān jǐ / jiǎo
mountain back / foot
'back/foot of the mountain' (Mandarin Chinese)

c. hegy.hát
mountain.back
'back of the mountain' (Hungarian)

[22] Note that Wolof is spoken in Senegal where a tree is a national symbol and is considered to be a person.

d. hegy láb-a
mountain foot-POSS.3SG
'foot of the mountain' (Hungarian)

In reference to a bottle, Wolof (21), Khoekhoe (22), and Bahasa Indonesia (23) map the body-part terms 'butt', 'neck', and 'mouth' or 'lip' to the corresponding parts, whereas most of the other languages assign either 'neck' or 'mouth' to the bottle ('neck': Vietnamese, Modern Greek, Mandarin Chinese, Hungarian, Modern Hebrew; 'mouth': Marathi, Vietnamese, Modern Greek, Persian, Mandarin Chinese, Hungarian, Japanese, Turkish). Note that the body-part metaphor *mouth of the bottle* 'bottle opening' occurs in eight languages and half of them use both body-part terms 'neck' and 'mouth' to refer to a bottle (Vietnamese, Modern Greek, Mandarin Chinese, and Hungarian). Again, one language realizes the body-part metaphor, which refers to the same object, with different grammatical forms, see (22). Khoekhoe uses a compound without a gender marker for the 'neck' and 'bottom' of the bottle, whereas for its 'mouth', the language uses a construction of two separate nouns with gender markers. Czech, on the other hand, is the only language that does not refer to any part of the bottle with a body-part term.

(21) baat-u / taat-u / gémmiñ-u bouteille
neck-GEN / butt-GEN / mouth-GEN bottle
'neck/bottom/opening of the bottle' (Wolof)

(22) a. ǂkhoro.!ao-b
bottle.neck-M
'neck of the bottle'

b. ǂkhoro.khao-s
bottle.butt-F
'bottom of the bottle'

c. ǂkhoro-b am!nâ-s
bottle-M mouth-F
'bottle opening' (Khoekhoe)

(23) leher / pantat / bibir botol
neck / butt / lip bottle
'neck/bottom/opening of the bottle' (Bahasa Indonesia)

The following analysis of the use of the body-part terms in each body-part metaphor also shows language variation. Table 3.4 demonstrates the frequency of body-part metaphors with a certain body-part term in each language. The analysis is based on the body-part metaphors which were explicitly stated by the participants, not on the original body-part metaphors in the seed list.

Tab. 3.4: Occurrences of body-part terms used in the body-part metaphors expressed by each language.

Body-part term	Wol	Cz	Mar	Viet	Gre	Per	Chi	Khoe	Hung	Jap	Heb	Turk	Indone
arm	**2**	**1**	**1**	**2**	**0**	**0**	**0**	**4**	**2**	**0**	**0**	**7**	**3**
back	1	1	1	0	1	2	2	1	2	1	0	1	2
butt	4	0	0	0	0	0	0	2	0	0	0	0	1
ear	2	3	2	0	0	0	0	0	2	0	0	0	0
eye	4	3	1	3	2	1	3	0	1	2	1	0	4
foot	1	0	3	2	1	3	2	0	2	0	0	1	0
hand	**1**	**0**	**1**	**3**	**0**	**6**	**2**	**0**	**0**	**2**	**5**	**1**	**1**
head	**8**	**2**	**2**	**7**	**2**	**4**	**5**	**5**	**3**	**0**	**3**	**3**	**1**
leg	**6**	**4**	**4**	**4**	**4**	**3**	**5**	**5**	**5**	**4**	**3**	**3**	**4**
mouth	**2**	**1**	**2**	**3**	**3**	**2**	**4**	**5**	**4**	**1**	**0**	**5**	**1**
neck	2	0	0	2	2	1	2	2	2	1	2	0	1
skin	2	1	0	0	2	1	1	0	0	2	0	1	3
tooth	1	1	1	1	1	0	1	1	1	1	1	2	1
body	0	1	0	0	0	1	3	2	1	1	1	2	1
forehead	0	1	0	0	0	0	0	0	0	0	0	0	0
heel	0	2	0	0	0	0	0	0	0	0	0	0	0
shoulder	0	1	0	1	0	0	0	0	0	0	1	0	0
nose	0	0	1	2	0	0	0	0	0	0	0	2	0
vein	0	0	1	0	1	1	0	1	1	1	0	1	1
face	0	0	0	2	0	0	1	0	0	0	1	0	1
tendon	0	0	0	1	0	0	0	0	0	0	0	0	0
heart	**0**	**0**	**0**	**0**	**3**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**
lip	0	0	0	0	1	0	0	0	0	0	0	0	2
sole	0	0	0	0	0	1	1	0	1	0	1	1	1
spine	0	0	0	0	0	0	0	0	1	0	1	0	0
tongue	0	0	0	0	0	0	0	0	1	0	1	0	0
belly	0	0	0	0	0	0	0	0	0	0	0	1	0

* Wol = Wolof; Cz = Czech; Mar = Marathi; Viet = Vietnamese; Gre = Modern Greek; Per = Persian; Chi = Mandarin Chinese; Khoe = Khoekhoe; Hung = Hungarian; Jap = Japnaese; Heb = Modern Hebrew; Turk = Turkish; Indone = Bahasa Indonesia

Modern Greek, for example, frequently uses body-part metaphors with καρδιά *kardia* 'heart' to refer to inner parts of vegetables, see (24). Similarly, Mandarin Chinese assigns 心 *xīn* 'heart' to the inner part of an onion and a lettuce, as illustrated in example (25). Furthermore, Modern Hebrew (26) uses לב *lev* 'heart' for the inner parts of an artichoke and a lettuce. Although the 'heart' is not as visually perceptible as other body-parts, these mappings could indicate that the body-part is also used because of the perception of its motion in our body. However, the other languages in the sample do not use this body-part term to refer to any parts in the pictures.

(24) a. καρδιά της αγκινάρας
kardi-a tis agkinar-a-s
heart-F of artichoke-F-GEN
'heart of the artichoke'

b. καρδιά του λάχανου
kardi-a tou lahan-o-u
heart-F of cabbage-N-GEN
'inside of the cabbage'

c. καρδιά της σαλάτας
kardi-a tis salat-a-s
heart-F of salad-F-GEN
'heart of the lettuce' (Modern Greek)

(25) a. 菜心

cài xīn
lettuce heart
'heart of the lettuce'

b. 洋葱心

yáng.cōng xīn
onion heart
'inside of the onion' (Mandarin Chinese)

(26) a. ארטישוק של לב

lev šel artišok
heart of artichoke
'heart of the artichoke'

b. חסה של לב

lev šel xasa
heart of lettuce
'heart of the lettuce' (Modern Hebrew)

In comparison, Turkish commonly assigns the body-part term *kol* 'arm' to multiple landscape and object features, see (27). It can refer to landscape properties of oceans, rivers, and trees as well as object features, such as sleeves and chairs.

(27) a. okyanus-un kolu
ocean-GEN arm
'estuary' (lit. 'arm of the ocean')

b. nehr-in kolları
river-GEN arms
'arm of the river'

c. ağac-ın kolları
tree-GEN arms
'roots' (lit. 'arms of the tree')

d. kazağ-ın kolu
pullover-GEN arm
'sleeves' (lit. 'arm of the pullover')

e. sandalye-nın kolu
chair-GEN arm
'armrest' (lit. 'arm of the chair') (Turkish)

In addition, Table 3.4 shows that Persian and Modern Hebrew express more body-part metaphors with the body-part term 'hand' than other languages. This is due to their use of a form similar to 'handle' for corresponding object parts. For example, instead of using the term 'arm' for the body-part metaphor *arm of the chair* 'armrest', Persian integrates a verb form[23], as in (28-a) and Modern Hebrew uses a derivative form of 'hand', see (28-b).

(28) a. dast-gir-eye sandali
hand-grab-GEN chair
'handle of the chair' (lit. 'handgrip of the chair') (Persian)

b. yadit šel kise
handle of chair

[23] As mentioned above, this structure needs further investigation to determine whether or not it is a body-part metaphor.

'handle of the chair' (Modern Hebrew)

The cross-linguistic comparison shows that only the body-part term 'leg' is used in every language of the sample. The body-part term 'mouth' is the second most common body-part term which appears in almost every language, except Modern Hebrew. Interestingly, only Khoekhoe, Wolof, and Bahasa Indonesia use the body-part term 'butt' to refer to object or landscape properties, e.g., bottles, end pieces of a baguette, and trees. Furthermore, Japanese does not assign the term 'head' to any parts of the pictures although this body-part term is used in other languages.

3.3.2 Analysis of the Dimensions

For the analysis of the three dimensions (shape, space, function), I categorized each body-part metaphor in at least one dimension.[24] In some cases, the body-part metaphor was grouped into two or three dimensions because similarities were apparent in more than one dimension. For example, the body-part metaphor *leg of the table* relates to all three dimensions. The body-part metaphor *arm of the tree* 'branch', for example, was categorized in the shape and space dimension, whereas *eye of the house* 'window' was grouped into the shape and function dimension. An example of a body-part metaphor that was categorized in the space and function dimension is *foot of the mountain*. Other body-part metaphors were assorted to one dimension only, e.g., *hand of the door* 'doorknob' (function), *head of the mountain* 'top of the mountain' (space), and *head of the lettuce* 'lettuce' (shape). Note that if a speaker used another body-part term to refer to the same object part of a body-part metaphor in the seed list, the assignment of the dimensions was changed accordingly. All results in this section are based on the body-part metaphors that were explicitly expressed by the participants, not on the original body-part metaphors in the seed list.

Further, I subdivided the analysis into two parts. First, the overall frequencies of body-part metaphors in relation to each dimension are analyzed. Second, I compare the use of body-part metaphors in each dimension in the overall language sample and the variation between the languages.

The comparison of the total number of body-part metaphors in the dimensions of shape, space, and function in the overall language sample is displayed in Figure 3.5. One dot in the graph represents the total occurrence of body-part metaphors that relate to one dimension in a certain language.

[24] Note that the number of assignments in each dimension was nearly balanced in the seed list. 45 body-part metaphors were categorized in the shape and 45 metaphors in the space dimension. The function dimension was associated with 39 body-part metaphors in the seed list.

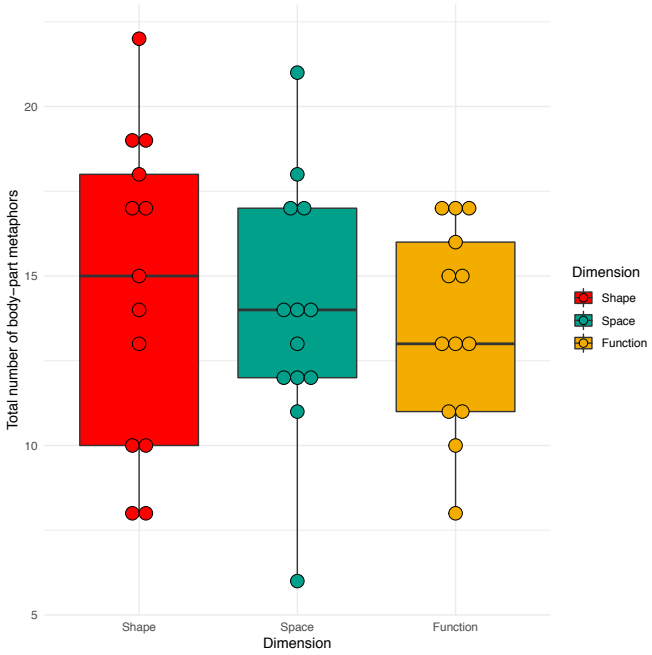


Fig. 3.5: Total number of body-part metaphors across the languages of the sample in each dimension. The horizontal axis shows the occurrences of body-part metaphors in each dimension. On the vertical axis, the three dimensions are displayed (red: shape dimension, turquoise: space dimension, yellow: function dimension). One dot represents the total number of body-part metaphors which are related to one of the three dimensions in one language. The box plots illustrate the variance and mean values of each dimension.

The figure illustrates the variance between the use of the three dimensions. The total number of body-part metaphors in the shape dimension ranges between a maximum of 22 metaphors in Wolof and a minimum of 8 metaphors in Persian and Mandarin Chinese. The maximum of the space dimension is 21 metaphors in Wolof and a minimum of 6 metaphors in Japanese. However, most of the languages have a total number of 12 to 14 body-part metaphors in this dimension. The minimum and the maximum number of body-part metaphors in the function dimension is not as far apart as in the other two dimensions. Persian, Mandarin Chinese, and Bahasa Indonesia have a total number of 17 body-part metaphors relating to this dimension and the minimum lies at 8 metaphors in Czech. Note that the values are influenced by the overall number of body-part metaphors in each language. Nevertheless, the comparison of the mean values reveals that the overall frequency of the dimensions differs only slightly. The shape dimension has a mean value of 14.62 which is close to the mean value of the space dimension (M=13.92). The least frequent dimension in the language sample is the function dimension (M=13.54).

In the next paragraphs, I describe the analysis of the variation across languages in terms of the realization of body-part metaphors assorted to the dimensions. Figure 3.6 demonstrates how many body-part metaphors relate to a dimension in each language of the sample, respectively. The graph reveals the differences and similarities between the languages.

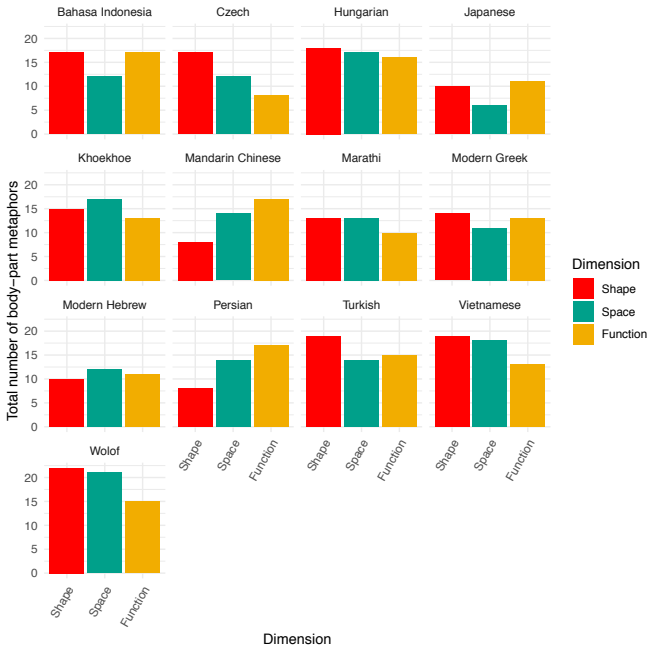


Fig. 3.6: Total number of body-part metaphors related to the three dimensions in each language. On the horizontal axis, the three dimensions appear (red: shape dimension, turquoise: space dimension, yellow: function dimension). The vertical axis shows the frequencies of body-part metaphors which are classified in one dimension. Each bar chart demonstrates the distribution of the dimensions in one language.

In some languages, such as Hungarian and Modern Hebrew, an almost equal number of body-part metaphors are grouped into all three dimensions. However, some languages prefer two dimensions over a third one. In Bahasa Indonesia, Modern Greek, and Japanese, most body-part metaphors are classified in the shape and function dimension compared to the space dimension. In contrast, Marathi, Vietnamese, and Wolof express an almost equal number of body-part metaphors in the shape and space dimension, whereas the function dimension is the least favored one. Khoekhoe, on the other hand, also realizes almost the same number of body-part metaphors in the shape and space dimension but seems to favor the function dimension for mapping body-part terms to object and landscape features. Turkish distinctively prefers the shape dimension in comparison to the space and function dimension which are used equally often. In other languages, such as Mandarin Chinese, Czech, and Persian, the number of body-part metaphors in each dimension differs from one another. Mandarin Chinese and Persian use metaphors in the shape dimension least often, the space dimension is in second place and most of the body-part metaphors in these languages are categorized in the function dimension. Although the space dimension is also in second place in Czech, it has more body-part metaphors which relate to the shape dimension instead of the function dimension. The results demonstrate that languages differ in terms of their preferences for the three dimensions of similarity.

The analysis of the explicitly expressed body-part metaphors shows that languages differ in terms of which dimension they favor in a certain body-part metaphor. In some cases, the choice for a different body-part term which refers to the same object or landscape feature can

be explained by taking the dimensions into account. However, the qualitative analysis below demonstrates that the preference for a specific dimension does not always explain the choice of a body-part term in a certain body-part metaphor.

The body-part metaphor *eye of the needle* is an example of a body-part metaphor which is used more often with the body-part term 'eye' (Wolof, Modern Greek, Mandarin Chinese, Hungarian, Bahasa Indonesia). Nevertheless, Czech expresses the metaphor with the body-part term *ouško* 'ear', see (29). Both mappings relate to the shape dimension, but the other languages seem to additionally account for the function dimension. This could explain the frequent occurrence of the metaphor with the term 'eye'.

(29) ouško jehl-y
ear needle-GEN
'eye of the needle' (lit. 'ear of the needle') (Czech)

On the other hand, Vietnamese expresses the body-part metaphor *eye of the water* 'water spring' with the term *đầu* 'head'. Therefore, it relates to the shape and the space dimension. Mandarin Chinese, Persian, and Bahasa Indonesia only use the shape dimension by mapping the body-part term 'eye' to the landscape feature, as in (30). The choices of body-part terms in the metaphors *eye of the needle* and *eye of the water* 'water spring' show that it is not always clear what determines the variation of body-part terms in a certain language.

(30) a. đầu sông
head river
'water spring' (lit. 'head of the river') (Vietnamese)

b. 泉眼
quán yǎn
spring eye
'water spring' (lit. 'eye of the water') (Mandarin Chinese)

c. cheshm-eye aab
eye-GEN water
'water spring' (lit. 'eye of the water') (Persian)

d. mata air
eye water
'water spring' (lit. 'eye of the water') (Bahasa Indonesia)

In terms of the space dimension, similar spatial alignments of body-part terms can result in different choices of body-part terms for a metaphor. The body-part metaphor *book spine* is expressed with 'back' in Mandarin Chinese, Khoekhoe, and Japanese, whereas Hungarian and Modern Hebrew use the body-part term 'spine'. In Vietnamese, the metaphor is realized with *gáy* 'backside of the neck'. A similar case is the body-part metaphor *mouth of the bottle* 'bottle opening': Bahasa Indonesia uses the body-part term *bibir* 'lip' *bibir botol* (lit. 'lip bottle') to refer to this part of the bottle.[25] In comparison, all other languages, which express this body-part metaphor, use the body-part term 'mouth'. However, both expressions can be grouped in the function and shape dimension.

Other cases suggest that the mapping of a body-part term to an object or landscape feature

[25]Note that additional data could determine whether the term 'mouth' includes or excludes the lips in Bahasa Indonesia.

relies on additional factors. The body-part metaphor *toes of the garlic* 'garlic clove' is expressed in Modern Hebrew and Turkish (31). However, instead of using the body-part term 'toe' as in the original body-part metaphor in the seed list, both languages use the body-part term 'tooth' to refer to a clove of the garlic. This indicates that both languages also consider the similarity in color between the body-part and the object.[26]

(31) a. שום של שן
šen šel šum
tooth of garlic
'garlic clove' (lit. 'tooth of the garlic') (Modern Hebrew)

b. sarımsağ-ın dişi
garlic-GEN tooth
'garlic clove' (lit. 'tooth of the garlic') (Turkish)

In addition, the aspect of spatial continuity or spatial proximity can influence the choice for a certain body-part term. For example, the body-part metaphor *leg of the bed* is frequently expressed with the body-part term 'leg'. Nonetheless, Turkish uses *ayağı* 'foot' instead of *bacağı* 'leg' to refer to this object part, as illustrated in (32). Another example that demonstrates the influence of spatial continuity or spatial proximity is the body-part metaphor *arm of the river* which occurs in Turkish and Czech. Turkish uses the body-part term *kolu* 'arm', whereas Czech applies the body-part term *rameno* 'shoulder' to this landscape feature. Furthermore, the body-part metaphor *eye of the compass* 'compass needle' is expressed with either हात *hāt* 'hand' (Marathi) or 'arm' (Turkish, Khoekhoe).

(32) yatağ-ın ayağı
bed-GEN foot
'foot of the bed' (Turkish)

Moreover, in the space dimension, different mapping strategies are generalized. Example (33) shows that Vietnamese uses the body-part term *đầu* 'head' in different spatial alignments. In case of the staircase, the pin, and the house, it seems that the body-part term is applied in an anthropomorphic view to the objects. On the other hand, it could be argued that the metaphors *head of the staircase* and *head of the house* 'roof' are determined by an egocentric model. Additionally, in the metaphor of *head of the bed*, the body-part term could be either based on a zoomorphic or an egocentric view. This indicates that the analysis af the space dimension needs to be further extended to account for the different models. Languages could also differ in terms of whether they prefer an egocentric versus object-centric model or an anthropomorphic versus zoomorphic model.

(33) a. đầu cầu.thang
head stairs
'head of the staircase'

b. đầu kim
head needle/pin
'pinhead'

[26]Note that in case of the body-part metaphors *eye of the potato* or *eye of the tree* 'knot in the wood', the transfer of the body-part term 'eye' could also be based on the black color of the pupil.

c. đầu nhà
head house
'roof' (lit. 'head of the house')

d. đầu giường
head bed
'head of the bed' (Vietnamese)

However, even if the preference of a language is based on a choice between an object-centric versus ego-centric model or an anthropomorphic versus zoomorphic model, the decision for either one is not always apparent. This is illustrated by the body-part metaphors *head of the bed* (see (33)) and *nose of the boat* 'bow of the boat'. Vietnamese, Persian[27], and Turkish express the latter body-part metaphor with 'nose' (relating to the shape dimension), whereas Wolof and Mandarin Chinese use the body-part term 'head'. It could be argued that the term 'head' is applied due to a zoomorphic view. Nevertheless, another approach would be to assume an object-centric model.

Furthermore, in some body-part metaphors, the categorization into any of the three dimensions is difficult. For example, Wolof, Mandarin Chinese, Khoekhoe, Hungarian, Japanese, and Modern Hebrew express the body-part metaphor *neck of the guitar* with the body-part term 'neck'. In comparison, Persian and Bahasa Indonesia realize this metaphor with 'hand'. It is not clear whether or not this expression relates to the function dimension. Another approach could be to establish the dimension of 'point of contact'. This additional aspect is also observed in the body-part metaphor *ear of the jug* 'handle of the jug'. In most languages (Wolof, Czech, Marathi, Hungarian), the metaphor is realized with 'ear' which highlights the shape and space dimension. On the other hand, Persian, Japanese, and Modern Hebrew use the body-part term 'hand' to express this metaphor. In both cases, the languages also realize the body-part metaphor *ear of the pot* 'handle of the pot' with the two body-part terms. In contrast, Turkish and Khoekhoe use the body-part term 'arm' in the metaphor *ear of the jug* 'handle of the jug' and do not express the body-part metaphor *ear of the pot* 'handle of the pot'. This could be due to an association with the shape dimension or a preference for an object-centric view.

Another ambiguous case is the body-part metaphor *arm of the chair* 'armrest'. Marathi, Khoekhoe, Hungarian, and Bahasa Indonesia use the body-part term 'arm' to refer to the corresponding object part, whereas Vietnamese, Persian, Mandarin Chinese, and Modern Hebrew realize it with 'hand' in combination with a verb, see (34). It might be that the term 'arm' relates to the space dimension compared to the 'hand' which relates to the function dimension. On the other hand, the different choices could account for the point of contact dimension in addition to the aspect of spatial continuity/proximity.

(34) a. tay dựa
hand lean.on
'handle of the chair' (Vietnamese)

b. dast-gir-eye sandali
hand-grab-GEN chair
'handle of the chair' (lit. 'handgrip of the chair') (Persian)

c. 椅子扶手

[27]Note that Persian can also refer to the front part of a boat with the term منقار *menġār* 'beak'. This is an interesting case and it seems to also relate to the shape dimension.

yǐ.zi fú.shǒu
chair help.hand
'handle of the chair' (lit. 'helping hand of the chair') (Mandarin Chinese)

d. כיסא ידית

yadit šel kise
handle of chair
'handle of the chair' (Modern Hebrew)

A similar uncertain example is the body-part metaphor for the end pieces of a baguette which is illustrated in the following examples. Khoekhoe and Wolof use the body-part terms 'head' and 'butt' to refer to the opposite parts which indicate a zoomorphic model, see (35). Vietnamese, on the other hand, refers to both pieces with *đầu* 'head', as shown in (36). This could be due to the rounded form of the pieces, and therefore, related to the shape dimension. The third possibility of referring to both pieces is found in Czech, see (37). The language uses a diminutive form of the body-part term *pata* 'heel' for this metaphor. The shape dimension may also be the determining dimension in this case. However, one could also imagine two shoe tips pointing together which could be counted in the space dimension.

(35) a. taat-u mburu
butt-GEN bread
'end piece of the baguette' (lit. 'butt of the bread')

b. bopp-u mburu
head-GEN bread
'end piece of the baguette' (lit. 'head of the bread') (Wolof)

c. pere-b khao-s
bread-M bum-F
'end piece of the baguette' (lit. 'butt of the bread')

d. pere-b dana-s
bread-M head-F
'end piece of the baguette' (lit. 'head of the bread') (Khoekhoe)

(36) đầu bánh
head bread
'end pieces of the baguette' (lit. 'head of the bread') (Vietnamese)

(37) patk-a chleb-a
heel-DIM bread-GEN
'end pieces of the baguette' (lit. 'heel of the bread') (Czech)

In addition, Vietnamese and Marathi express the body-part metaphor *eye of the arrow* 'tip of the arrow' with the body-part term 'nose'. In this case, the body-part metaphor is grouped in the shape dimension. In comparison, Mandarin Chinese and Modern Hebrew use the body-part term 'head' to refer to this object feature which relates to the space dimension. Khoekhoe makes another choice by applying the body-part term *gaub* 'mouth' to the tip of the arrow, as illustrated in (38).[28]

[28]Interestingly, Bahasa Indonesia uses the term 'sun' for this part of the arrow: *anak panah* 'tip of the arrow' (lit. 'sun of the arrow'). As of yet, the origin of this metaphor is not clear and needs further investigation.

(38) ǁgau-b am-s
arrow-M mouth-F
'tip of the arrow' (lit. 'mouth of the arrow') (Khoekhoe)

It is not clear how to categorize this body-part metaphor. More data are needed to establish the determining dimension which accounts for *mouth of the arrow* 'tip of the arrow'.

The choice of body-part terms might also be connected to the preference for a specific dimension in a certain language. However, no general correlation was derived from the data. For example, Bahasa Indonesia uses the body-part term 'eye' frequently which relates mostly to the shape dimension. Nevertheless, the shape dimension is only one of the favored dimensions in this language. The analysis in this section shows that languages differ in terms of which dimension they prefer. However, the use of a certain body-part metaphor does not always indicate a preference for one dimension in a particular language.

3.3.3 Analysis of the Correlation

In this section, I examine the correlation between the frequency of the body-part metaphors in the language sample and the number of dimensions in which the metaphors are categorized. The analysis investigates the hypothesis that the frequency of body-part metaphors depends on how many dimensions it relates to. Note that the following analysis is based on the original body-part metaphors in the seed list. Therefore, the categorization of the dimensions builds on the body-part terms which were used in the original metaphors.

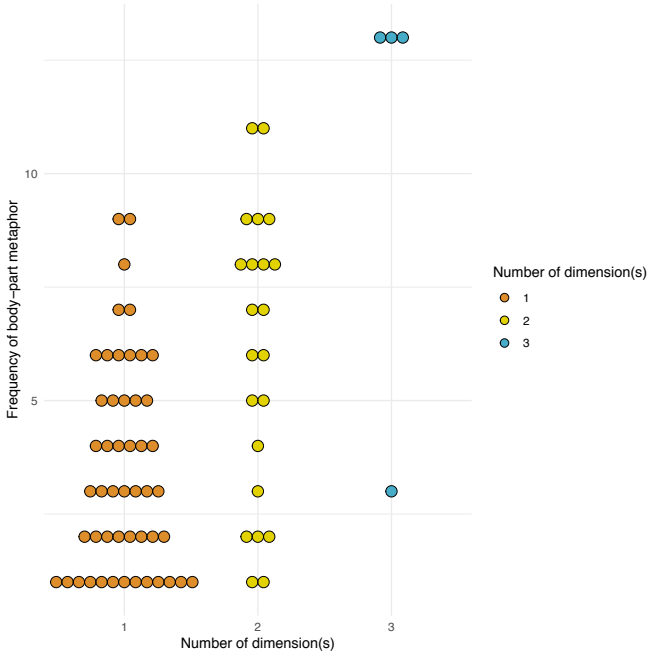


Fig. 3.7: Frequency of body-part metaphors in relation to their classification into the three dimensions. The horizontal axis shows the number of dimensions each body-part metaphor is associated with (orange: one dimension, yellow: two dimensions, blue: three dimensions). On the vertical axis, the frequency of the metaphor throughout the language sample are displayed. Each dot represents one body-part metaphor from the seed list.

Figure 3.7 demonstrates the frequency of each body-part metaphor which were expressed by at least one language in the sample and its relation to one, two, or three dimensions. Each dot represents one body-part metaphor from the seed list. It is apparent that most body-part metaphors which are associated with one dimension have a low frequency. The body-part metaphors which occur in only one language include, e.g., *neck of the mountain* (space dimension), *nose of the land* 'promontory' (shape dimension). The most frequent body-part metaphors in this category are *head of the bed* and *arm of the chair* 'armrest' which are realized in 9 languages. Note that both metaphors were also expressed with different body-part terms in certain languages. The former is expressed with 'forehead' in Czech and the latter with 'hand' in Persian, Mandarin Chinese, and Modern Hebrew. However, the number of dimensions does not change even though the different choice of body-part terms might influence in which dimension the metaphors are grouped. The metaphor *head of the bed* is categorized in the space dimension whether it is expressed with 'head' or 'forehead'. On the other hand, if *arm of the chair* 'armrest' is expressed with 'arm' it relates to the space dimension, whereas if it is realized with 'hand' it relates to the function dimension. Another explanation could be that 'hand' and 'arm' relate to the dimension of spatial continuity or point of contact.

The comparison between the frequencies of body-part metaphors which are associated with one dimension and body-part metaphors which are connected to two dimensions shows that the body-part metaphors in the latter seem to be more frequent. The least frequent body-part metaphors in this category include *water vein* (Khoekhoe) and *face of the mountain* 'surface of the mountain' (Bahasa Indonesia). The body-part metaphors *saw tooth* (function and shape dimension) and *mouth of the bottle* 'bottle opening' (shape and function dimension) have the highest frequency in this category. They occur in 11 languages of the sample. The body-part metaphor *mouth of the bottle* 'bottle opening' is realized with 'lip' in Bahasa Indonesia. However, this does not influence the categorization of the body-part metaphor into two dimensions. One of the second most common body-part metaphors which are grouped in two dimensions is *ear of the jug* 'handle of the jug'. As discussed in the previous section, this body-part metaphor is expressed with the body-part term 'hand' in Persian, Japanese, and Modern Hebrew. In comparison, Khoekhoe and Turkish use the body-part term 'arm'. Wolof, Czech, Marathi, and Hungarian use 'ear' to refer to the handle of a jug. In the case of 'hand', the body-part metaphor is categorized in one dimension (function), whereas in the case of 'arm' and 'ear', it is grouped into two dimensions (shape and space). This example indicates that a more fine-grained analysis which accounts for different mapping strategies, e.g., egocentric versus object-centric, and further dimensions, such as 'point of contact', needs to be established.

The third category illustrates body-part metaphors which relate to all three dimensions. These include the body-part metaphors *leg of the chair/table/bed* and *leg of the tree* 'root'. The latter one is categorized in all three dimensions although it could be argued that roots do not share a similarity in shape with the body-part term 'leg'. The factor of 'degree of similarity' would explain its low frequency: It occurs in Wolof, Persian, and Hungarian. Furthermore, the body-part metaphor *leg of the bed* occurs with the body-part term 'foot' in Turkish and would be classified into two dimensions. However, if the aspect of spatial continuity or spatial proximity would be included, the number of dimensions would concur.

The mean values of the three categories shows that body-part metaphors that are linked

to one dimension have the lowest mean value (M=3.5). In comparison, body-part metaphors associated with two dimensions have a mean value of 6. Body-part metaphors that are based on three dimensions appear in a wide range of language (M=10.5). The difference between the mean values indicates that body-part metaphors which relate to more dimensions occur more frequently.

3.4 Discussion

The aim of the present study was to investigate a variety of body-part metaphors in object and landscape terms in a diverse set of languages. The study was designed to examine the frequencies of body-part metaphors in the overall language sample and in each language individually. Furthermore, I analyzed the preferences for each dimension in the various languages and the categorization of the body-part metaphors in the dimensions. This analysis provided insights into the hypothesis that different languages have different preferences regarding the prioritization of the dimensions of similarity. Moreover, I correlated the frequency of body-part metaphors with their categorization in the dimensions to reveal whether or not the number of dimensions determines its frequency. In this section, I discuss my findings in relation to the general assumptions and hypotheses found in the literature.

The systematic cross-linguistic approach of this study showed that body-part metaphors do not seem to be isolated instances. Lakoff & Johnson's hypothesis might be true for the English language. However, the results in this study highlight the importance of typological studies in the field of cognitive linguistics. Many assumptions concerning our conceptual system are established in the literature although they are based on observations in one language. This argument was also brought forward by other authors (cf. Filippone 2006; Kraska-Szlenk 2014; Ibarretxe-Antuñano 2012). Similar to the observations by Kraska-Szlenk (2014) and Filippone (2006), the present study demonstrated that some languages use body-part terms frequently to map them to object or landscape features. However, the results of the analysis of the frequency of each body-part metaphor in the seed list revealed that some body-part metaphors occur in more languages than others. The body-part metaphors *leg of the table/chair/bed* are expressed in every language of the sample. However, most body-part metaphors are realized in one to four languages which could indicate that the majority of body-part metaphors are language-specific. The general assumption that these differences are based on cultural differences (cf. Atef-Vahid & Zahedi 2013; Kraska-Szlenk 2014; Burenhult & Levinson 2008; Ibarretxe-Antuñano 2012) did not provide verifiable predictions, and therefore, it was not assessed in the present study.

The results of the frequencies of body-part terms which were realized in the body-part metaphors supported the hypothesis that the body-part terms 'arm' and 'leg' are commonly used to denote elongate object or landscape properties (cf. Andersen 1978; Kraska-Szlenk 2014). However, the shape dimension is not always the crucial factor for the mapping. In case of the body-part metaphor *leg of the tree* 'root', the space and the function dimension seem to determine the metaphorical transfer. Similarly, in the body-part metaphor *arm of the chair* 'armrest', the pivotal dimension could be the space or function dimension or even another category, such as point of contact. The hypothesis that the body-part terms 'head' and 'eye' are commonly applied to round object features because of their visual properties is only partially supported. The body-part term 'eye' seems to be used to describe round features, as in *eye*

of the potato or *eye of the tree* 'knot in the wood'. In addition, the factor of color may also play a role in these mappings because of the black color of the pupil. On the other hand, the body-part term 'head', which was used commonly in the data set, referred to the objects and landscapes on the basis of the space dimension in most cases, e.g., *head of the guitar* or *head of the mountain* 'top of the mountain'. Furthermore, the results indicated that body-part terms which are more visible accessible are more salient in the overall language sample which would support Andersen's (1978) hypothesis. Inner body-part terms, such as 'vein' or 'heart', are not as frequently used to refer to object or landscape features as visually perceptible body-parts, for example, 'leg' or 'head'. Nevertheless, some languages use the body-part term 'heart' productively (Modern Greek). This would account for another dimension, such as perceptual prominence, which could relate to visually perceptible body-parts and body-part terms which are perceptual because of their motion in our body.

The analysis of the variation between languages in terms of how many body-part metaphors from the seed list they express indicated that some languages use more body-part metaphors compared to others. Wolof and Mandarin Chinese seem to map body-part terms more productively to object and landscape features than Japanese and Marathi. This finding supports the observations of Burenhult & Levinson (2008), Levinson (1994), and Tilbe (2017) that some languages use more body-part terms for naming object and landscape features compared to other languages, e.g., English. In addition, the comparison of individual body-part metaphors also showed differences between languages in terms of which objects or landscapes are commonly the target for the mapping of various body-part terms. As mentioned by Filippone (2006), Persian seems to map more body-part terms to the mountain than other languages. However, the results of this study could not replicate the expressions *shoulder/waist/throat/breast/nose of the mountain*. Furthermore, the comparison showed that languages vary in terms of which body-part term they frequently use. Turkish seems to apply the body-part term 'arm' more frequently to object and landscape features compared to the other languages in the sample. Again, this variation could be due to cultural influences. However, this assumption avoids determining a crucial factor for the different choices.

Another common hypothesis which was expressed in the literature was that body-part metaphors are based on a bodily experience and support the embodiment hypothesis (cf. Goschler 2005a; Kraska-Szlenk 2014; Ibarretxe-Antuñano 2012). The present study cannot present a clear conclusion for this assumption because it needs to be further specified in terms of the theoretical question and the expectations of the results of empirical studies. Therefore, I focused on the hypothesis that some body-part metaphors are widespread because they are based on the perception of a striking similarity (Ullmann, 1963). Although Ullmann (1963) does not elaborate how he defines an obvious similarity, other scholars establish the similarity in shape, spatial alignment, and function as the determining factor for the transfer of body-part terms to object and landscape features (cf. Filippone 2006; Kraska-Szlenk 2014; Levinson 1994; Tilbe 2017). The analysis of the frequency of body-part metaphors in each dimension investigated this claim. The results showed only a minimal difference between the total number of body-part metaphors in each dimension. On the other hand, the comparison of the preferences for each dimension in the languages of the sample demonstrated that in some languages, the distribution of body-part metaphors in each dimension is balanced (Modern Hebrew, Hungarian),

whereas others favor two (Bahasa Indonesia, Modern Greek, Japanese, Marathi, Vietnamese, Wolof) or one dimension (Khoekhoe, Mandarin Chinese, Czech, Persian, Turkish). This finding indicates that cross-linguistic variation could be explained with the different preferences of languages regarding the prioritization of the dimensions of similarity and supports the results in Tilbe (2017).

However, the analysis of the explicitly expressed body-part metaphors in the languages revealed that the three dimensions may not be entirely sufficient. In some cases, the underlying dimension of a body-part metaphor did not explain its occurrence with other body-part terms, e.g., *book spine* can be expressed with 'spine', 'back', 'neck' or 'back side of the neck'. Another example was the expression *mouth of the bottle* 'bottle opening' which was realized with 'mouth' and 'lip'. The approaches of Levinson (1994) and Tilbe (2017) do not account for this variation between languages. Other cases illustrate that additional factors could influence the mapping of a body-part term to an object or landscape feature: i) color (e.g., *tooth of the garlic* 'garlic clove'), ii) spatial continuity or proximity (e.g., *arm/hand of the compass* 'compass needle'), and iii) point of contact (e.g., *hand of the guitar* 'neck of the guitar'). A systematic examination of these factors could provide further insights into the basis of body-part metaphors. For example, the parameter 'point of contact' could be tested on the basis of the body-part metaphor *butt of the chair* 'chair seat'. Furthermore, the results of the present study indicated that languages differ in terms of their preferences for an object-centric versus egocentric model (e.g., *head of the bed*) compared to an anthropomorphic versus zoomorphic model (e.g., *head/butt of the baguette* 'end pieces of the baguette'). Levinson (1994) observed a preference for an object-centric view in the Mesoamerican language Tzeltal. Other languages could behave similarly. Nevertheless, even the distinction between the different orientations is not necessarily clear: For example, *head of the boat* 'bow of the boat' could be categorized as zoomorphic or object-centric. These factors need to be controlled for with precise stimuli and an improved categorization system. Moreover, this study raised the questions of how the categorization of individual body-part metaphors could be regulated and how a body-part metaphor, such as *mouth of the arrow* 'tip of the arrow', could be categorized.

The correlation between the frequency of the body-part metaphors and the number of dimensions in which the metaphors are categorized showed that if a body-part metaphor relates to more dimensions it tends to be more frequent. This could explain the common occurrence of the body-part metaphors *leg of the table/chair/bed*. However, this tendency does not apply to all body-part metaphors (*leg of the tree* 'root'). Therefore, Ullmann's hypothesis needs further specification and a factor, such as 'degree of similarity' might also play a role. On the other hand, if an additional dimension, such as point of contact, would be established the high frequency of *mouth of the bottle* 'bottle opening' could be explained. This would also account for different choices of body-part terms: If *ear of the jug* 'handle of the jug' (shape and space) is expressed with the body-part term 'hand' it is categorized in only one dimension (function). In this body-part metaphor, the factor of point of contact could also be an indicator for the variance in terms of body-part term choices. Furthermore, the frequency of the body-part metaphor *arm of the chair* 'armrest' could be influenced by the factor point of contact and its occurrence with the body-part term 'hand' could be based on the spatial continuity/proximity of the two body-parts.

The present study investigated a variety of general assumptions about body-part metaphors and provided insights into their basis and variation. The results showed that the categorization principles based on the three dimensions may not be exhaustive. Additional dimensions and categories need to be considered. In addition, new questions arose from the analysis, for example, what are the reasons for the variation of the dimensions and are these principles universal? Further studies need to determine a clear classification scheme to account for variation between languages.

3.5 Outlook

The present section comprises an outlook of research possibilities to further examine body-part metaphors in object and landscape terms. Based on my observations while conducting the study, I present improvements and biases that need to be considered in future studies. In addition, I demonstrate further research approaches which could investigate body-part metaphors from different angles.

The study in this thesis aimed to be exploratory. However, to make future investigations more representative, some improvements should be considered. A balanced seed list needs to be established in which factors, such as the universality of objects and landscapes, are accounted for. Furthermore, the seed list should not be investigated with the same languages from which the body-part metaphors stem. The Wolof body-part metaphors which were included after the first interview distort the results in comparison with other languages. The additional metaphors (Appendix D) are a starting point to further develop a more representative seed list. The language sample should also include languages from a variety of language families and should be genetically, typologically, and geographically balanced. To rule out speaker variation, the study must be conducted with more than one speaker of each language. Moreover, the classification of the body-part metaphors needs further improvement in terms of the number of dimensions and the factors which determine the categorization of a certain body-part metaphor into a specific dimension. A pilot study in which participants classify particular body-part metaphors into a set of dimensions would make the categorization more representative. In addition, data about the frequency of body-part terms needs to be collected in various languages to correlate the body-part term frequency with its occurrence in body-part metaphors.[29] By implementing these improvements, the frequencies of dimensions, the salience of body-part terms, differences between language families, and so on could be statistically tested.

In hindsight, I discovered some biases in the structure of the study. The first bias that was brought to my attention was the selection of pictures. Most of them depict European objects and food. Especially the picture of a bread (see Appendix B) is a very German representative. After my first interview, I additionally described a baguette while showing the picture because they are more common than German bread. Furthermore, I realized that artichokes and sausages are not very common in other countries. Moreover, a traditional house, for example, in China, looks very different from European houses. Another bias was that most of the speakers did not live in the environment of their native language anymore. Therefore, they were biased by their new language environment or a second language that they spoke most of the time. This needs to be

[29] With this data, the hypothesis by Kraska-Szlenk (2014) that frequently used body-part terms develop a variety of meanings could be tested.

controlled for or a fieldwork study in the original language environment without the influence of a second language needs to be conducted.

In addition, some languages connect a pejorative meaning to a certain body-part term, and therefore, do not use it as often as other languages. For example, the term 'butt', has a pejorative meaning or evokes a feeling of shame in some cultures. Furthermore, some body-part terms do not have an equivalent translation in English. Khoekhoe, for example, has a word for 'butt' (ǂ*aredi*) which does not correspond to the anatomical structures the English term refers to. Hungarian has a word for 'side upper body' (*oldala*), and Modern Greek differentiates between different layers of skin: δέρμα *derma* 'skin' and επιδερμίδα *epidermis* 'upper skin'. A combination of the materials introduced by Enfield et al. (2006) could identify these differences and also give insights into why a certain body-part metaphor is not expressed in the language under investigation.

Moreover, the present study yields interesting results which could be further investigated with various methods. In the following, three possible neuroscientific approaches are presented. First, an fMRI study could test the claim by Lakoff & Johnson (1980) that body-part metaphors, such as *leg of the table*, are conventionalized. If their assumption is correct, these 'dead' metaphors would only activate areas in the brain which are responsible for processing semantic knowledge. Therefore, motor sensory or spatial attention areas in the brain should not be affected by the metaphor. This would also prove or dismiss the claim by Kraska-Szlenk (2014) that body-part metaphors are an argument for the embodiment hypothesis. Furthermore, one could test if the term 'leg' activates similar areas as 'leg of the table'. Second, an fMRI experiment which includes body-part metaphors relating to either the shape dimension or the function dimension could investigate the information retrieved from different brain areas. The former body-part metaphors, such as *eye of the potato*, should evoke activation in areas of the brain which are responsible for visual properties, whereas the latter would activate areas in which semantic knowledge is processed, for example, *eye of the house*. This would underpin the assumptions by Tilbe (2017) that shape is derived from raw sensory data and function from encyclopedic knowledge. Third, an EEG study could investigate the processing of body-part metaphors. While presenting sentences, which include body-part metaphors, the N400 could be analyzed in EEGs of participants with different native languages. If a Japanese speaker sees a body-part metaphor which is conventionalized in her language, I would predict that the N400 effect does not appear. A body-part metaphor which is specific to another language should evoke an N400 because the speaker has difficulty to integrate the unknown body-part metaphor into the context. The third condition would present a sentence with a body-part metaphor which is not present in Japanese, but common in other languages. In this case, the N400 effect would be not as striking as in the second condition.

From a cross-linguistic perspective, future studies could examine which mapping direction is more common in the languages of the world. To my knowledge, no systematic studies exist that investigate whether the body is more commonly used as a source domain or a target domain. Other typological approaches could provide insights into how the differences in the cultural background of a specific language community shapes body-part metaphors. One example would be a study that compiles body-part metaphors in different cultures in which Spanish is the official language. I would expect that some body-part metaphors are cross-cultural, whereas

others are specific to a certain group of speakers. In addition, a look at the grammars of the languages could answer the question of whether the grammar of a language influences the use of body-part metaphors. This could provide an explanation of why different grammatical forms are used to express body-part metaphors in the same language. Furthermore, additional knowledge about how languages align objects in space must be established to predict the choice of body-part terms for a specific object feature. Studies, such as O'Meara & Pérez Báez (2011) which examine the spatial frames of reference in Mesoamerican languages, could give insights into the different choices of body-part terms referring to the same object or landscape feature in diverse languages.

The study of body-part metaphors in object and landscape terms provides an ideal seed-bed for further endeavors.

4 Conclusion

In this thesis, I investigated the phenomenon 'body-part metaphor'. The literature overview in Chapter 2 showed a variety of assumptions concerning body-part metaphors. Different scholars examined the phenomenon from various angles. However, systematic studies are still scarce. As of yet, the theoretical foundation of body-part metaphors and their basis have not been fully explored. Nevertheless, the present thesis demonstrated that body-part metaphors shed light on categorization principles which may be determined by our cognitive system.

Studies which discussed the relation between metaphor and cognition claimed, on the one hand, that body-part metaphors are not systematically used (Lakoff & Johnson, 1980) and, on the other hand, that they are a common cross-linguistic pattern (cf. Filippone 2006; Kraska-Szlenk 2014). The data in this thesis supports the latter assumption. Furthermore, some studies indicated that body-part metaphors might be evidence for the embodiment hypothesis (cf. Goschler 2005a; Kraska-Szlenk 2014; Ibarretxe-Antuñano 2012). However, my study did not further pursue this claim because the theoretical and empirical expectations of this approach were not apparent. In addition, while comparing two different languages (English and Farsi), Atef-Vahid & Zahedi (2013) concluded that most body metaphors are language-specific. They explained the variance between the languages with the cultural background of the speakers. Although this assumption is present in various studies (cf. Atef-Vahid & Zahedi 2013; Kraska-Szlenk 2014; Burenhult & Levinson 2008; Ibarretxe-Antuñano 2012), it does not lead to verifiable predictions for variance across languages.

Moreover, I discussed studies which examined semantic universals and revealed the hypothesis that some body-part metaphors might be commonly used in a variety of languages (Ullmann, 1963). In general, the similarity between a body-part and an object or landscape feature and in particular, the similarity in the dimensions of shape, spatial alignment, and function were suggested to be the basis of body-part metaphors (cf. Ullmann (1963); Kraska-Szlenk 2014; Filippone 2006; Andersen 1978; Enfield et al. 2006; Levinson 1994; Tilbe 2017). The results of the present study showed that the three dimensions seem to play a role in the transfer of body-part terms to object and landscape features. However, in some cases, the pivotal dimension is not always distinctive. The question of the determining factor for the transfer of body-part terms to object and landscape features is still unanswered. In addition, some studies showed

that languages can differ in terms of how productively they use body-part metaphors to categorize their environment and object features (cf. Burenhult & Levinson 2008; Tilbe 2017). The findings of my study support this observation although the reason for these differences is still to be discovered.

Furthermore, I examined studies which investigated the three dimensions of similarity in more detail. The studies by Levinson (1994) and Tilbe (2017) demonstrated that Mesoamerican languages productively use the shape and the space dimension to map body-part terms to object properties. The systematic investigation in Tilbe (2017) showed that variation between languages could be due to their preference for a specific dimension. This hypothesis was of special interest for the present study because it was the only verifiable hypothesis found in the literature which could predict language variation. The results of my analysis showed that Tilbe's approach is promising. Nevertheless, in some cases, the three dimensions fail to account for a certain body-part term choice in a particular body-part metaphor (Khoekhoe: *mouth of the arrow* 'tip of the arrow'). Examples, such as *tooth of the garlic* 'garlic clove', *mouth/lip of the bottle* 'bottle opening', and *arm of the chair* 'armrest', illustrate that the dimensions of shape, spatial alignment, and function may not be exhaustive. Therefore, I suggest to extend the classification scheme with the dimensions of color, point of contact, and spatial continuity/proximity. Furthermore, the correlation between the frequency of the body-part metaphors and their categorization into the three dimensions indicated that the number of dimensions may be the determining factor for their frequency. This finding specifies the factor of 'obvious similarity' which was suggested by Ullmann (1963). In addition, other factors, such as 'degree of similarity' could also determine the frequency of body-part metaphors, e.g., *leg of the tree* 'root'. However, the body-part metaphors which are frequent although they are categorized in one to two dimensions may also account for the assumption that the shape, spatial alignment, and function are not necessarily solely responsible for the mapping of a body-part term to an object or landscape feature.

In conclusion, the exploratory design of the present study provided various insights into the occurrence of body-part metaphors in a wide range of languages and raised further questions. The results of this thesis support the hypothesis that differences between languages in terms of their use of body-part metaphors may be due to their preference for a certain dimension. However, the proposed dimensions (shape, space, function) do not include all factors which could determine the transfer of a body-part term to an object or landscape feature. In addition, the qualitative analysis of individual body-part metaphors raises the question of whether language variation can be explained with the preference of a language for an egocentric versus object-centric model in comparison to an anthropomorphic versus zoomorphic model. Even though the distinction between the two models might not always be apparent, further studies need to account for their effect on a certain mapping. The body-part metaphors investigated in this thesis together with the additional collection of body-part metaphors in the languages of the sample could be a starting point for future research endeavors. In my opinion, the study of body-part metaphors is a promising research field which could provide crucial insights into fundamental aspects of our conceptual system and the connection between body and mind.

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A Seed List of Body-Part Metaphors

Tab. A.1: Seed list of body-part metaphors.

Body-part metaphor	Meaning	Body-part term	Shape	Function	Space
body of the bottle	bottle	body	0	1	0
neck of the bottle	bottle neck	neck	1	0	1
butt of the bottle	bottom of the bottle	butt	0	1	0
mouth of the bottle	bottle opening	mouth	1	1	0
heart of the appel	apple's core	heart	0	0	1
toes of the garlic	garlic clove	toe	1	0	0
heart of the artichoke	heart of the artichoke	heart	0	0	1
lettuce head	lettuce	head	1	0	0
heart of the lettuce	inside of the lettuce	heart	0	0	1
hand of banana	hand of banana	hand	1	0	0
eye of the cheese	holes in cheese	eye	1	1	0
skin of the fruit	skin of the fruit	skin	0	1	0
heart of the cabbage	inside of the cabbage	heart	0	0	1
skin of the sausage	casings	skin	0	1	0
ear of the corn	ear of a corn	ear	0	0	1
skin of the corn	skin of the corn	skin	0	1	0
eye of the potato	eye of the potato	eye	1	0	0
heart of the onion	inside of the onion	heart	0	0	1
butt of the baguette	bottom of baguette	butt	0	0	1
eye of the bread	hole in bread	eye	1	1	0
head of the baguette	head of baguette	head	0	0	1
heart of the bread	bread crumb	heart	0	0	1
back of the house	back of house	back	0	0	1
eye of the house	window	eye	0	1	0
head of the house	roof	head	0	0	1
mouth of the house	door	mouth	0	1	0
neck of the house	chimney	neck	1	0	0
hand of the door	doorknob	hand	0	1	0
mouth of the doorway	doorway	mouth	0	1	0
foot of the staircase	foot of the staircase	foot	0	0	1
head of the staircase	head of the staircase	head	0	0	1
head of the bed	head of the bed	head	0	0	1
leg of the bed	leg of the bed	leg	1	1	1
eye of the piano	piano keys	eye	1	0	0
leg of the table	leg of the table	leg	1	1	1
ear of the pot	handle of the pot	ear	1	0	0
mouth of the pot	lid	mouth	0	1	0
eye of the knife	blade of the knife	eye	0	1	0
hand of the knife	handle of the knife	hand	0	1	0
arm of the chair	arm of the chair	arm	0	0	1
leg of the chair	leg of the chair	leg	1	1	1
eye of the needle	eye of the needle	eye	1	1	0
pinhead	pinhead	head	1	0	1
arm of the pullover	sleeve	arm	1	0	1
sole of the shoe	shoe sole	sole	0	0	1
pants leg	pants leg	leg	1	0	1
body of the vase	body of the vase	body	1	1	0
eye of the ladder	rung	eye	0	1	0
head of the ladder	head of ladder	head	0	0	1
leg of the ladder	leg of the ladder	leg	1	1	0
ear of the jug	handle of the jug	ear	1	0	1
mouth of the jug	opening of the jug	mouth	1	1	0
back of the book	book spine	back	0	0	1
body of the instrument	body of the instrument	body	0	1	0
head of the guitar	head of guitar	head	0	0	1
neck of the guitar	neck of the guitar	neck	1	0	1
saw tooth	saw tooth	tooth	1	1	0
eye of the arrow	tip of an arrow	eye	0	1	0
ear of the pistol	trigger	ear	1	0	0
eye of the net	mesh of a net	eye	1	0	0

Tab. A.1: Seed list of body-part metaphors. *(continued)*

Body-part metaphor	Meaning	Body-part term	Shape	Function	Space
bulls eye	porthole	eye	1	1	0
nose of the boat	prow of the boat	nose	1	0	1
eye of the compass	compass needle	eye	0	1	0
foot of the monument	foot of the monument	foot	0	1	1
eye of the storm	eye of the storm	eye	1	0	0
arm of the tree	branches	arm	1	0	1
bottom of the tree	bottom of tree	butt	0	0	1
eye of the wood	knot in wood	eye	1	1	0
leg of the tree	roots	leg	1	1	1
eye of the plant	budding part of plant	eye	1	0	0
rib of the leaf	rib of the leaf	rib	1	1	0
vein of the leaf	leaf veins	vein	1	1	0
back of the mountain	back of the mountain	back	0	0	1
face of the sky	sun	face	1	0	0
foot of the mountain	foot of the mountain	foot	0	1	1
head of the mountain	top of the mountain	head	0	0	1
neck of the mountain	neck of the mountain	neck	0	0	1
nose of the mountain	ledge of the mountain	nose	1	0	0
shoulder of the mountain	shoulder of the mountain	shoulder	1	0	1
face of the mountain	surface of the mountain	face	0	1	1
throat of the mountain	inside of the mountain	throat	0	0	1
arm of the river	arm of the river	arm	1	0	1
mouth of the river	mouth of the river	mouth	0	1	0
water vein	water vein	vein	1	1	0
bottom of the valley	bottom of the valley	butt	0	0	1
eye of the water	water spring	eye	1	0	0
knee of the water	waves	knee	1	1	0
nose of the land	cape of land	nose	1	0	0
on the foot of the brink	on the edge of the abyss	foot	0	0	1
face of the ocean	coast	face	0	1	0
arm of the ocean	estuary	arm	1	0	0
tongue of the land	headland	tongue	1	0	0

B Pictures for Body-Part Metaphor Elicitation

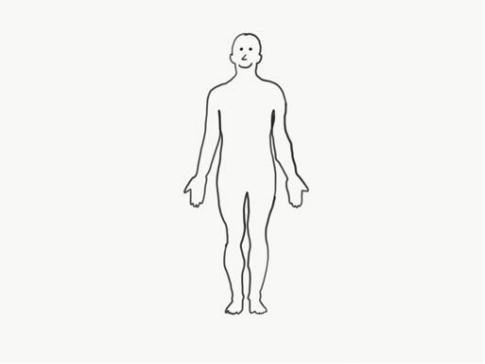

Fig. B.1: Picture of a human for eliciting the body-parts in each language.

Fig. B.2: Picture of the body-part metaphors *body/bottom/neck/mouth of the bottle*.

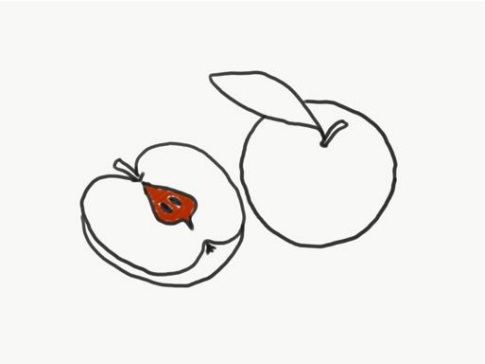

Fig. B.3: Picture of the body-part metaphor *heart of the appel*.

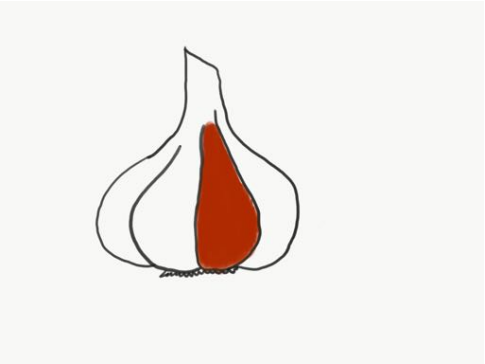

Fig. B.4: Picture of the body-part metaphor *toes of the garlic*.

Fig. B.5: Picture of the body-part metaphor *heart of the artichoke*.

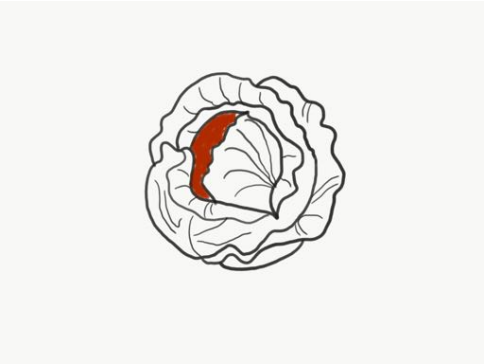

Fig. B.6: Picture of the body-part metaphors *heart of the lettuce* and *lettuce head*.

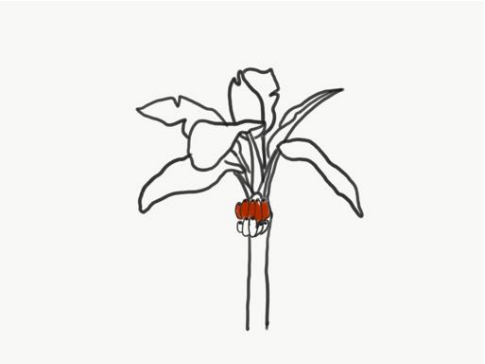

Fig. B.7: Picture of the body-part metaphor *hand of banana*.

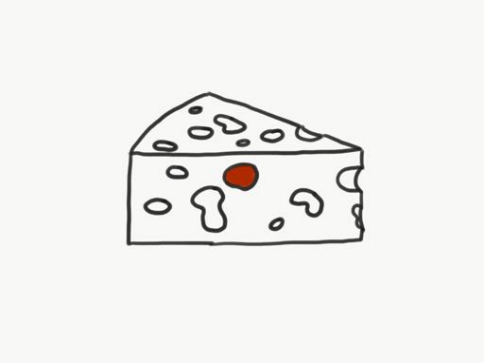

Fig. B.8: Picture of the body-part metaphor *eye of the cheese*.

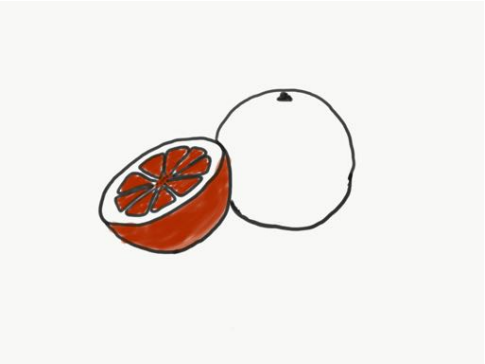

Fig. B.9: Picture of the body-part metaphor *skin of the fruit*.

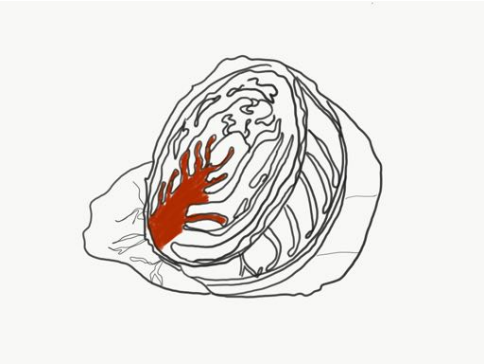

Fig. B.10: Picture of the body-part metaphor *heart of the cabbage*.

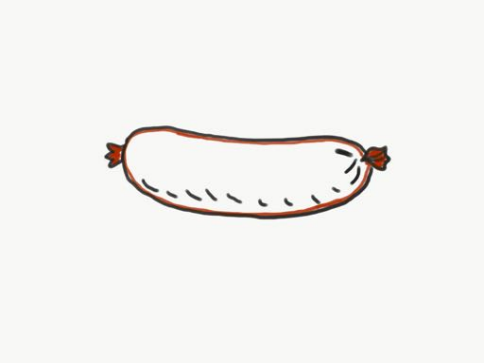

Fig. B.11: Picture of the body-part metaphor *skin of the sausage*.

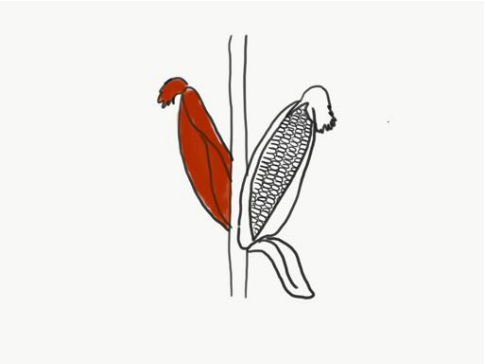

Fig. B.12: Picture of the body-part metaphors *ear/skin of the corn*.

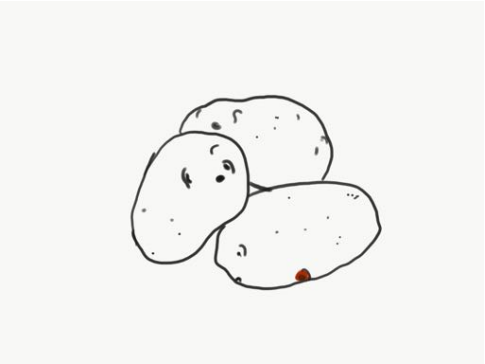

Fig. B.13: Picture of the body-part metaphor *eye of the potato*.

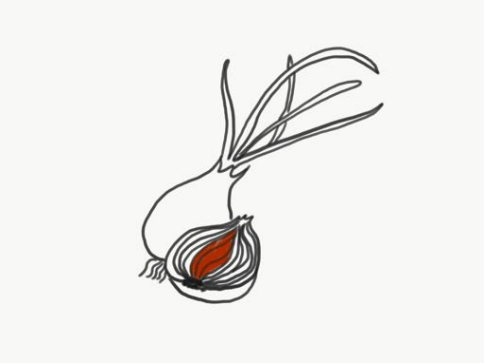

Fig. B.14: Picture of the body-part metaphor *heart of the onion*.

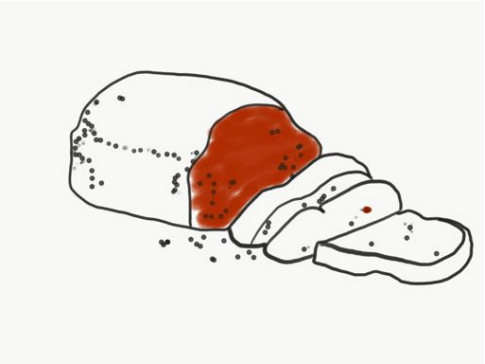

Fig. B.15: Picture of the body-part metaphors *eye/heart/bottom/head of the bread/baguette*.

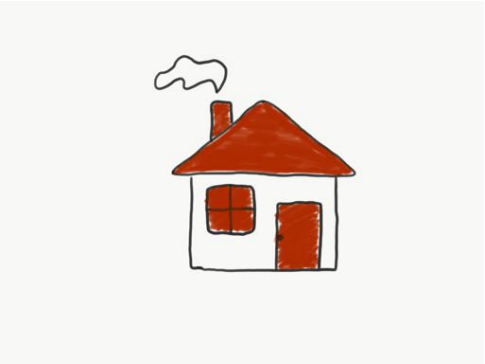

Fig. B.16: Picture of the body-part metaphors *mouth/eye/head/neck/back of the house*.

Fig. B.17: Picture of the body-part metaphors *mouth of the doorway* and *hand of the door*.

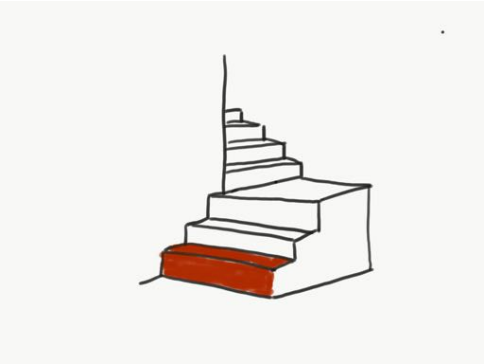

Fig. B.18: Picture of the body-part metaphors *foot/head of the staircase*.

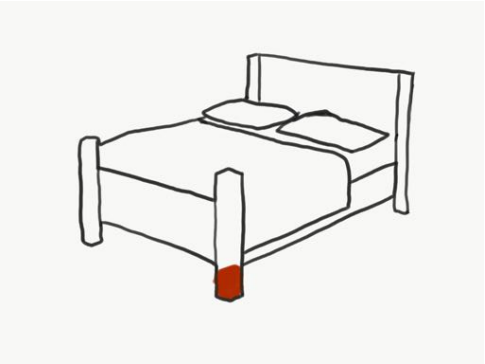

Fig. B.19: Picture of the body-part metaphors *head/leg of the bed*.

Fig. B.20: Picture of the body-part metaphor *eye of the piano*.

Fig. B.21: Picture of the body-part metaphor *leg of the table*.

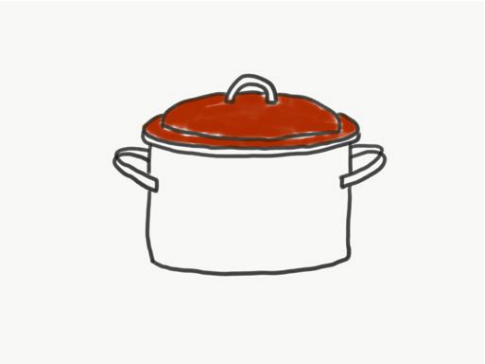

Fig. B.22: Picture of the body-part metaphors *mouth/ear of the pot*.

Fig. B.23: Picture of the body-part metaphors *eye/hand of the knife*.

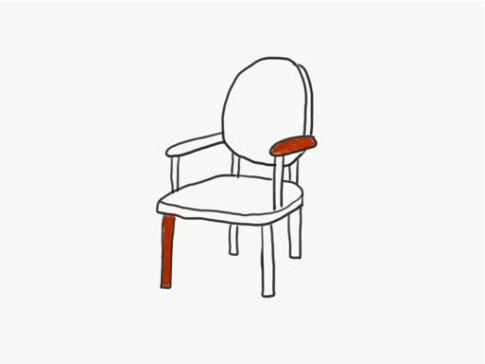

Fig. B.24: Picture of the body-part metaphors *arm/leg of the chair*.

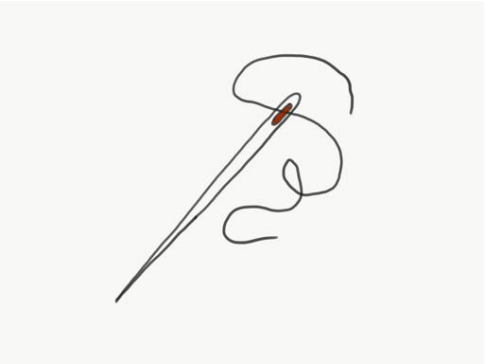

Fig. B.25: Picture of the body-part metaphor *eye of the needle*.

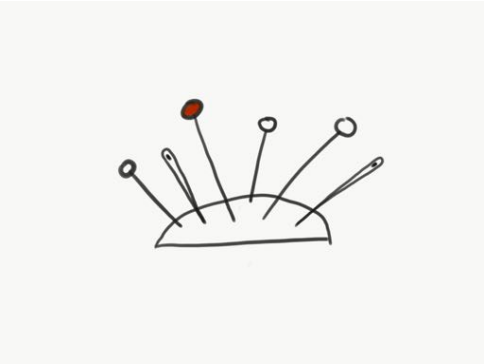

Fig. B.26: Picture of the body-part metaphor *pinhead*.

Fig. B.27: Picture of the body-part metaphor *arm of the pullover*.

Fig. B.28: Picture of the body-part metaphor *sole of the shoe*.

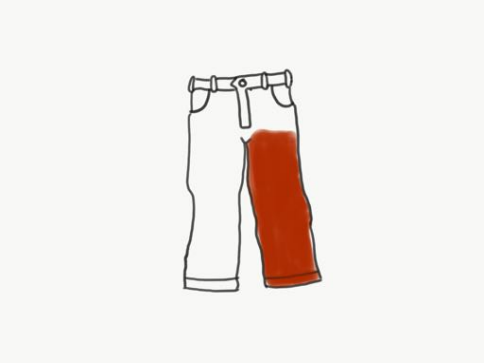

Fig. B.29: Picture of the body-part metaphor *pants leg*.

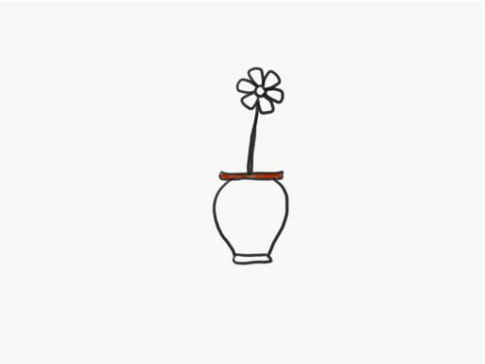

Fig. B.30: Picture of the body-part metaphor *body of the vase*.

Fig. B.31: Picture of the body-part metaphors *eye/head/leg of the ladder*.

Fig. B.32: Picture of the body-part metaphors *ear/mouth of the jug*.

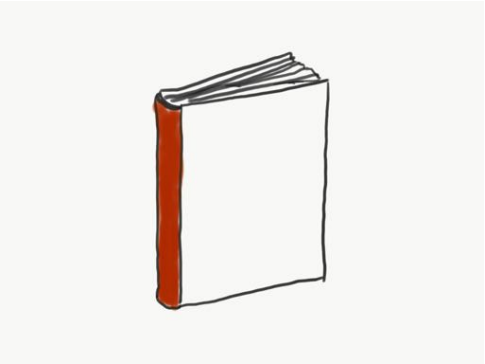

Fig. B.33: Picture of the body-part metaphor *back of the book*.

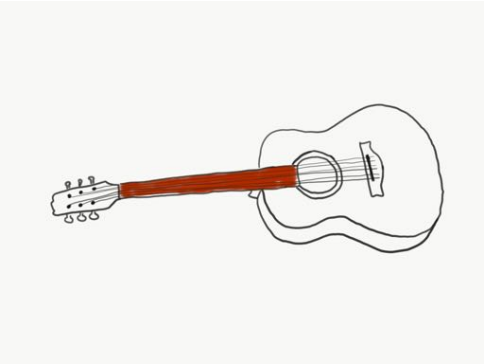

Fig. B.34: Picture of the body-part metaphors *head/body/neck of the guitar*.

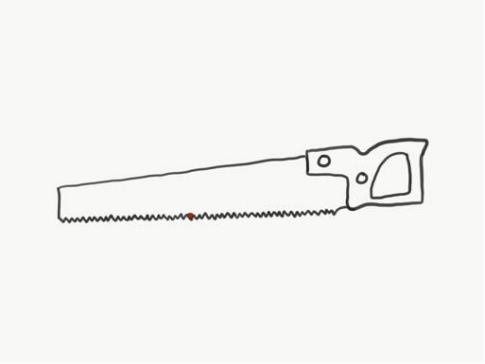

Fig. B.35: Picture of the body-part metaphor *sawtooth*.

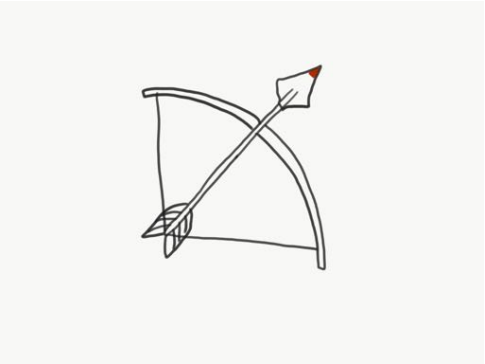

Fig. B.36: Picture of the body-part metaphor *eye of the arrow*.

Fig. B.37: Picture of the body-part metaphor *ear of the pistol*.

Fig. B.38: Picture of the body-part metaphor *eye of the net*.

Fig. B.39: Picture of the body-part metaphors *bulls eye* and *nose of the boat*.

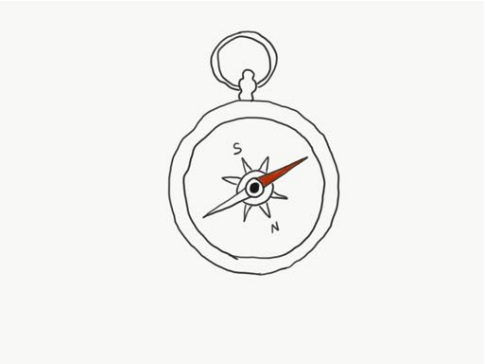

Fig. B.40: Picture of the body-part metaphor *eye of the compass*.

Fig. B.41: Picture of the body-part metaphor *foot of the monument*.

Fig. B.42: Picture of the body-part metaphor *eye of the storm*.

Fig. B.43: Picture of the body-part metaphors *bottom/leg/arm of the tree* and *eye of the wood*.

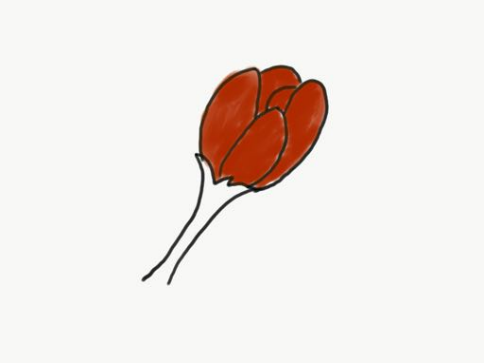

Fig. B.44: Picture of the body-part metaphor *eye of the plant*.

Fig. B.45: Picture of the body-part metaphors *rib/vein of the leaf*.

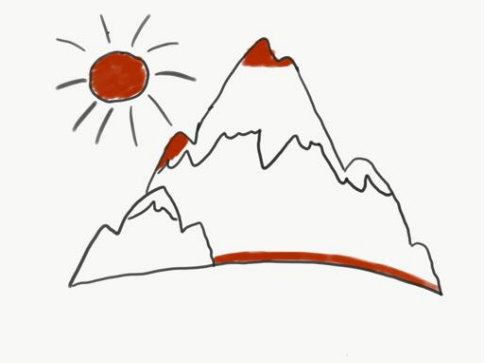

Fig. B.46: Picture of the body-part metaphors *nose/throat/face/neck/shoulder/head/back/foot of the mountain* and *face of the sky*.

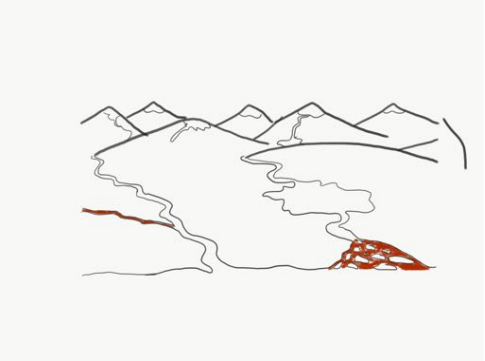

Fig. B.47: Picture of the body-part metaphors *water vein* and *arm/mouth of the river*.

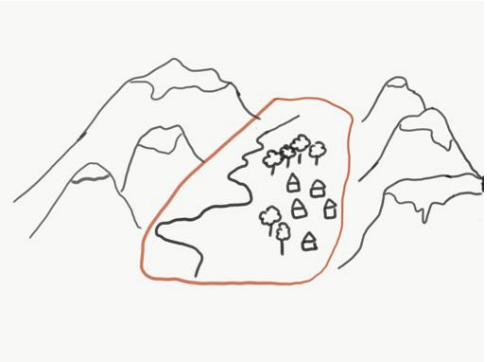

Fig. B.48: Picture of the body-part metaphor *bottom of the valley*.

Fig. B.49: Picture of the body-part metaphor *eye of the water*.

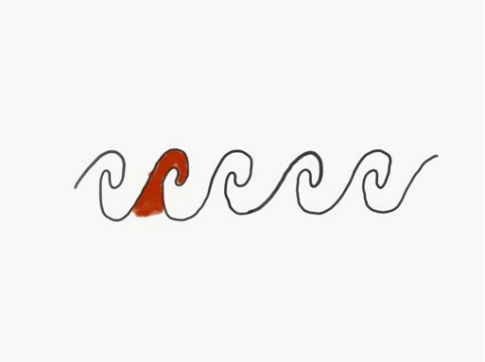

Fig. B.50: Picture of the body-part metaphor *knee of the water*.

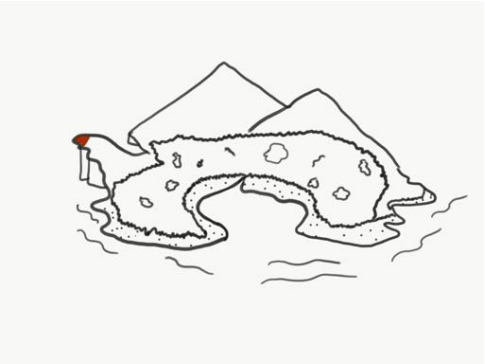

Fig. B.51: Picture of the body-part metaphors *nose of the land* and *on the foot of the brink*.

Fig. B.52: Picture of the body-part metaphor *face of the ocean*.

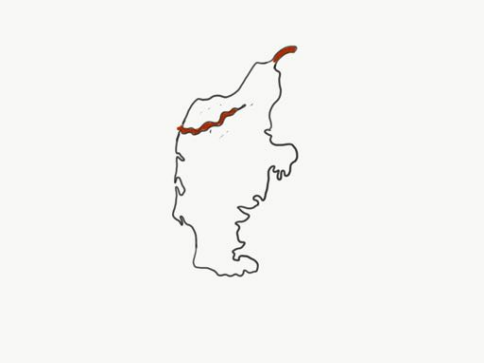

Fig. B.53: Picture of the body-part metaphors *arm of the ocean* and *tongue of the land*.

C Body-Part Metaphors in the Language Sample

Wolof

Tab. C.1: Body-part metaphors in Wolof.

Body-part metaphor	Wolof	Glosses
neck of the bottle	baat-u bouteille	neck-GEN bottle
butt of the bottle	taat-u bouteille	butt-GEN bottle
mouth of the bottle	gémmiñ-u bouteille	mouth-GEN bottle
lettuce head	bopp-u salade	head-GEN salad
hand of banana	loxo- banana	hand-GEN banana
skin of the fruit	der-u pomme	skin-GEN apple
skin of the corn	der-u mboq	skin-GEN corn
butt of the baguette	taat-u mburu	butt-GEN bread
head of the baguette	bopp-u mburu	head-GEN bread
back of the house	ginàw- kër	back-GEN house
head of the staircase	bopp-u escalliers	head-GEN stairs
head of the bed	bopp-u lal	head-GEN bed
leg of the bed	tank-u lal	leg-GEN bed
leg of the table	tank-u table	leg-GEN table
ear of the pot	nopp-u cin	ear-GEN pot
leg of the chair	tank-u chaise	leg-GEN chair
eye of the needle	bët-u pusso	eye-GEN needle/pin
pinhead	bopp-u pusso	head-GEN needle/pin
arm of the pullover	loxo- jacket	arm-GEN jacket
pants leg	tank-u tubëy	leg-GEN trouser
head of the ladder	bopp-u échelle	head-GEN ladder
leg of the ladder	tank-u échelle	leg-GEN ladder
ear of the jug	nopp-u karaaf	ear-GEN jug
mouth of the jug	gémmiñ-u karaaf	mouth-GEN jug
head of the guitar	bopp-u ngalam	head-GEN guitar
neck of the guitar	baat-u ngalam	neck-GEN guitar
saw tooth	bëñ-u scie	tooth-GEN saw
eye of the net	bët-u mbaal	eye-GEN net
nose of the boat	bopp-u gaal	head-GEN kanu
foot of the monument	taat-u monument	butt-GEN monument
arm of the tree	loxo- garab	arm-GEN tree
bottom of the tree	taat-u garab	butt-GEN tree
eye of the wood	bët-u garab	eye-GEN tree
leg of the tree	tank-u garab	leg-GEN tree
face of the sky	bët-u assamaan / jant	eye-GEN sky
foot of the mountain	tank-u mon.tañ	foot-GEN mountain

Czech

Tab. C.2: Body-part metaphors in Czech.

Body-part metaphor	Czech	Glosses
lettuce head	hlávka salát-u	head salad-GEN
skin of the fruit	kůže pomerančov-á	skin orange-GEN

Tab. C.2: Body-part metaphors in Czech. *(continued)*

Body-part metaphor	Czech	Glosses
butt of the baguette	patk-a chleb-a	heel-DIM bread-GEN
head of the baguette	patk-a chleb-a	heel-DIM bread-GEN
back of the house	záď dom-u	back house-GEN
eye of the house	okno	window
head of the bed	čelo postel-e	forehead bed-GEN
leg of the bed	noha postel-e	leg bed-GEN
leg of the table	noha stol-u	leg table-GEN
ear of the pot	ucho hrnc-e	ear pot-GEN
leg of the chair	noha židl-e	leg chair-GEN
eye of the needle	ouško jehl-y	ear needle-GEN
pinhead	hlavička špendlík-u	head-DIM pin-GEN
arm of the pullover	rukáv tričk-a	hand/arm t-shirt-GEN
pants leg	nohavice kalhot	leg trousers-GEN
ear of the jug	ucho džbán-u	ear jug-GEN
body of the instrument	tělo kytar-y	body guitar-GEN
saw tooth	zub pil-y	tooth saw-GEN
eye of the net	síťové oko	net-ADJ eye
eye of the storm	v oku hurikánu	in eye hurrican-GEN
arm of the river	rameno řek-y	shoulder river-GEN
mouth of the river	ústí řek-y	mouth river-GEN

Vietnamese

Tab. C.3: Body-part metaphors in Vietnamese.

Body-part metaphor	Vietnamese	Glosses
neck of the bottle	cổ chai	neck bottle
mouth of the bottle	miệng chai	mouth bottle
eye of the potato	mắt khoai.tây	eye potato
butt of the baguette	đầu bánh	head bread
head of the baguette	đầu bánh	head bread
head of the house	đầu nhà	head house
hand of the door	tay cửa	arm/hand door
foot of the staircase	chân cầu.thang	leg/foot stairs
head of the staircase	đầu cầu.thang	head stairs
head of the bed	đầu giường	head bed
leg of the bed	chân giường	leg/foot bed
leg of the table	chân bàn	leg/foot table
mouth of the pot	miệng nồi	mouth pot
hand of the knife	tay cầm	hand hold
arm of the chair	tay dựa	hand lean.on
leg of the chair	chân ghế	leg/foot chair
pinhead	đầu kim	head needle
arm of the pullover	tay áo	arm/hand shirt
leg of the ladder	chân thang	leg/foot ladder
mouth of the jug	miệng bình/lọ	mouth vase/jar/jug
back of the book	gáy sách	back.neck book
saw tooth	răng cưa	tooth saw

Tab. C.3: Body-part metaphors in Vietnamese. *(continued)*

Body-part metaphor	Vietnamese	Glosses
eye of the arrow	mũi tên	nose arrow
eye of the net	mắt lưới	eye net
nose of the boat	mũi tàu/thuyền	nose boat
eye of the storm	mắt bão	eye storm
arm of the tree	cánh cây	upper.arm tree
vein of the leaf	gân lá	tendon leaf
face of the sky	mặt trời	face sky
foot of the mountain	chân núi	leg/foot mountain
shoulder of the mountain	vai núi	shoulder mountain
eye of the water	đầu sông	head river
face of the ocean	mặt nước	face water

Mandarin Chinese

Tab. C.4: Body-part metaphors in Mandarin Chinese.

Body-part metaphor	Mandarin Chinese	Transcription	Glosses
body of the bottle	瓶身	píng shēn	bottle body
neck of the bottle	瓶颈	píng jǐng	bottle neck
mouth of the bottle	瓶口	píng kǒu	bottle mouth
heart of the lettuce	菜心	cài xīn	lettuce heart
skin of the fruit	橘皮	jú pí	orange skin
heart of the onion	洋葱心	yáng.cōng xīn	onion heart
hand of the door	门把手	mén bǎ shǒu	door grab hand
mouth of the doorway	门口	mén kǒu	door mouth
head of the bed	床头	chuáng tóu	bed head
leg of the bed	床腿	chuáng tuǐ	bed leg
leg of the table	桌腿	zhuō tuǐ	table leg
arm of the chair	椅子扶手	Yǐ.zi fú.shǒu	chair help.hand
leg of the chair	椅子腿	yǐ.zi tuǐ	chair leg
eye of the needle	针眼	zhēn yǎn	needle/pin eye
sole of the shoe	鞋掌	xié zhǎng	shoe palm
pants leg	裤腿	kù tuǐ	trousers leg
body of the vase	瓶身	píng shēn	vase body
leg of the ladder	梯子腿	tī.zi tuǐ	ladder leg
mouth of the jug	壶口	hú kǒu	jug mouth
back of the book	书脊	shū jí	book back
body of the instrument	吉他身	jí.tā shēn	guitar body
head of the guitar	吉他头	jí.tā tóu	guitar head
neck of the guitar	吉他颈	jí.tā jǐng	guitar neck
saw tooth	锯齿	jù chǐ	saw tooth
eye of the arrow	箭头	jiàn tóu	arrow head
nose of the boat	船头	chuán tóu	boat head
foot of the monument	纪念碑脚	jì.niàn.bēi jiǎo	monument foot
eye of the storm	台风眼	tái.fēng yǎn	storm eye
back of the mountain	山脊	shān jǐ	mountain back
foot of the mountain	山脚	shān jiǎo	mountain foot
head of the mountain	山头	shān tóu	mountain head

Tab. C.4: Body-part metaphors in Mandarin Chinese. *(continued)*

Body-part metaphor	Mandarin Chinese	Transcription	Glosses
mouth of the river	河口	hé kǒu	river mouth
eye of the water	泉眼	quán yǎn	spring eye
face of the ocean	海面	hǎi miàn	ocean face

Hungarian

Tab. C.5: Body-part metaphors in Hungarian.

Body-part metaphor	Hungarian	Glosses
neck of the bottle	az üveg nyak-a	ART bottle neck-POSS.3SG
mouth of the bottle	az üveg száj-a	ART bottle mouth-POSS.3SG
lettuce head	egy fej salát-a	ART head salad-POSS.3SG
back of the house	a ház hát-a	ART house back-POSS.3SG
head of the bed	az ágy fej-a	ART bed head-POSS.3SG
leg of the bed	az ágy láb-a	ART bed leg/foot-POSS.3SG
leg of the table	asztal.láb	table.leg/foot
ear of the pot	a fozik fül-e	ART pot ear-POSS.3SG
mouth of the pot	a fozik száj-a	ART pot mouth-POSS.3SG
arm of the chair	a szék kar-ja	ART chair arm-POSS.3SG
leg of the chair	szék.láb	chair.leg/foot
eye of the needle	a tű szem-e	ART needle eye-POSS.3SG
pinhead	gombostű.fej	pin.head
arm of the pullover	a pulóver kar-ja	ART pullover arm-POSS.3SG
sole of the shoe	cipő.talp	shoe.sole
leg of the ladder	a létra láb-a	ART ladder leg/foot-POSS.3SG
ear of the jug	a korsó fül-e	ART jug ear-POSS.3SG
mouth of the jug	a korsó száj-a	ART jug mouth-POSS.3SG
back of the book	a könyv gerinc-e	ART book spine-POSS.3SG
body of the instrument	a gitár test-e	ART guitar body-POSS.3SG
neck of the guitar	a gitár nyak-a	ART guitar neck-POSS.3SG
saw tooth	a fűrész fog-a	ART saw tooth-POSS.3SG
foot of the monument	a szobor láb-a	ART statue leg/foot-POSS.3SG
leg of the tree	a fa láb-a	ART tree leg/foot-POSS.3SG
vein of the leaf	levél.ér	leaf.vein
back of the mountain	hegy.hát	mountain.back
foot of the mountain	a hegy láb-a	ART mountain leg/foot-POSS.3SG
mouth of the river	a folyó száj-a	ART river mouth-POSS.3SG
tongue of the land	sziget.nyelv	island.tongue

Japanese

Tab. C.6: Body-part metaphors in Japanese.

Body-part metaphor	Japanese	Transcription	Glosses
mouth of the bottle	瓶の飲み口	bin no nomi.kuchi	bottle GEN drink.mouth
skin of the fruit	リンゴの皮	ringo no kawa	apple GEN skin

Tab. C.6: Body-part metaphors in Japanese. *(continued)*

Body-part metaphor	Japanese	Transcription	Glosses
skin of the sausage	ソFセFジの皮	sōsēji no kawa	sausage GEN skin
leg of the bed	ベッドの脚	beddo no ashi	bed GEN leg
leg of the table	机の脚	tsukue no ashi	table GEN leg
ear of the pot	鍋の持ち手	nabe no mochi.te	pot GEN have.hand
leg of the chair	椅子の脚	isu no ashi	chair GEN leg
pants leg	ズボンの脚	zubon no ashi	trousers GEN leg
ear of the jug	かめ (瓶) の持ち手	kame no mochi.te	jug GEN have.hand
back of the book	本の背	hon no se	book GEN back
body of the instrument	ギタFのボディ	gitā no bodī	guitar GEN body
neck of the guitar	ギタFのネック	gitā no kubi	guitar GEN neck
sawtooth	鋸のF	nokogiri no ha	saw GEN tooth
eye of the net	網の目	ami no me	net GEN eye
eye of the storm	台風の目	taifū no me	typhoon GEN eye
vein of the leaf	洋F	yō myaku	leaf pulse/vein

Turkish

Tab. C.7: Body-part metaphors in Turkish.

Body-part metaphor	Turkish	Glosses
mouth of the bottle	şişe-nin ağzı	bottle-GEN mouth
toes of the garlic	sarımsağ-ın dişi	garlic-GEN tooth
heart of the cabbage	lahana-nın göbeği	cabbage-GEN belly
skin of the sausage	sosis-in derisi	suasage-GEN skin
hand of the door	kapı-nın kolu	door-GEN hand
mouth of the doorway	kapı-nın ağzı	door-GEN mouth
foot of the staircase	merdiven-in başı	stair-GEN head
head of the bed	yatağ-ın başı	bed-GEN head
leg of the bed	yatağ-ın ayağı	bed-GEN foot
leg of the table	masa-nın ayağı / bacağı	table-GEN foot/leg
mouth of the pot	tencere-nın ağzı	pot-GEN mouth
arm of the chair	sandalye-nın kolu	chair-GEN arm
leg of the chair	sandalye-nın (ayağı) bacağı	chair-GEN (foot) leg
pinhead	iğne-nin kafası	pin-GEN head
arm of the pullover	kazağ-ın kolu	pullover-GEN arm
sole of the shoe	ayakkabı-nın tabanı	shoe-GEN sole
body of the vase	vazo-nun gövdesi	vase-GEN body
leg of the ladder	merdive-nin bacakları	ladder-GEN legs
ear of the jug	sürahi-nin kolu	jug-GEN arm
mouth of the jug	sürahi-nin ağzı	jug-GEN mouth
body of the instrument	gitar-ın gövdesi	guitar-GEN body
saw tooth	testere-nin dişleri	saw-GEN teeth
nose of the boat	gemi-nin burnu	boat-GEN nose
eye of the compass	pusula-nın kolu	compass-GEN arm
arm of the tree	ağac-ın kolları	tree-GEN arms
vein of the leaf	yaprağ-ın damarları	leaf-GEN veins
back of the mountain	dağ-ın sırtlarında	mountain-GEN backs
arm of the river	nehr-in kolları	river-GEN arms
mouth of the river	nehr-in ağzı	river-GEN mouth

Tab. C.7: Body-part metaphors in Turkish. *(continued)*

Body-part metaphor	Turkish	Glosses
nose of the land	Ümit Burnu	hope nose
arm of the ocean	okyanus-un kolu	ocean-GEN arm

Bahasa Indonesia

Tab. C.8: Body-part metaphors in Bahasa Indonesia.

Body-part metaphor	Bahasa Indonesia	Glosses
neck of the bottle	leher botol	neck bottle
butt of the bottle	pantat botol	butt bottle
mouth of the bottle	bibir botol	lip bottle
skin of the fruit	kulit buon jeruk	skin CLF.fruit orange
skin of the sausage	kulit paging sosis	skin CLF.meat sausage
skin of the corn	kulit jagung	skin corn
back of the house	bagian belakang ruman	part back house
leg of the bed	kaki tempat.tidur	leg bed
leg of the table	kaki meja	leg table
arm of the chair	lengan kursi	arm chair
leg of the chair	kaki kursi	leg chair
eye of the needle	mata jarum	eye needle/pin
pinhead	kepala jarum	head needle/pin
arm of the pullover	lengan sweater	arm sweater
sole of the shoe	alas sepatu	sole shoe
leg of the ladder	kaki tangga	leg stair/ladder
mouth of the jug	mulut botol.minum	mouth jug
body of the instrument	badan gitar	body guitar
neck of the guitar	tangan gitar	hand guitar
saw tooth	gigi gergagi	tooth saw
eye of the net	mata jaring	eye net
arm of the tree	lengan pohon	arm tree
eye of the wood	mata pohon	eye tree
vein of the leaf	urat daun	vein leaf
back of the mountain	bagian belakang gunung	part back mountain
face of the mountain	muka gunung	face mountain
eye of the water	mata air	eye water
face of the ocean	bibir pantai	lip beach

Persian

Tab. C.9: Body-part metaphors in Persian.

Body-part metaphor	Persian	Glosses
mouth of the bottle	dahaan-eye botri	mouth-GEN bottle
skin of the fruit	pust-e porteghal khuni	skin-GEN orange blood
head of the baguette	sar-e naan	head-GEN bread
back of the house	posht-e khane	back-GEN house
hand of the door	dast-gir-eye dar	hand-grab-GEN door

Tab. C.9: Body-part metaphors in Persian. *(continued)*

Body-part metaphor	Persian	Glosses
head of the staircase	sar-e pelle	head-GEN stairs
leg of the bed	pa-ye takht	leg-GEN bed
leg of the table	pa-ye miz	leg-GEN table
ear of the pot	dast-gir-eye ghablame	hand-grab-GEN pot
hand of the knife	dast-eye chaghoo	hand-GEN knife
arm of the chair	dast-gir-eye sandali	hand-grab-GEN chair
leg of the chair	paa-yeye sandali	leg-GEN chair
sole of the shoe	tah-e kafsh	sole-GEN shoe
body of the vase	badan-eye goldan	body-GEN vase
ear of the jug	dast-gir-eye kuze	hand-grab-GEN jug
mouth of the jug	dahaan-eye kuze	mouth-GEN jug
neck of the guitar	dast-eye gittar	hand-GEN guitar
nose of the boat	sar-e ghayegh	head-GEN boat
foot of the monument	pa-yeye mojasame	foot-GEN monument
leg of the tree	pa-ye derakht	foot-GEN tree
vein of the leaf	rag-e barg	vein-GEN leaf
back of the mountain	posht-e kooh	back-GEN mountain
foot of the mountain	pa-yeye kooh	foot-GEN mountain
head of the mountain	sar-e kooh	head-GEN mountain
neck of the mountain	gardan-eye kooh	neck-GEN mountain
eye of the water	cheshm-eye aab	eye-GEN water

Marathi

Tab. C.10: Body-part metaphors in Marathi.

Body-part metaphor		Transcription	Glosses
mouth of the bottle	बाटलीचं तोंड	bāṭlī-c-a tōṇḍ	bottle-GEN-N mouth
eye of the potato	बटाट्याचे डोळे	baṭāṭ-yā-c-ē ḍōḷ-ē	potato-OBL-GEN-PL eye-PL
back of the house	घराचे मागले अंग	ghar-ā-c-ē māgl-ē aṅga	house-OBL-GEN-N back-N body
head of the bed	पलंगाचं डोकं	Palaṅg-ā-c-a ḍōka	bed-OBL-GEN-N head
leg of the bed	पलंगाचा पाय	Palaṅg-ā-c-ā pāy	bed-OBL-GEN-M leg
leg of the table	टेबलाचा पाय	ṭēbl-ā-c-ā pāy	table-OBL-GEN-M leg
ear of the pot	कढईचा कान	kaḍhaī-c-ā kān	pot-GEN-M ear
arm of the chair	खुर्चीचा हात	khurcī-c-ā hāt	chair-GEN-M arm
leg of the chair	खुर्चीचा पाय	khurcī-c-ā pāy	chair-GEN-M leg
pinhead	सुईचं डोकं/टोक	suī-c-a ḍōka/ṭōk	needle-GEN-N head/point
pants leg	पॅन्टचा पाय	pênṭ-c-ā pāy	pant-GEN-M leg
ear of the jug	जगाचा कान	jag-ā-c-ā kān	jug-OBL-GEN-M ear
sawtooth	करवतीचा दात	karvat-ī-c-ā dāt	saw-OBL-GEN-M tooth
eye of the arrow	बाणाचं नाक/टोक	bāṇ-ā-c-a nāk/ṭōk	arrow-OBL-GEN-N nose/point
eye of the compass	कंपासाचा हात/काटा	kampās-ā-c-ā hāt/kāṭā	compass-OBL-GEN-M hand/thorn
foot of the monument	स्मारकाचा पाया	smārak-ā-c-ā pāy-ā	monument-OBL-GEN-M foot-derivative
vein of the leaf	पानाच्या शीरा	pān-ā-c-yā śīr-ā	leaf-OBL-GEN-F-PL vein-PL
foot of the mountain	डोंगराचा पायथा	ḍōṅgar-ā-c-ā pāy-thā	mountain-OBL-GEN-M foot-derivative
mouth of the river	नदीचे मुख	nadī-c-ē mukha	river-M-N mouth

Tab. C.10: Body-part metaphors in Marathi. *(continued)*

Body-part metaphor		Transcription	Glosses
bottom of the valley	दरीचा पायथा	darī-c-ā pāy-thā	valley-GEN-M foot-derivative

Modern Greek

Tab. C.11: Body-part metaphors in Modern Greek.

Body-part metaphor	Modern Greek	Transcription	Glosses
neck of the bottle	λαιμός του μπουκαλιού	lem-os tou boukal-i-ou	neck-M of bottle-N-GEN
mouth of the bottle	στόμιο του φιαλιδίου	stom-io tou boukal-i-ou	mouth-N of bottle-N-GEN
heart of the artichoke	καρδιά της αγκινάρας	kardi-a tis agkinar-a-s	heart-F of artichoke-F-GEN
heart of the lettuce	καρδιά της σαλάτας	kardi-a tis salat-a-s	heart-F of salad-F-GEN
skin of the fruit	πετσα του πορτοκαλιού	pets-a tou portokal-i-ou	epidermis-F of orange-N-GEN
heart of the cabbage	καρδιά του λάχανου	kardi-a tou lahan-o-u	heart-F of cabbage-N-GEN
skin of the sausage	πετσα του λουκάνικου	pets-a tou loukanik-o-u	epidermis-F of sausage-N-GEN
neck of the house	λαιμός της καμινάδας	lem-os tis kaminad-a-s	neck-M of chimney-F-GEN
head of the bed	προσκεφάλι του κρεβατιού	proskefal-i tou krevat-i-ou	front.head-N of bed-N-GEN
leg of the bed	πόδι του κρεβατιού	pod-i tou krevatt-i-ou	foot/leg-N of bed-N-GEN
leg of the table	πόδι του τραπεζιού	pod-i tou trapez-i-ou	foot/leg-N of table-N-GEN
mouth of the pot	στόμιο της κατσαρόλας	stom-io tis katsarol-a-s	mouth-N of pot-F-GEN
leg of the chair	πόδι της καρέκλας	pod-i tis karekl-a-s	foot/leg-N of chair-F-GEN
eye of the needle	μάτι της βελόνας	mat-i tis velon-a-s	eye-N of needle-F-GEN
pinhead	κεφάλι της καρφίτσας	kefali tis karfitsas	head-N of pin-N-GEN
leg of the ladder	πόδι της σκάλας	pod-i tis skal-a-s	leg/foot-N of ladder-F-GEN
mouth of the jug	στόμιο της κατσαρόλα	stom-io tis kanat-a-s	mouth-N of jug-F-GEN
sawtooth	δόντι του πριονιού	dont-i tou prion-i-ou	tooth-N of saw-N-GEN
eye of the storm	μάτι του κυκλώνα	mat-i tou kyklona	eye-N of hurricane
vein of the leaf	φλέβα του φύλλου	flev-a tou fyll-o-u	vein-F of leaf-N-GEN
back of the mountain	πλάτη του βουνού	plat-i tou voun-o-u	back-N of mountain-N-GEN
foot of the mountain	πρόποδες του βουνού	propod-es tou voun-o-u	front.foot-M of mountain-N-GEN
on the foot of the brink	στο χείλος του γκρεμού	sto hilos tou gkremou	on lip-M of brink-N-GEN

Khoekhoe

Tab. C.12: Body-part metaphors in Khoekhoe.

Body-part metaphor	Khoekhoe	Glosses
neck of the bottle	ǂkhoro.!ao-b	bottle.neck-M
bottom of the bottle	ǂkhoro.khao-s	bottle.butt-F
mouth of the bottle	ǂkhoro-b am!nâ-s	bottle-M mouth-F
skin of the fruit	lemun.soro-b	orange.body-M
skin of the corn	mili.soro-b	corn.body-M
bottom of the baguette	pere-b khao-s	bread-M bum-F
head of the baguette	pere-b dana-s	bread-M head-F
head of the bed	kharo-b dana-s	bed-M head-F
leg of the bed	kharo-b ǀnū-b	bed-M leg-M
leg of the table	tā-b ǀnū-b	table-M leg-M
mouth of the pot	sū-s ǂgan-am-s	pot-F close-mouth-F

Tab. C.12: Body-part metaphors in Khoekhoe. *(continued)*

Body-part metaphor	Khoekhoe	Glosses
arm of the chair	ǂnû-ai!nao-s ǁôa-b	chair-F arm-M
leg of the chair	ǂnû-ai!nao-s ǀnū-b	chair-F leg-M
pinhead	nal-i dana-s	needle/pin-N head-F
arm of the pullover	jacket-s ǂôa-b	jacket-F arm-M
pants leg	purukhoe-b ǀnū-b	trousers-M leg-M
leg of the ladder	laeda-b ǀnū-b	ladder-M leg-M
ear of the jug	apa-s ǂôa-b	jug-F arm-M
mouth of the jug	apa-s am!nâ-s	jug-F mouth-F
back of the book	ǂkhani-s ǂâ-b	book-F back-M
head of the guitar	kitar-s dana-s	guitar-F head-F
neck of the guitar	kitar-s !ao-b	guitar-F neck-F
sawtooth	saxa-b ǂgû-b	saw-M tooth-M
eye of the arrow	ǂgau-b am-s	arrow-M mouth-F
eye of the compass	compas-s ǂôa-b	compass.arm-M
head of the mountain	ǂnō-b dana-s	mountain-M head-F
mouth of the river	!ā-b am-s	river-M mouth-F
water vein	ā-b ǂkhuru-b	river-M vein-M

Modern Hebrew

Tab. C.13: Body-part metaphors in Modern Hebrew.

Body-part metaphor		Transcription	Glosses
neck of the bottle	הבקבוק צוואר	tzvar ha-bakbuk	neck ART-bottle
toes of the garlic	שום של שן	šen šel šum	tooth of garlic
heart of the artichoke	ארטישוק של לב	lev šel artišok	heart of artichoke
lettuce head	חסה של ראש	roš šel xasa	head of lettuce
heart of the lettuce	חסה של לב	lev šel xasa	heart of lettuce
hand of the door	דלת של ידית	yadit šel delet	handle of door
leg of the bed	מיטה של רגל	regel šel mita	leg of bed
leg of the table	שולחן של רגל	regel šel šulxan	leg of table
ear of the pot	סיר של ידית	yadit šel sir	handle of pot
hand of the knife	הסכין ידית	yadit ha-sakin	handle of knife
arm of the chair	כיסא ידית	yadit šel kise	handle of chair
leg of the chair	כיסא של רגל	regel šel kise	leg of chair
sole of the shoe	הנעל סוליית	suliya šel na'al	sole of shoe
ear of the jug	הקנקן ידית	yadit šel kad	handle of jug
back of the book	הספר של שדרה	šidra šel sefer	spine of book
body of the instrument	הגיטרה גוף	guf ha-gitara	body ART-guitar
neck of the guitar	הגיטרה צוואר	tzavar ha-gitara	neck ART-guitar
eye of the arrow	החץ ראש	roš šel xetz	head of arrow
eye of the storm	הסערה עין	ein ha-se'ara	eye ART-storm
head of the mountain	ההר ראש	roš ha-har	head ART-mountain
shoulder of the mountain	ההר כתף	katef ha-har	shoulder ART-mountain
face of the ocean	הים פני	pne ha-yam	face ART-sea
tongue of the land	יבשה לשון	lašon yabaša	tongue earth

D Additional Body-Part Metaphors

Tab. D.1: Additional body-part metaphors.

Metaphor	Original	Body-part term	Source Language	Meaning
hair of the corn	kaṇsācē kēs	hair	Marathi	corn silk
tooth of the corn	răng ngô	tooth	Vietnamese	corn
foot of the house	ghar-ā-c-ā pāy-ā	foot	Marathi	base of the house
face of the table	mặt bàn	face	Vietnamese	surface of the table
head of the pot	sar-e ghablame	head	Persian	lid
ear of the lid	ucho pokličk-y	ear	Czech	handle of the lid
nose of the knife	mũi dao	nose	Vietnamese	pinch
tooth of the fork	kāṭyā camc-yā-c-ā dāt	tooth	Marathi	prongs of the fork
face of the knife	dāo liăn	face	Mandarin Chinese	blade
nose of the pin	mũi kim	nose	Vietnamese	pinpoint
head of the needle	sar-e sozan	head	Persian	head of the needle
heel of the shoe	buṭ-ā-c-ī ṭāc	heel	Marathi	heel
tongue of the shoe	buṭ-ā-c-ī jībh	tongue	Marathi	tongue of the shoe
mouth of the vase	miệng bình/lọ	mouth	Vietnamese	opening of the vase
bottom of the vase	đáy bình/lọ	bottom	Vietnamese	bottom of the vase
neck of the vase	cổ bình/lọ	neck	Vietnamese	neck of the vase
back of the boat	záď lod-i	back	Czech	back of the boat
eye of the mountain	oko hor-y	eye	Czech	mountain lake
head of the onion	yáng.cōng tóu	head	Mandarin Chinese	onion
back of the chair	khurcī-c-ī pāṭh	back	Marathi	chair's back
trunk of the boat	thân tàu	body	Vietnamese	middle part of the boat
waist of the tree	ndiggu garab	waist	Wolof	middle part of the tree
head of the house	boppu kër	head	Wolof	corner
front body of the house	gharācē puḍhlē aṅga	body	Marathi	front of the house
head of the table	boppu table	head	Wolof	corner of the table
bottom of the boat	tahe ghayegh	bottom	Persian	bottom of the boat
trunk of the tree	thân cây	trunk	Vietnamese	trunk of the tree
eye of the watermelone	bëtu xaal	eye	Wolof	eye of watermelone
head of the street	boppu coñ	head	Wolof	street corner
neck of the mainland	pevninská šíje	neck	Czech	isthmus
leg of the glasses	nožička brýlí	leg	Czech	leg of glasses
eye of the pantyhose	oko na punčoše	eye	Czech	hole in tights
shoulder of the crane	rameno jeřábu	shoulder	Czech	shoulder of the crane
knee of the pipe	koleno trubky	knee	Czech	bent pipe
ear of the cup	kapācā kān	ear	Marathi	handle of the cup
heart of the watermelone	kardia apo to karpouzi	heart	Modern Greek	hollow piece in watermelone
leg of the step	pāyrī	leg	Marathi	step
skeleton of the house	kostra domu	skeleton	Czech	skeleton of the house
body of the bed	chuáng shēn	body	Mandarin Chinese	middle part of the bed
foot of the trousers	kù jiăo	foot	Mandarin Chinese	endpiece of the trousers
head of the syringe	zhēn tóu	head	Mandarin Chinese	syringe head
body of the boat	chuán shēn	body	Mandarin Chinese	middle of the boat
body of the onion	tsuibelsorob	body	Khoekhoe	layers of the onion
head of the arrow	gaub danas	head	Khoekhoe	blade of the arrow
arm of the watch	olosis ǂab	arm	Khoekhoe	watch hand
vein of the tree	hais churub	vein	Khoekhoe	thin roots
back of the bed	az ágy hát-a	back	Hungarian	back part of the bed
bottom of the jug	a korsó fenék-e	bottom	Hungarian	bottom of the jug
stomach of the boat	a hajó gyomor-a	stomach	Hungarian	inside of the boat
side body of the mountain	a hegy oldal-a	body	Hungarian	side of the mountain
stomach of the mountain	a hegy gyomor-a	stomach	Hungarian	inside of the mountain
mouth of the valley	a völgy száj-a	mouth	Hungarian	beginning of a valley
skin of the onion	tamanegi no kawa	skin	Japanese	skin of the onion
bottom of the ladder	taxtit hasulam	bottom	Modern Hebrew	bottom of the ladder
rib of the mountain	tzela hahar	rib	Modern Hebrew	mountain skeleton
arm of the stream	zro'a hazerem	arm	Modern Hebrew	arm of the stream
belly of the glass	bardağın göbeği	belly	Turkish	bulbous glass
mouth of the pot	nabe no sosogiguchi	mouth	Japanese	opening of the pot
tooth of the rock	šen hasela	tooth	Modern Hebrew	tooth of the rock
lip of the stream	sfat hanaxal	lip	Modern Hebrew	lip of the stream

Tab. D.1: Additional body-part metaphors. *(continued)*

Metaphor	Original	Body-part term	Source Language	Meaning
tongue of sea	lašon yam	tongue	Modern Hebrew	bay
veins of the mountain	san myaku	vein	Mandarin Chinese	mountain pulse/vein
brow of a hill	brow of a hill	brow	English	brow of a hill
mouth of a vulcano	mouth of a vulcano	mouth	English	mouth of a vulcano
spearhead	spearhead	head	English	spearhead
head of the broccoli	Bokkoli Kopf	head	Vietnamese	head of the broccoli
nose of the rock	Felsnase	nose	German	nose of the rock
eye of the dice	Würfelauge	eye	German	eye of the dice
mouth of the valley	mouth of the valley	mouth	English	mouth of the valley

E Abbreviations used in Glosses

3	third person
ABS	absolutive
ADJ	adjective
ALL	allative
ART	article
AUX	auxiliary
CLF	classifier
DAT	dative
DIM	diminutive
F	feminine
GEN	genitive
INST	instrumental
LOC	locative
M	masculine
N	neuter
OBL	oblique
PFV	perfective
PL	plural
POSS	possessive
SG	singular