

## When Embodiment Meets Generative Lexicon: The Human Body Part Metaphors in Sinica Corpus

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### Abstract

This research aims to integrate embodiment with generative lexicon. By analyzing the metaphorically used human body part terms in Sinica Corpus, the first balanced modern Chinese corpus, we reveal how these two theories complement each other. Embodiment strengthens generative lexicon by spelling out the cognitive reasons which underlies the production of meaning, and generative lexicon, specifically the qualia structure, complements embodiment by accounting for the reason underlying the selection of a particular body part for metaphorization. Discussing how the four body part terms—血 *xie* “blood”, 肉 *rou* “flesh”, 骨 *gu* “bone”, 脈 *mai* “meridian”—behave metaphorically, this research argues that the visibility and the telic role of the qualia structure are the major reasons motivating the choice of a body part to represent a comparatively abstract notion. The finding accounts for what constrains the selection of body parts for metaphorical uses. It also facilitates the prediction of the behavior of the four body part terms in these uses, which can function as the starting point to examine whether the two factors—visibility and telicity—also motivate the metaphorization of the rest human body parts.

### 1 Introduction

Human body is an important medium through which people understand the world. It is through

the interaction between the human body and the environment that people make sense of what they perceive, with which they conceive. Body part terminology, therefore, is used extensively to represent a variety of things, ranging from the physical surroundings, time, situations, to a person's emotion, temperament, behavior, etc. (e.g. Gibbs, 2006; Kovecses, 2002; Li, 2015). This is embodiment, which demonstrates how body part terms are used metaphorically. While embodiment provides cognitive reasons which underlies meaning production (e.g. Yu, 2003, 2007) and serves as the foundation of conceptual metaphor understanding and interpretation (e.g. Lakoff and Johnson, 1980, 1999; Johnson, 2008), it does not account for exactly what triggers the metaphorical use of a corporeal term, or what constrains the selection of a body part term to represent a comparatively abstract concept.

In order to answer this question, this research integrates the theory of embodiment, a key concept in cognitive linguistics, with the theory of Generative Lexicon (Pustejovsky, 1991, 1995), of which we focus on the qualia structure, by analyzing the lexical items containing body part terms in Sinica Corpus (Chen et al., 1996). Embodiment tackles how and where meaning arises, but it falls short in explaining what triggers the selection of a body part to represent an abstract notion. Generative lexicon functions as a way to study the representations and relations of meanings, but it lacks the explanation for the source of meanings. The integration of both, which has not been found in previ-

ous research, in the analysis of the corporeal metaphors in corpus data allows us to account for the cognitive motivation of body metaphors and to represent these metaphors by the qualia structure. More importantly, the combination of the two theories enables us to find out the motivation underlying the choice of certain human body parts for metaphorical uses.

## 2 Theoretical Background, Research Questions and Hypotheses

### 2.1 Embodiment

Embodiment, or the embodied theory of meaning by Johnson (2008), is proposed as a counterargument against mind-body dualism, a key concept of the Western philosophy and epistemology (Lakoff and Johnson, 1999). The Western tradition has regarded mind and body as distinct entities, which are independent of each other and cannot be integrated. The proposal of embodiment, arguing against the dualist view of knowledge in the West, claims that body and mind should be regarded as continuity (e.g. Johnson, 1987, 2008). Its central tenet is how people make sense of their experiences in the world lies in their interaction between their bodies and the environment. The meaning emerging from the corporeal experiences furthermore form the basis for people to understand abstract concepts. The human body and body parts, during the process of people's acquisition of knowledge and meaning, are involved and function as indispensable media. What the physical side goes through describe what the mental side conceives, and the mental states are instantiated by the physical states/actions. In a word, embodiment is to map the concrete body and/or body part(s) onto abstract concepts that are difficult to understand/convey so as to facilitate communication.

Previous studies on embodiment (e.g. Yu, 2009, 2011) focus on the identification of the human body and body parts used in the mappings, explaining how human body (parts) is/are activated for the conceptualization of abstract ideas. Despite the explanation of how the corporeal level influences the conceptual level, embodiment suffers a limitation it: it does not explain why the human body and/or body parts are chosen to represent abstract notions? To answer this question, we think visibility of the body part is consequential. Moreo-

ver, the supplementation of the qualia structure within the generative lexicon also helps us find out the answer.

### 2.2 Generative Lexicon

The generative lexicon (Pustejovsky, 1991, 1995) addresses the richness of word meanings. Tackling the creative use of words and the issues of compositionality of lexical items, it proposes four levels of representation connected by mechanisms of selection. Among the four levels—argument structure, event structure, qualia structure, and lexical inheritance structure (Pustejovsky, 1995: 61)—qualia structure accounts for the semantic richness of a lexical item in a construction, based on which. Based on the qualia structure, concepts in the world are composed of at least the following four roles:

- (1) The constitutive role, which concerns the relation between an object and its constituents or parts;
- (2) The formal role, which distinguishes the object within a larger domain;
- (3) The telic role, which reveals the purpose and function of the object;
- (4) The agentive role, which explains the factors bringing about an object.

The constitutive and formal roles provide the descriptive information of an object. The telic and agentive roles, not directly referring to the object, present the embodiment information of the object at issue, as they represent eventive dimensions which indicate the interaction between the object and human beings, i.e. how it functions to people and how it is brought into being.

The application of the qualia structure facilitates us to extrapolate why the human body or a specific body part is activated in the representation of an abstract notion. The qualia, specifically the telic and agentive roles, help us find out the reason motivating the mappings, and furthermore make prediction about what body part(s) is/are to be chosen in other mappings. Combining embodiment with the generative lexicon, this research aims to enrich the embodiment and conceptual metaphor theory with a more sophisticated view brought about by the generative lexicon. Analyzing the metaphorical use of body parts, we will testify that human body

parts are not treated as equal in embodiment. Instead, specific body parts are chosen, and the rationale behind the choices can be explained and predicted with the application of the qualia structure within the generative lexicon.

### 2.3 Research Questions and Hypotheses

This research aims to find the answers to the following two questions:

- (1) How do embodiment and the generative lexicon interact? Does the qualia role influence the metaphorical use of the body part terms? Or does the metaphorical use of the body part terms facilitate the retrieval of the qualia role?
- (2) What is the significance of the qualia structure in constraining the selection of a body part for metaphorical use?

This research is built on the following hypotheses:

- (1) We hypothesize that the generative lexicon and embodiment complement each other: the generative lexicon strengthens embodiment by providing a way to explain the selection of a particular body part for metaphorization. Embodiment enhances the generative lexicon by providing the cognitive reasons which underlies the production of meaning (Huang et al., 2013; Huang and Hsieh, forthcoming).
- (2) Among the five faculties employed by human beings to interact with the world—vision, hearing, smell, taste and touch—we hypothesize vision is consequential. That is, the visibility of human body parts is important for the selection of a body part to be used metaphorically.
- (3) Among the four roles of the qualia structure, the telic role, referring to the purpose and function of body parts, is predicted to be the most productive in the representations of body metaphors.

## 3 Data and Method

### 3.1 Data

The corpus data under analysis come from Sinica Corpus, short for Academia Sinica Balanced Corpus of Modern Chinese used in Taiwan (Chen et al., 1996). It is the first balanced modern Chinese corpus with part of speech tagging and has been em-

ployed for a variety of research ranging from the core fields such as morphology, syntax, semantics (e.g. Liu, 2002; Myers et al., 2006; Tseng, 2001), to applied fields such as discourse analysis, computational linguistics, and cognitive linguistics (e.g. Huang, 2000; Huang et al., 2002). The corpus data are culled from different topics/themes: philosophy (8%), science (8%), society (38%), art (5%), life (28%), and literature (13%) (<http://rocling.iis.sinica.edu.tw/CKIP/engversion/20corpus.htm>).

### 3.2 Method

We choose to analyze the four atypical body parts: 血, 肉, 骨, 脈, each of which is defined by the online dictionary compiled by the Ministry of Education, Taiwan (MOE Dictionary) as<sup>1</sup>

血 xie “blood”: “The red fluid in the veins/vessels of higher organisms, which starts from the heart and circulates throughout the body. It functions to carry nutrients and wastes so as to conduct metabolism.”

肉 rou “flesh”: “The soft part of an animal’s body which encloses bones. E.g., flesh.”

骨 gu “bone”: “The frame inside the body of an animal which supports the body.”

脈 mai “meridian”: “The blood vessels, distributed all over the human body and animal body, carry blood everywhere.” However, following the traditional Chinese medicine, we think the concept of 脈 should be regarded as part of the body in which life-sustaining substances are held through, rather than merely the blood vessels in anatomy. The substances circulating through the meridians are both visible and invisible, the former of which is blood and the latter 氣 qi “energy”

These four atypical body parts are chosen for the following reasons:

- (1) They are not typical body parts. Unlike e.g. 手 shou “hand”, 腳 jiao “foot”, 肝 gan “liver”, 肺 fei “lung”, of which the boundaries are defined more clearly, these four parts of the body have no clear boundaries. Instead, they are “extensive” and compose a large proportion of the human body.
- (2) They are intertwined with each other. One

<sup>1</sup> The definitions of the four body parts are translated by the authors.

functions to form another, e.g. flesh forms blood vessels, the tangible part of the meridian; one carries another, e.g. blood vessels, part of meridian, carry blood; one manufactures another, e.g. bone (marrow) manufactures blood. These four parts of the body are so intertwined, which we assume will be reflected in their metaphor uses.

- (3) According to the definition, 血 xie “blood”, 骨 gu “bone”, and 肉 rou “flesh” are more embodied, while 脈 mai “meridian” is less so, as it involves an imagined part, i.e. the conduit circulating 氣 qi “energy”. Comparing these four body parts reveals that the more embodied a body part is, the more easily we can predict its behavior, and vice versa.

### Identifying metaphorically used word

We examine whether the lexical items consisting of body part terms are used metaphorically in the corpus. At this step, we modify the metaphor identification procedure (MIP) proposed by the Pragglejaz Group (2007) so that it better works for Chinese texts. The modification mainly involves

- (1) The determination of the basic contemporary meaning of a lexical unit, and
- (2) The analysis of the body part terminology in compounds of differing morphological structures.

The reason for the modification lies in the fact that the lexical items containing corporeal words in Sinica Corpus are mostly compounds, which are composed of a body part term with another/other word(s). The basic contemporary meaning thus cannot be determined based on a compound as a whole. Instead, the body part terms need to be extracted and examined on their own so as to reveal how these terms behave in the compound. The rationale behind this modified step is, when a word forms part of a compound, it usually undergoes metaphorical/metonymical extensions, except that it is part of a coordination structured compound.

Take the lexical item 血緣 xieyuan, which is a compound containing the body part 血 xie “blood”. In the MOE dictionary, 血緣 is defined as 血統上的關係 xietong shang de guanxi “relations by blood”. If the definition is taken as the basic contemporary meaning, this lexical item is considered

literal. In our modified MIP, we take the unit or morpheme 血 xie “blood” out of the compound 血緣 xieyuan “relations by blood” and examine the semantic change occurring to the body part in the compound. In other words, considering 血, and other body part terms, as a lexical unit in compounds, we examine the basic contemporary meaning of these body part terms and their behavior in compounds.

The basic contemporary meaning of the unit 血 xie “blood” found in the MOE dictionary is “The red fluid in the veins/vessels of higher organisms, which starts from the heart and circulates throughout the body. It functions to carry nutrients and wastes so as to conduct metabolism”. In the compound 血緣 xieyuan “relations by blood”, 血 xie “blood” does not simply refer to the body fluid which sustains life. Instead, it has undergone semantic extension. The unit 血 xie “blood” refers to the genetic traits or ancestral tie carried by this fluid. It is the genetic/ancestral tie embedded in blood which forms the relations of a group of people. 血 xie “blood” in 血緣 xieyuan “relations by blood” is thus treated as a metaphorical expression.

Once we identify a metaphorically used lexical unit, we need to formulate how it behaves in the metaphor. We propose to incorporate the qualia structure, which provides more information for the metaphorically used word and helps us formulate metaphors, as elaborated below.

### Retrieving qualia roles

In order to find out the constraints underlying the selection of a body part term in a metaphor, we incorporate the qualia structure, through which we retrieve the qualia role(s) of the body part(s) in the corpus data. We expand the method proposed by Song and Zhao (2013a, 2013b), as we focus on two levels: the qualia role of a body part term at the lexical and clausal levels. In brief,

- (1) We first examine whether there is more than one sense of the body part at issue. E.g. in the corpus data, two senses are found in 血 xie “blood”:  
Sense 1 refers to the liquid circulating naturally inside human body, and sense 2 to the liquid flowing inside/out of human body due to injury or effort making.
- (2) We spell out the qualia structure, i.e. the four

roles, of the body part at issue according to the sense(s) found in step (1). For example, the qualia structures of the two senses of 血 xie “blood” is shown below:

#### Sense 1

Constitutive=...

Formal= liquid, red

Telic= sustain life, carry ancestral features, carry emotion and personal traits, etc.

Agentive: Natural kind

#### Sense 2

Constitutive=...

Formal=liquid, red, smell, coagulation

Telic=...

Agentive=X which causes blood to flow out of body/body parts

- (3) We examine the behavior of the body part term in a lexical form and see whether a specific role is highlighted.
- (4) We then go beyond the lexical level into the clausal level to find out the role(s) of the body part which is/are specified at the clausal level.

We compare the role(s) specified at the lexical and clausal levels, and derive three kinds of meaning representations:

- (1) The lexical item with a specified role at the lexical level and the word’s metaphorical meaning is lexically accessed.
- (2) The lexical item with a specified role at the lexical level but the word’s metaphorical meaning is NOT lexically accessed.
- (3) The lexical item with NO specified role at the lexical level and the word’s metaphorical meaning is NOT lexically accessed.

We argue that the three representations of the words consisting of a body part term reveal a point not addressed in previous research on embodiment: the layeredness and inter-connectedness of the meaning extensions of body parts, which strengthens the human body as a whole in the embodiment process.

### The hierarchy of visibility

We propose a hierarchy of visibility of the four body parts. We think 血 xie “blood” is the most visible, because it is the only body part among the four that most speakers have the experience of visualizing, as bleeding of small amounts of blood is a

common human experience. On the other hand, seeing (human) bone or flesh requires traumatic unusual events, and meridian is comparatively abstract among the four, as it consists of not only the tangible but also the imagined parts.

We believe visibility is linguistically significant; i.e. the visibility of a body part is reflected in its collocation with visual verbs, the number of compounds and compounds indicating visibility. We thus examine (1) the construction of 見 jian “see” X (e.g. 見骨 jiangu “see the bone”) and 看 kan “see” and/or 見 jian “see”...X (e.g. \*看 kan “see”...骨 gu “bone”; 看見 kanjian “see”...骨 gu “bone”) in the corpus,<sup>2</sup> (2) all the types of compounds with the four body parts as components, regardless of the metaphoricity and morphological structure. These compounds may come into the form comprising the body part term followed/preceded by one, two, or three characters.

## 4 Results

Table 1 shows the four body parts in the constructions of 見 jian “see” X, and 看 kan “see” and/or 見 jian “see”...X. There are 15 tokens of 見血 jianxie “see blood”, all of which occur as part of the fixed idiom 一針見血 yizhenjianxie, which metaphorically means “hit the nail (right) on the head; right on target”, but none of 見骨 jiangu “see the bone”, \*見肉 jianrou “see flesh”, and \*見脈 jianmai “see meridians” can be found. We then examine the construction 看 kan “see” and/or 見 jian “see”...X. The token numbers of the 看 kan “see” and/or 見 jian “see”...血 xie “blood” still tops, followed by 看 kan “see” and/or 見 jian “see”...肉 rou “flesh”, 看 kan “see” and/or 見 jian “see”...骨 gu “bone”, and no token is found in 看 kan “see” and/or 見 jian “see”...脈 mai “meridian”. Calculating the percentage of these two constructions against the total token numbers of 見 jian “see” X and X as a morpheme word, we have found the constructions with 血 xie “blood” presents the highest percentage (9.22%), followed by those with 骨 gu “bone” (2.27%), 肉 rou “flesh” (0.94%), and 脈 mai “meridian” (0%), upon which the hierarchy of visibility of the four body parts is

<sup>2</sup> 看 kan “see” and 見 jian “see” are chosen because they represent the most common visual verbs.

built: 血 xie “blood” > 骨 gu “bone” > 肉 rou “flesh” > 脈 mai “meridian”.

Constructions	血	骨	肉	脈
見 X	15	0	0	0
看 and/or 見...X	5	1	2	0
Total token of 見 X	15	0	0	0
Total token of X (morpheme word)	202	44	213	24
Percentage	9.22%	2.27%	0.94%	0%

Table1. Constructions with the body parts as the object of verbs indicating vision

When it comes to the compound with the body part terms as a component, we investigate compounds comprising the body part term followed by one, two, or three characters (e.g. 血漬 xiezi “stain of blood”, 血淋淋 xielinlin “bleeding”, 血流如注 xieliruzhu “blood streaming down”), or the other way around (e.g. 白骨 baigu “white bone”, 皮包骨 pibaogu “skinny”, 粉身碎骨 fenshensuigu “at the cost of one’s life”). We then calculate the ratio between the number of the types indicating the visual perceptibility against those of all the compounds and make Table 2.

Body part	Number of types of all compounds (A)	Number of types of compounds indicating visibility (B)	Ratio (B/A)
血 compounds	152	65	42.76%
骨 compounds	124	15	12.10%
肉 compounds	130	8	6.15%
脈 compounds	47	1	2.13%

Table 2. Compounds with the body parts as components and their visibility

According to Table 2, 血 xie “blood” tops in terms of its visibility, with 152 types of all the compounds and 42.76% of compounds indicating visibility. 骨 gu “bone” ranks the second highest, with 124 types of all the compounds and 12.10% of the compounds conveying visibility. The third highest is the compounds composed of 肉 rou “flesh” preceded/followed by other characters, with 130 types of compounds and 6.15% of compounds denoting visibility. 脈 mai “meridian”

demonstrate the lowest visibility, with only 47 types of all the compounds and 2.13% of compounds specifying visual perceptibility.

The analysis of these compounds basically supports the hierarchy of visibility we have formulated previously based on the analysis of the constructions 見 jian “see” X, and 看 kan “see” and/or 見 jian “see”...X, with 血 xie “blood” as the most visible body part, followed by 骨 gu “bone”, 肉 rou “flesh”, and 脈 mai “meridian” is the least visible.

Regarding how the qualia structure works, we draw out all the two-character compounds with the four body parts positioned in front of and behind the other characters respectively. That is, we examine how each of the four body parts behaves in the compounds of the following patterns:

- X 血 xie “blood”, 血 xie “blood” X
- X 肉 rou “flesh”, 肉 rou “flesh” X
- X 骨 gu “bone”, 骨 gu “bone” X
- X 脈 mai “meridian”, 脈 mai “meridian” X

We go through all the clauses/sentences with these eight patterns of compounds, and check whether they are metaphorically used. To clearly present the interplay between the compounds and the metaphorically used body part terms, when a compound is assigned different types of metaphoricity, the compound is numbered according to number of types. Example 1 indicates the three types of metaphoricity of 血 xie “blood” in the coordinated compound 血脈 xiemai “blood (and) meridians”, with the corresponding metaphors enclosed in the brackets.

#### Example 1

- (1) 彷彿\_\_根本\_\_不\_\_是\_\_與\_\_我們\_\_血脈\_\_相連\_\_的\_\_孩子 (FAMILY IS BLOOD)  
As-  
if\_\_fundamental\_\_NEG\_\_SHI\_\_and\_\_we\_\_blood-meridian\_\_connect\_\_DE\_\_children  
...as if they were not our children.
- (2) 不期然而然\_\_地，我\_\_立刻\_\_血脈\_\_貫張，坐立難安。(EMOTION IS BLOOD)  
Unexpectedly\_\_DE, I\_\_immediately\_\_blood-meridian\_\_expand, cannot-sit-or-stand  
*Unexpectedly, I got hot immediately and restless.*

	血 X (69 types)		X 血 (43 types)		骨 X (27 types)		X 骨 (57 types)		肉 X (53 types)		X 肉 (43 types)		脈 X (11 types)		X 脈 (26 types)	
Sense	1	2	1	2	1	1	2	1	1	1	1	1	1	1	1	1
Modifier-modified	T*: 18	A: 8 F: 3	T: 3	A: 1 F: 1	T: 5	T: 6	A: 1	T: 2 F: 1 A: 1	0	T: 1 F: 1	T: 4 F: 2					
Coordination	T: 4	0	T: 1 A: 1	0	T: 2	C: 1	0	0	T: 5	0	T: 1					
Subject-predicate	0	0	0	0	0	0	0	0	0	T: 4	0					
Verb-object	0	0	T: 2	A: 10 F: 6	0	0	0	0	0	0	0					
Noun-particle	0	0	0	0	T: 1 C: 1	0	0	0	0	0	0					
Total	T: 22	A: 8 F: 3	T: 6 A: 1	A: 11 F: 7	T: 8 C: 1	T: 6 C: 1	A: 1	T: 2 F: 1 A: 1	T: 5	T: 5 F: 1	T: 5 F: 2					

\*C=Constitutive; F=Formal; T=Telic; A=Agentive

Table 3. Compounding patterns, number of types in total, senses, the morphological structures, and number of the qualia roles

- (3) 不得不\_\_當\_\_空中飛人，回頭\_\_依靠\_\_臺灣的\_\_「經濟\_\_血脈」。 (LIFE IS BLOOD)  
 Cannot-but\_\_be\_\_flying-trapeze (frequent flyer), look-back\_\_rely-on\_\_Taiwan\_\_DE\_\_“economy\_\_blood-meridian”.  
*[They] cannot but become frequent flyers, coming back to rely on the economy of Taiwan.*

Table 3 demonstrates the qualia roles correlated to the types of metaphorical uses. This is not a one-on-one correlation, as a type of metaphorical use may be encoded in more than one qualia role. It is thus not feasible to show the percentage of each qualia role. Instead, we compare the number of each qualia role in each compounding pattern. E.g. for Sense 2 of 血 xie “blood” X, the agentive role is more dominant than the formal role, as there are 8 occurrences of the former but only 3 hits of the latter. The inspection of the qualia roles across all the compound types shows that the telic role predominates in motivating the metaphors with the body parts as the source concept, except Sense 2 of 血 xie “blood” X, Sense 2 of X 血 xie “blood”, and Sense 2 of X 骨 gu “bone”, in which the agentive role predominates.

## 5 Conclusion

By incorporating embodiment with the generative lexicon, specifically the qualia structure, in the analysis of metaphors involving four atypical body parts in a balanced corpus, we have demonstrated that the visibility and the telic role of the body part are two major reasons constraining the selection of body parts for metaphorical uses. The finding not only accounts for the constraints which underlie the selection, but also facilitates the prediction of the behavior of the four body part terms in these uses. That is, the higher the visibility a body part is, the more possible it is to be employed metaphorically. Moreover, the telic role of a body part predominantly motivates the use of a body part as the source concept in a metaphor. With our finding as the starting point, for the future study, we will examine whether the two factors—visibility and telicity—also motivate the metaphorization of the rest human body parts in corpus data.

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