

Cognitive Analysis of the Conceptualization of Object Subparts by Body Parts in Thai*

Xinhui LU¹

Teavakorn Khumsat²

School of Foreign Languages, Nanjing Tech University Pujiang Institute, China¹

General Education, Panyapiwat Institute of Management, Thailand²

Corresponding author's email: njpi111948@163.com

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Abstract

Thai body part terms—*hua*²¹⁴ ‘head’, *lan*²¹⁴ ‘back’, *pa:k*²¹ ‘mouth’, *tʰɔŋ*⁴⁵ ‘belly’, *na:*⁴¹ ‘face’, *tin*³³ ‘foot’, and *kon*⁴¹ ‘buttocks’—which function as free morphemes and combine with inanimate nouns, have evolved into compound word stems. These terms serve as heads of genitive constructions within compound word structures, and act as relational nouns that cause semantic expansion, enabling them to spatially locate subparts of objects such as the ‘front end,’ ‘top end,’ ‘bottom end,’ and ‘back end.’ This study utilizes the corpus from the Royal Thai Academy’s Thai Dictionary and the Thai Language Corpus to examine Levinson’s (1994) and Heine’s (1997) theories on the conceptual transfer of body parts, additionally applying Heine’s anthropomorphic and zoomorphic models, along with Lu and Park’s (2019) sleeping model, to explore how Thai body parts are cognitively conceptualized to spatially locate subparts of objects. The results indicate that the conceptualization of the front end of object subparts involves *hua*²¹⁴, *pa:k*²¹, and *na:*⁴¹. Specifically, *hua*²¹⁴ is linked to the Zoomorphic Model and Sleeping Model. *pa:k*²¹ is associated with the Anthropomorphic Model and Zoomorphic Model, and *na:*⁴¹ relies on both the Anthropomorphic Model and Zoomorphic Model. For the back end of object subparts, the conceptualization involves *lan*²¹⁴ and *kon*⁴¹, where *lan*²¹⁴ uses the Anthropomorphic Model, while *kon*⁴¹ uses the Zoomorphic Model. The top end of

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object subparts is conceptualized using lar²¹⁴ and na:⁴¹, with lar²¹⁴ linked to the Zoomorphic Model, and na:⁴¹ to the Sleeping Model. The bottom end of object subparts includes lar²¹⁴, ti:n³³, tho:ŋ⁴⁵, and kon⁴¹, with lar²¹⁴ using the Sleeping Model, ti:n³³ using the Anthropomorphic Model, t^ho:ŋ⁴⁵ using the Zoomorphic Model, and kon⁴¹ relying on both the Anthropomorphic Model and the Sleeping Model. This study enhances our understanding of Thai linguistics and enriches cognitive linguistics by demonstrating how Thai body part terms spatially locate subparts of objects.

Keywords: Body parts, Object subparts, Conceptualization, Compound word

1. Introduction

Body parts play a crucial role in human perception and cognition. They define individual identity and serve as a fundamental tool for interacting with the world. Unlike ordinary objects, body parts have a unique dual cognitive characteristic. They are perceivable through vision and touch, and through intrinsic proprioception for self-perception and experience. In daily life, people constantly interact with their bodies, adjusting and adapting. In communication, body parts are often used as reference points to understand various entities in the external world. Lim (2008) mentions that body parts, which are concepts acquired before other concepts, serve as the starting point for human understanding of the world and form the foundation for understanding other objects or abstract concepts.

In many languages worldwide, body parts serve as source concepts and inputs for conceptualization and grammaticalization, generating more abstract concepts and various grammatical structures, including spatial concepts, personal pronouns, and prepositions. Research by scholars such as Svorou (1994), Heine (1997), Lim (2008), Lu and Park (2019), Lu and Khumsat (2022), Levinson (1994), and Berendt and Tanita (2011) supports this viewpoint, demonstrating its universal characteristics. The conceptualization or grammaticalization of body part terms, as discussed by Heine et al. (1991a, 1991b), Bowden (1992), Svorou (1994), Hågège (2011), and Lehmann (2022), consistently views body part terms as a rich source for enhancing human language structure and usage. Furthermore, these scholars point out that body parts provide the primary means for humans to perform physical actions and experience bodily reactions, thus playing an indispensable role in human behavior and experience, and ultimately in linguistic expressions representing these behaviors and experiences.

All languages use personification metaphors to conceptualize inanimate objects as possessing human body characteristics (Lakoff & Johnson, 1980;

Perekhval'skaya, 2011). This means that individuals, by using body parts, including those of animals, to describe and understand objects that do not have a body, employ common metaphors such as A MOUNTAIN IS A PERSON and THE HUMAN BODY AS A HOUSE. These metaphors project the anatomical structure of the body onto inanimate entities such as mountains and houses. In Mixtec and other Oto-Manguean languages, the metaphorical cognitive mechanism of HUMAN BODY PART AS INANIMATE OBJECT SUBPART enables almost all body part morphemes to describe various components of a house's structural framework. This cross-domain mapping captures all possible features between body parts and subparts of a house's structure, such as dhó'òvè'è 'ear' + house > chimney, dhíki vè'è 'head' + house > ceiling/roof, núú vè'è 'face' + house > the front of a building.

Similarly, Chinese exhibits a linguistic phenomenon where subparts of inanimate objects are represented by body parts, as seen in terms like ʃan⁵⁵ tɕyɛ³⁵ and xɿ³⁵ kʰou³. In these examples, body part nouns like tɕyɛ³⁵ 'foot' and kʰou³ 'mouth' combine with inanimate object nouns like ʃan⁵⁵ 'mountain' and xɿ³⁵ 'river' to describe and spatially locate subparts of these inanimate objects, referring to concepts such as the bottom and front end of objects. When body part nouns in Chinese are grammaticalized and integrated into compound word stems, their meanings deviate from the original, reducing transparency and enhancing their metaphorical nature (Martinez & Schmitt, 2012, p. 304). Similar linguistic phenomena exist in Thai, illustrating the metaphorical and conceptual functions of language as expressions of abstract thinking.

This study, based on the theories of Levinson (1994) and Heine (1997), will discuss specific Thai body part terms such as hua²¹⁴ 'head', lan²¹⁴ 'back', pa:k²¹ 'mouth', tʰɔ:ŋ⁴⁵ 'belly', na:⁴¹ 'face', ti:n³³ 'foot', and kon⁴¹ 'buttocks'. When combined with nouns of inanimate objects to form compound words, these terms serve as heads of genitive constructions, functioning as relational nouns that conceptualize parts of inanimate

objects. This process causes semantic expansion and includes the function of locating these subparts spatially. For instance, *hua*²¹⁴ ‘head’, originally referring to the head of a human or animal, can be used metaphorically before most object nouns to express the front or starting point of an object, such as in *hua*²¹⁴ *kra*²¹ *sun*²¹⁴ ‘bullet head’. This study will explore how specific body parts are used to conceptualize subparts of inanimate objects, focusing on how body part terms in compound word structures (N-body part + N-object) create spatial localization functions from a cognitive semantics perspective. Additionally, the study will discuss the multi-dimensional perspective of body parts in locating various regions of an object and examine how Thai people uniquely use body parts for conceptual construction and their cognitive systems.

2. Literature Review

2.1 Transfer patterns from body parts to inanimate object subparts

In the Tzeltal society of Chiapas, Mexico, a Maya language group, almost all subparts or regions of inanimate objects can be described using body parts. Objects like knives, pots, leaves, feathers, and planks have conceptual properties that are almost entirely derived from the human body. According to Levinson (1994), the transfer patterns from body parts to inanimate object subparts can be distinguished into three main types (Heine, 1997).

Type 1: From body part to object part where shape properties are transferred. For example, *sni* ‘nose’ represents a pointed extremity or an extremity with a sharp convex protrusion of three-dimensional depth. *s-ti* ‘mouth’ refers to the edge or outline of a two-dimensional plane, a three-dimensional ring or band (like lips), an orifice, or the closure or stopper of an orifice. Type 2: From body part to object part where space properties are transferred. For example, *y-it* ‘buttocks’ indicates the

bottom end, the reverse end of s-jol 'head'. s-pat 'back' indicates the reverse end of surface of y-elaw 'face' and x-ch'ujt 'belly'. Type 3: Situations where entities are entirely described by spatial properties are rare, and in Tzeltal, possibly only s-jol 'head' fits this type. In specific contexts, this term seems to have lost its shape properties and become similar to s-ba 'top surface', 'edge', or 'on top of' (Levinson, 1994, p. 803). This type belongs to an independent conceptual domain; that is, spatial orientation concepts.

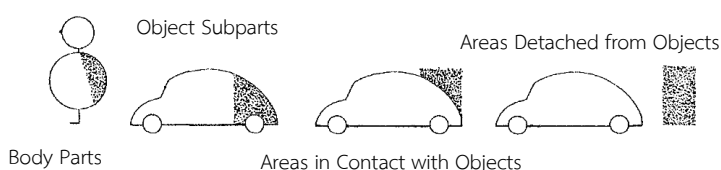
In Tzeltal, shape and space (the position of body parts relative to each other) are the main conceptual transfer patterns from body parts to object subparts. However, this study focuses only on the second type, which uses body parts to conceptualize subparts of inanimate objects and extends the semantic function of spatially locating these subparts. It is important to note that the role of human and animal body parts as structural templates for spatially locating object subparts is limited, as not all body parts are suitable for this purpose, nor can all inanimate objects be described using the body part model.

The semantics of certain body part morphemes undergo generalization or weakening, allowing a concrete body part concept to express a more abstract concept while preserving its image-schematic representation. Heine (1997, p. 137) provides common transfer patterns from body parts to abstract schemas: the head can represent the top end or tip, buttocks or foot can signify the bottom end, the mouth is used for the opening edge, and the neck or wrist indicates a narrow section. Conceptual transfers from body parts, resulting in concepts like the highest point, top end, bottom end, and opening, mainly involve inanimate objects (Heine, 1997), meaning body parts can serve as reference points to describe objects unrelated to actual body parts. This occurs in two situations: transfer due to shape similarity between body parts and subparts of inanimate objects, and transfer due to spatial similarity in the distribution

of body parts and subparts of inanimate objects. Additionally, the conceptual development from body parts to object subparts follows a process from the first to the second stage in the four-stage scenario of body parts to space concepts (Heine, 1997), as shown in Figure 1.

Figure 1

Scenario of Conceptual Transformation from Body Parts to Spatial Regions



Note. from *Cognitive foundations of grammar* (p. 44), by B. Heine, 1997, Oxford University Press.

As shown in Figure 1, the initial reference to body parts extends to denote subpart areas of inanimate objects, areas adjacent to the object, and finally areas adjacent but detached from the object. This study focuses on the evolution from the first to the second stage, discussing the cross-domain mapping between body parts and subparts of inanimate objects based on spatial distribution similarity.

2.2 Grammaticalization of body part nouns

Body part terms often serve as inputs for grammaticalization, providing intuitive and convenient reference points for humans, which is why they are frequently used metaphorically to refer to other objects (Rhee, 1988, p. 304). When body part nouns undergo grammaticalization, causing both semantic and syntactic changes, they gradually lose their original meanings and syntactic features (Bybee et al., 1985; Heine & Reh, 1984; Svorou, 1994). As individuals use body parts to express spatial

orientation, they metaphorically transfer concepts from one domain of human experience to another, influencing linguistic structure. This transformation involves the following: Semantic changes from body part, to relational part of an object, to location adjacent to the object part, and finally to location in the region of the object; and syntactic changes from noun, to genitive construction, to adposition, and ultimately to affix. For example, consider the body part noun *na*⁴¹ ‘face’ in Thai (Lu et al., 2024)

1. *kʰaw*²¹⁴ *na*⁴¹ *mwān*²¹⁴ *pʰw*⁴¹
 3SG¹ *face* COP² *father*
 *His face looks like his dad’s.
 He looks like his father.
2. *tɪt*²¹ *klɔːŋ*⁴¹ *na*⁴¹ *rot*⁴⁵
 install *camera* *front* *car*
 Install a camera at the front of the car.
3. *na*⁴¹ *baːn*⁴¹ *mi*³³ *ton*⁴¹*maj*⁴⁵
 front *home* *have* *tree*
 There are trees in the area in front of the house.
4. *saʔ*²¹*tʰa*²¹⁴*ni*³³ *rot*⁴⁵*faj*³³ *ju*²¹ *na*⁴¹ *roːŋ*³³*rian*³³
 station *train* *located* PREP³ *school*
 The train station is in front of the school.

In sentence 1, *na*⁴¹ as a noun denoting ‘face’ exhibits typical noun characteristics, including serving as the subject. In sentence 2, *na*⁴¹ acts as the head of genitive constructions, functioning as a relational noun that describes the possessive relationship between an entire object and its parts, spatially locating object subparts, for example, *na*⁴¹ *rot*⁴⁵ refers to

¹ 3SG-third person singular

² COP-copula, copulative

³ PREP-preposition

the front part of a vehicle. In sentence 3, when combined with a locative noun, na:⁴¹ forms the construction na:⁴¹ + LOC, retaining its nominal characteristics while subtly transitioning from its original noun meaning. These constructions are used to precisely identify specific subregions within a location, with na:⁴¹ segmenting the spatial range of the locative noun into areas directly in front of or behind a given place. For instance, na:⁴¹ba:n⁴¹ specifies the area in front of a house. In sentence 4, V + na:⁴¹ + LOC, na:⁴¹ transitions away from its nominal characteristics, forms a prepositional phrase that modifies the verb and acts as a landmark, referencing a specific object and indicating the positional relationship of the train station relative to the school. However, this study exclusively focuses on analyzing the transition from body part to relational part of an object and from noun to genitive construction.

3. Methodology

3.1 Sources of the Data

To ensure a comprehensive analysis of compound nouns containing body part morphemes, this study primarily used the Royal Thai Academy's Thai Dictionary (2011 edition), known for its authority and extensive vocabulary, providing the foundational dataset. Additionally, the corpus was enriched with data from the Thai Language Corpus⁴, accessed on March 15, 2024. This study selected seven body part terms like hua²¹⁴, laŋ²¹⁴, pa:k²¹, tho:ŋ⁴⁵, na:⁴¹, ti:n³³, and kon⁴¹, totaling 52 words. These terms were chosen for their representativeness in spatial positioning. As mentioned, the role of body parts (including human and animal) in providing a structural template for spatially locating object subparts is limited, and not all body parts are suitable for this purpose. Studying these terms helps understand the semantic and syntactic changes of body part terms during

⁴ <https://www.arts.chula.ac.th/ling/tnc3/>

grammaticalization and how they describe different parts of objects. Covering various areas of the human body, from head to foot, these terms provide a comprehensive perspective to analyze this linguistic phenomenon.

3.2 Data Collection

This study focuses on identifying specific body part morphemes, such as *hua*²¹⁴, *lan*²¹⁴, *pa:k*²¹, *tho:ŋ*⁴⁵, *na:*⁴¹, *ti:n*³³, and *kon*⁴¹, using them as keywords to retrieve compound nouns where the body part morpheme is a core component, following the structure N-body part + N-object. The semantic function of N-body part is to describe and spatially locate subparts of objects within the compound noun structure. To maintain this focus on spatial characteristics, compound nouns based on shape or functional properties, such as *pa:k*²¹*mo:*⁴¹, *tʰo:ŋ*⁴⁵*na:*³³, were excluded. The compound nouns filtered from the Thai Language Corpus must follow the structure N-body part + N-object and accurately reflect the function of body part morphemes in spatially locating subparts of objects. Additionally, this study created a vocabulary list from the collected compound nouns for interviewing native Thai speakers to determine the spatial location relationship of the N-object subpart referred to by the N-body part within the entire object in the compound structure. This step is crucial for verifying whether body part morphemes can spatially locate subparts of objects, providing empirical support for the study's hypothesis.

3.3 Data Analysis

This study analyzes the cognitive processes underlying the grammaticalization of body part morphemes as the heads of genitive constructions, functioning as relational nouns, based on collected data. Utilizing the theoretical frameworks of Levinson (1994) and Heine (1997), it focuses on the semantic expansion of body part morphemes in N-body part + N-object compound structures, particularly how the N-body part spatially locates the subparts of the N-object. The study analyzes the

conceptualization process of using body part terms to describe object subparts in Thai and explore the cognitive processes of human bodily experience and perception that underpin these linguistic choices.

4. Results

4.1 The grammaticalization from body part nouns to genitive constructions with relational nouns describing subparts of an object

This discussion explores how Thai body part nouns *hua*²¹⁴, *lan*²¹⁴, *pa:k*²¹, *tho:ŋ*⁴⁵, *na:*⁴¹, *ti:n*³³, and *kon*⁴¹ gradually evolve from free morphemes to compound word stems, subsequently functioning as the heads of genitive constructions within compound word structures and serving as relational nouns. This change promotes a semantic expansion of these body part nouns, leading to their function in spatially locating subparts of objects. Primarily representing the anatomical structures of living beings such as humans and animals, Thai body part nouns possess semantic features such as [animate], [shape], [space], and [function] (Lu & Part, 2019), as demonstrated in examples 5 through 11.

5.	<i>puat</i> ²¹ ache headache	<i>hua</i> ²¹⁴ head
6.	<i>top</i> ²¹ pat pat on the back	<i>lan</i> ²¹⁴ back
7.	<i>ʔa:</i> ⁴¹ open open mouth	<i>pa:k</i> ²¹ mouth
8.	<i>puat</i> ²¹ ache stomachache	<i>tʰo:ŋ</i> ⁴⁵ belly

- | | | |
|-----|--------------------|--------------------|
| 9. | la:ŋ ⁴⁵ | na: ⁴¹ |
| | wash | face |
| | wash the face | |
| 10. | tæp ²¹ | ti:n ³³ |
| | ache | foot |
| | foot pain | |
| 11. | la:ŋ ⁴⁵ | kon ⁴¹ |
| | wash | buttocks |
| | wash buttocks | |

The body part nouns refer to specific parts of a human or animal, and to specify the possessor, a genitive construction is needed. In the structure N-body part + k^hɔ:ŋ²¹⁴ + N-Animate creature, the genitive marker k^hɔ:ŋ²¹⁴ cannot be omitted, as shown in examples 12 through 18.

- | | | | | |
|-----|--------------------------------------|-----------------------------------|---|---|
| 12. | hua ²¹⁴ | k ^h ɔ:ŋ ²¹⁴ | dek ²¹ t ^h a: ³³ rok ⁴⁵ | |
| | head | GEN ⁵ | baby | |
| | Baby's head. | | | |
| 13. | lu:p ⁴¹ | lan ²¹⁴ | k ^h ɔ:ŋ ²¹⁴ | lu:k ⁴¹ |
| | caress | back | GEN | child |
| | Stroke the child's back. | | | |
| 14. | nam ⁴⁵ la:j ³³ | naj ³³ | pa:k ²¹ | k ^h ɔ:ŋ ²¹⁴ raw ³³ |
| | drool | PREP | mouths | GEN 1 PL ⁶ |
| | The drool in our mouths. | | | |
| 15. | lu:k ⁴¹ | naj ³³ | t ^h ɔ:ŋ ⁴⁵ | k ^h ɔ:ŋ ²¹⁴ raw ³³ |
| | child | PREP | belly | GEN 1 PL |
| | The child in my belly. | | | |

⁵ GEN- genitive

⁶ 1 PL-first person plural

- | | | | | | |
|-----|--------------------------------------|--------------------|-----------------------------------|---|---------------------------------|
| 16. | nam ⁴⁵ fon ²¹⁴ | bon ³³ | na: ⁴¹ | k ^h ɔ:ŋ ²¹⁴ | t ^h ɣ: ³³ |
| | rain | PREP | face | GEN | 3 SG |
| | The rain on her face. | | | | |
| 17. | jiap ²¹ | ti:n ³³ | k ^h ɔ:ŋ ²¹⁴ | p ^h wan ⁴¹ | |
| | step | foot | GEN | friend | |
| | Step on your friend's feet. | | | | |
| 18. | la:ŋ ⁴⁵ | kon ⁴¹ | k ^h ɔ:ŋ ²¹⁴ | dek ²¹ t ^h a: ³³ rok ⁴⁵ | |
| | wash | buttocks | GEN | baby | |
| | Wash baby's buttocks | | | | |

However, the omission of the genitive marker k^hɔ:ŋ²¹⁴ is permitted because the possessor and the possessor's body parts are parts that individuals frequently interact with in daily life. According to the iconicity principle (Wang, 1999), if N-body part are significant parts of the interaction between N-Animate creatures and are conceptually close, this conceptual closeness will be reflected in the surface structure, forming the linguistic structure of N-body part + N-Animate creature. Further syntactic reanalysis, including changes in phrase structure and enhanced syntactic cohesion between N-body part and N-Animate creature, is conducted, as shown in examples 19-25.

- | | | | | | |
|-----|--------------------------------------|-----------------------------------|---|---|---------------------------------|
| 19. | hua ²¹⁴ | k ^h ɔ:ŋ ²¹⁴ | dek ²¹ t ^h a: ³³ rok ⁴⁵ | | |
| 20. | lu:p ⁴¹ | lan ²¹⁴ | k ^h ɔ:ŋ ²¹⁴ | lu:k ⁴¹ | |
| 21. | nam ⁴⁵ la:j ³³ | naj ³³ | pa:k ²¹ | k ^h ɔ:ŋ ²¹⁴ | raw ³³ |
| 22. | lu:k ⁴¹ | naj ³³ | t ^h ɔ:ŋ ⁴⁵ | k ^h ɔ:ŋ ²¹⁴ | raw ³³ |
| 23. | nam ⁴⁵ fon ²¹⁴ | bon ³³ | na: ⁴¹ | k ^h ɔ:ŋ ²¹⁴ | t ^h ɣ: ³³ |
| 24. | jiap ²¹ | ti:n ³³ | k ^h ɔ:ŋ ²¹⁴ | p ^h wan ⁴¹ | |
| 25. | la:ŋ ⁴⁵ | kon ⁴¹ | k ^h ɔ:ŋ ²¹⁴ | dek ²¹ t ^h a: ³³ rok ⁴⁵ | |

In examples 19-25, the possessors of body parts are limited to animate creatures. However, through metaphorical mechanisms like INANIMATE OBJECT IS ANIMATE CREATURE, a cross-domain mapping occurs, allowing the N-animate creature in the genitive construction N-body part + N-animate creature to be replaced by a noun representing an inanimate object (N-object). This forms a genitive construction N-body part + N-object, triggering the semantic expansion of N-body part, as demonstrated in examples 26-28.

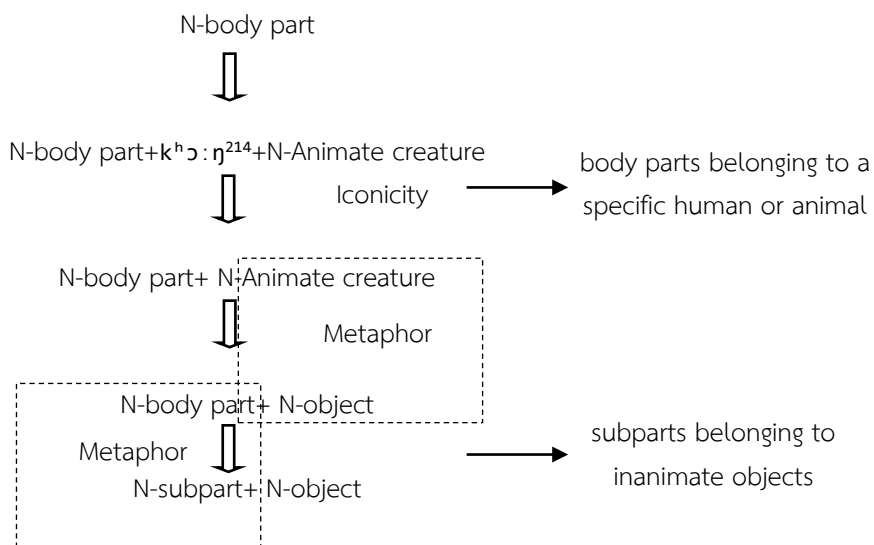
- | | | |
|-----|----------------------|----------------------------------|
| 26. | hua ²¹⁴ | rot ⁴⁵ |
| | head | car |
| | front end of the car | |
| 27. | lan ²¹⁴ | rot ⁴⁵ |
| | back | car |
| | back end of the car | |
| 28. | ti:n ³³ | k ^h aw ²¹⁴ |
| | foot | mountain |
| | foothill | |

In the genitive constructions N-body part + N-x (animate creature or object), N-body parts gradually evolve from free morphemes to compound word stems, serving as heads of genitive constructions and functioning as relational nouns with higher attachment. Through metaphorical thinking, the N-animate creature in N-body part + N-animate creature extend to other inanimate object nouns (N-object), forming the structure N-body part + N-object and resulting in the semantic expansion of N-body part. Influenced by the metaphorical cognitive mechanism of HUMAN BODY PART AS INANIMATE OBJECT SUBPART and interference from the semantic features of N-animate creature, N-body part loses the [animate] feature but retains semantic features such as [shape], [space], and [function],

thus acquiring [inanimate] semantic features. When the [inanimate] and [space] semantic features in the conceptual structure of N-body part are activated and placed in the figure, with other semantic features placed in the ground, N-body part undergoes semantic expansion. It can be used to refer to subparts of N-object and to spatially locate object subparts, forming the genitive construction N-subpart + N-object, where N-subpart functions as the relational noun of the genitive construction. For example, hua²¹⁴rot⁴⁵ refers to the front end of a car, a part frequently interacted with in daily life, as shown in Figure 2.

Figure 2

The grammaticalization from body part nouns to genitive constructions with relational nouns describing subparts of an object



4.2 The semantic function of N-subpart in the N-subpart + N-object structure for spatially locating the distribution of N-object

Thai body part nouns *hua*²¹⁴, *lan*²¹⁴, *pa:k*²¹, *tho:ŋ*⁴⁵, *na:*⁴¹, *ti:n*³³, and *kon*⁴¹ undergo grammaticalization, evolving into compound word stems with a higher degree of attachment. Through semantic expansion, these body part morphemes are used to refer to subparts of N-object and spatially locate the distribution of N-object, forming the N-subpart + N-object structure. The discussion will next focus on the semantic function of N-subpart, as shown in Table 1.

Table 1
The Semantic Function of N-subpart in the N-subpart + N-object Structure for Spatially Locating the Distribution of N-object

N-subpart + N-object	semantic function of N-subpart	Examples
<i>hua</i> ²¹⁴ + N-object	front end	<i>hua</i> ²¹⁴ <i>kraʔ</i> ²¹ <i>sun</i> ²¹⁴
		bullet Head
		<i>hua</i> ²¹⁴ <i>rwa</i> ³³
		bow
		<i>hua</i> ²¹⁴ <i>tiaŋ</i> ²²
		head of bed
		<i>hua</i> ²¹⁴ <i>rot</i> ⁴⁵
		front end of car

Table 1
The Semantic Function of N-subpart in the N-subpart + N-object Structure for Spatially Locating the Distribution of N-object (cont.)

N-subpart + N-object	semantic function of N-subpart	Examples
laŋ ²¹⁴ + N-object	back end	laŋ ²¹⁴ rot ⁴⁵ back end of the car
		laŋ ²¹⁴ p ^h raŋ ⁴⁵ p ^h ut ⁴⁵ t ^h a ⁴⁵ ru:p ⁴¹ back end of Buddha statue
	top end	laŋ ²¹⁴ k ^h a: ³³ /laŋ ²¹⁴ k ^h a: ³³ ruan ³³ roof
		laŋ ²¹⁴ mur ⁴⁵ top end of mosquito net
	bottom end	pok ²¹ laŋ ²¹⁴ back cover
pa:k ²¹ + N-object	front end	pa:k ²¹ mɛ: ⁴¹ nam ⁴⁵ river mouth
		pa:k ²¹ soj ³³ entrance to lane
na: ⁴¹ + N-object	front end	na: ⁴¹ we: ³³ t ^h i: ³³ proscenium
	top end	na: ⁴¹ kraŋ ²¹ da:t ²¹ paper surface
		na: ⁴¹ pok ²¹ front cover
ti:n ³³ + N-object	bottom end	ti:n ³³ k ^h aw ²¹⁴ foothill

Table 1
The Semantic Function of N-subpart in the N-subpart + N-object Structure for Spatially Locating the Distribution of N-object (cont.)

N-subpart + N-object	semantic function of N-subpart	Examples
t ^h ɔːŋ ⁴⁵ + N-object	bottom end	t ^h ɔːŋ ⁴⁵ t ^h aŋ ⁴⁵ leː ³³ seabed
kon ⁴¹ + N-object	bottom end	kon ⁴¹ t ^h ian ³³ bottom of candle kon ⁴¹ moː ⁴¹ bottom of pot
	back end	kon ⁴¹ buŋ ²¹ riː ²¹ end part of cigarette

As shown in Table 1, body parts serving as N-subpart can spatially locate parts of N-object based on spatial distribution properties. However, in conceptualizing body parts to locate object subparts, a single body part may be viewed from multiple perspectives, or different body parts may refer to the same subpart position, as illustrated in Table 2.

Table 2
Multidimensional Perspectives on Conceptualizing Body Parts to Locate Object Subparts

semantic function	hua ²¹⁴ head	lan ²¹⁴ back	pa:k ²¹ mouth	t ^h ɔːŋ ⁴⁵ belly'	naː ⁴¹ face	ti:n ³³ feet	kon ⁴¹ buttocks
Front end	√		√		√		
Top end		√			√		
Bottom end		√		√		√	√
Back end		√					√

To discuss the multidimensional perspective of body parts in spatially locating various regions of an object, the following questions need to be addressed:

1) *Why do body parts such as hua²¹⁴, pa:k²¹, and na:⁴¹ all represent the front end of an object?*

2) *Why can body parts like lan²¹⁴ and na:⁴¹, which are opposite in terms of front and back, both denote the top end of an object?*

3) *Why can body parts like lan²¹⁴, t^hɔ:ŋ⁴⁵, and ti:n³³, kon⁴¹ all signify the bottom end of an object?*

4) *Why can body parts like lan²¹⁴ denote the top end, the bottom end, and the back end?*

5) *Why can body parts like na:⁴¹ denote the top end and the front end?*

6) *Why can body parts like kon⁴¹ refer to both the back end and the bottom end?*

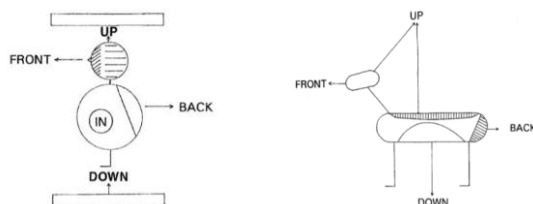
This study will further discuss the aforementioned issues.

4.3 Cognitive Processes Based on Anthropomorphic and Zoomorphic Models

The body is a significant conceptual source for forming spatial orientation concepts, typically involving metaphorical transfer and grammaticalization. The human body can serve as a model or source, known as the anthropomorphic model (Heine, 1997, p. 48), or it can refer to animal bodies, using the zoomorphic model (also called the pastoralist model) (Heine, 1997, p. 41; Svorou, 1994, p. 74). Figure 3 illustrates the differences between these two models.

Figures 3

Anthropomorphic model versus zoomorphic model

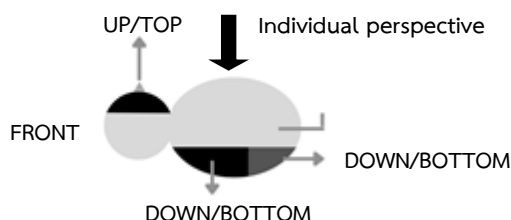


Note. from *Cognitive foundations of grammar* (p. 48, p. 41), by B. Heine, 1997, Oxford University Press.

As shown in Figure 3, the anthropomorphic model uses the human body part ‘back’ to construct the spatial orientation ‘back’, while the zoomorphic model uses the animal body part ‘back’ to construct ‘up’. In the zoomorphic model, the animal body part ‘head’ constructs ‘front’, whereas in the anthropomorphic model, the human body part ‘head’ constructs ‘up’. The animal body part ‘belly’ in the zoomorphic model constructs ‘down’, while in the anthropomorphic model, the human body part ‘belly’ constructs ‘in’. Heine (1997) mentions that the zoomorphic model is never used alone, languages that employ this model also use the anthropomorphic model. In some languages based on the anthropomorphic model, human body parts like ‘head’, ‘ribs’, and ‘belly’ construct spatial orientations such as ‘front’, ‘side’, and ‘in’, while ‘buttocks’, based on the zoomorphic model, construct the spatial orientation ‘back’ (Svorou, 1994, p. 75). Lu and Park (2019), in their study of the spatial orientation concepts of the Thai body part term *hua*²¹⁴ ‘head’, proposed a unique perspective on how spatial orientations are constructed in Thai, particularly through what they call the sleeping model (Figure 4), which is used to construct the spatial concepts of ‘front’, ‘down/bottom’, and ‘up/top’. Unlike the previously mentioned

anthropomorphic and zoomorphic models, the sleeping model is based on experiential cognition from observing humans in a horizontal sleeping position. In this model, when people lie flat, the body's horizontal axis defines the spatial orientations of front, up, and down. First, the face, oriented upwards, corresponds to up or top, and the back, facing downwards, corresponds to down or bottom. Additionally, the face is positioned at the front relative to the feet. In other words, when a person is lying flat and parallel to the earth's horizontal plane, the visible parts of the body (face) construct the spatial concept of up/top, while the unseen parts (back/buttocks) construct the concept of down/bottom.

Figure 4
Sleeping model



Note. from “A cognitive linguistic study on polysemy of body part term hǔa ‘head’ in Thai,” by X. H. Lu & K. E. Park, 2019, *Southeast Asia Journal*, 28(3), 71-122.

4.3.1 hua²¹⁴, pa:k²¹, na:⁴¹ > the front end of objects

Table 3

Cognitive Process from Body Parts to the Front End of Object

Body Part	Cognitive Model	the Front End of Object
hua ²¹⁴ ‘head’	Zoomorphic Model	hua ²¹⁴ rot ⁴⁵
	Sleeping Model	head → front car front end of car
pa:k ²¹ ‘mouth’	Anthropomorphic Model	pa:k ²¹ so:j ³³
	Zoomorphic Model	mouth → front lane entrance to lane
na: ⁴¹ ‘face’	Anthropomorphic Model	na: ⁴¹ we: ³³ t ^h i: ³³
	Zoomorphic Model	face → front stage proscenium

As shown in Table 3, during the spatial distribution positioning of object subparts, body parts such as hua²¹⁴, pa:k²¹, and na:⁴¹ are conceptualized as the front end of inanimate objects based on spatial distribution similarity between animal body parts, the position of the head in the sleeping model, and object sub-parts. Similarly, pa:k²¹ and na:⁴¹ are conceptualized as the front end of objects based on the spatial similarity between human and animal body parts and object subparts.

4.3.2 lar²¹⁴, na:⁴¹ > the top end of objects

Table 4
Cognitive Process from Body Parts to the Top End of Object

Body Part	Cognitive Model	the Top End of Object
lar ²¹⁴ ‘back’	Zoomorphic Model	lar ²¹⁴ mur ⁴⁵ Back → Top mosquito top end of mosquito net
na: ⁴¹ ‘face’	Sleeping Model	na: ⁴¹ pok ²¹ face → Top cover of book front cover

As shown in Table 4, based on spatial distribution similarity between animal body parts and object subparts, lar²¹⁴ is conceptualized as the top end of objects during the spatial distribution positioning of object subparts. However, the conceptualization of na:⁴¹ as the top end of objects is noteworthy since it does not align with either the anthropomorphic or zoomorphic models, where na:⁴¹ should be conceptualized as the front end of objects.

Addressing this issue, Lu and Park (2019) suggested that Thai people might use a third model, the sleeping model, in conceptualizing spatial orientation. The conceptualization of na:⁴¹ as the top end appears to be related to this sleeping model, as shown in Figure 4.

4.3.3 lan^{214} , $t^h\alpha:\eta^{45}$, $ti:n^{33}$, kon^{41} > the bottom end of objects

Table 5

Cognitive Process from Body Parts to the Bottom End of Object

Body Part	Cognitive Model	the Bottom End of Object	
lan^{214} ‘back’	Sleeping Model	pok^{21}	lan^{214}
		cover of book	back → bottom
		back cover	
$t^h\alpha:\eta^{45}$ ‘belly’	Zoomorphic Model	$t^h\alpha:\eta^{45}$	$t^ha\gamma^{45}le^{33}$
		belly → bottom	ocean
		seabed	
$ti:n^{33}$ ‘foot’	Anthropomorphic Model	$ti:n^{33}$	k^haw^{214}
		foot → bottom	mountain
		foothill	
kon^{41} ‘buttocks’	Anthropomorphic Model	kon^{41}	mo^{41}
	Sleeping Model	buttocks → bottom	pot
		bottom of pot	

As shown in Table 5, based on spatial distribution similarity, body parts such as lan^{214} , $t^h\alpha:\eta^{45}$, $ti:n^{33}$, and kon^{41} are used in the conceptualization process of object subparts to represent the bottom end of objects. The conceptualization of $t^h\alpha:\eta^{45}$ as the bottom end of an object is based on the spatial distribution similarity between animal body parts and object subparts, while $ti:n^{33}$ is based on the spatial distribution similarity between human body parts and object subparts. The conceptualization of lan^{214} as the bottom end of an object is based on the human sleeping model, as shown in Figure 4. Regarding the

conceptualization of kon^{41} as the bottom end of an object⁷, two possibilities are involved: first, in the anthropomorphic model, the buttocks are positioned lower relative to the head, suggesting that the bottom end of object subparts may relate to human body parts; second, based on the sleeping model, when a person is lying flat, the spatial distribution of the buttocks relative to the face is similar to that of the back, also positioning them at the bottom end.

4.3.4 lan^{214} , kon^{41} >the back end of objects

Table 6
Cognitive Process from Body Part to the Back End of Object

Body Part	Cognitive Model	Object Front End	
lan^{214} ‘back’	Anthropomorphic Model	lan^{214}	rot^{45}
		Back→ back end	car
		car rear	
kon^{41} ‘buttocks’	Zoomorphic Model	kon^{41}	$bu^{21}ri^{21}$
		Back→ back end	cigarette
		end part of cigarette	

As shown in Table 6, based on spatial distribution similarity, the body parts lan^{214} and kon^{41} can represent the back end of objects in the conceptualization process of object subparts. lan^{214} is based on the spatial distribution similarity between human body parts and object subparts, while kon^{41} is based on the spatial distribution similarity between animal body parts and object subparts.

⁷ Buttocks are the most common body part source for ‘down’, even though there are only three examples of this in her fifty-five language sample (Svorou, 1994, p. 71).

5. Conclusion and Discussion

This study, based on the theoretical foundations of Levinson (1994) and Heine (1997), examined how specific body part nouns like *hua*²¹⁴, *larj*²¹⁴, *pa:k*²¹, *tʰɔ:ŋ*⁴⁵, *na:*⁴¹, *ti:n*³³, and *kon*⁴¹ when combined with inanimate object nouns, function in spatially locating subparts or regions of inanimate objects. It analyzes the grammaticalization process and the cognitive processes involved in using body parts to spatially locate object subparts from multiple perspectives. The research findings are shown in Table 7 below.

Table 7
Cognitive Process from Body Parts to spatially locating subparts or regions of inanimate objects

N-subpart + N-object	semantic function of N-subpart	Cognitive model
<i>hua</i> ²¹⁴ + N-object	front end	Zoomorphic Model
		Sleeping Model
<i>larj</i> ²¹⁴ + N-object	back end	Anthropomorphic Model
	top end	Zoomorphic Model
	bottom end	Sleeping Model
<i>pa:k</i> ²¹ + N-object	front end	Anthropomorphic Model
		Zoomorphic Model
<i>na:</i> ⁴¹ + N-object	front end	Anthropomorphic Model
	top end	Zoomorphic Model
		Sleeping Model

Table 7

Cognitive Process from Body Parts to spatially locating subparts or regions of inanimate objects (cont.)

N-subpart + N-object	semantic function of N-subpart	Cognitive model
ti:n ³³ + N-object	bottom end	Anthropomorphic Model
t ^h ɔ:ŋ ⁴⁵ + N-object	bottom end	Zoomorphic Model
kon ⁴¹ + N-object	bottom end	Anthropomorphic Model
		Sleeping Model
	back end	Zoomorphic Model

Based on Table 7, the conceptualization of the front end of object subparts involves the head, mouth, and face. The head is linked to the Zoomorphic and Sleeping Models, the mouth is associated with the Anthropomorphic and Zoomorphic Models, and the face relies on both the Anthropomorphic and Zoomorphic Models. For the back end of object subparts, the conceptualization involves the back and buttocks, with the back using the Anthropomorphic Model and the buttocks using the Zoomorphic Model. The top end of object subparts is conceptualized using the back and face, with the back linked to the Zoomorphic Model and the face to the Sleeping Model. The bottom end of object subparts includes the back, foot, belly, and buttocks, with the back using the Sleeping Model, the foot using the Anthropomorphic Model, the belly using the Zoomorphic Model, and the buttocks relying on both the Anthropomorphic and Sleeping Models.

This study discusses the cognitive processes involved in using Thai body part morphemes to spatially locate object subparts, demonstrating the unique interaction between language structure and human perception. The results show that metaphorical extensions of body part

morphemes to object subparts are common in Thai, serving as a cognitive tool to conceptualize the physical world. This aligns with the principles proposed by Levinson (1994) and Heine (1997), emphasizing metaphorical thinking in grammaticalization and semantic evolution.

The study examines the transformation of Thai body part nouns such as *hua*²¹⁴, *laŋ*²¹⁴, and *pa:k*²¹ from free morphemes to compound word stems, expanding their range of use. This transformation is facilitated by cognitive models like the anthropomorphic, zoomorphic, and sleeping models proposed by Lu and Park (2019), demonstrating the alignment of spatial positions of body parts with the spatial distribution of inanimate object subparts. The results show the multifunctionality and flexibility of body part morphemes in Thai, indicating that the same body part can denote different spatial orientations in various contexts. This multiplicity of meanings illustrates the richness of metaphorical thinking in language use, where body parts serve as physical descriptors and anchors for complex spatial mappings. This study contributes to our understanding of Thai linguistics and enriches the broader discourse on cognitive linguistics by demonstrating how metaphorical language is deeply rooted in human experience and perception. The use of body part terms to spatially organize the world evidences the fundamental human tendency to draw meaning from bodily experience to understand abstract or unseen phenomena, a principle likely prevalent across languages and cultures.

References

- Bybee, J., Pagliuca, W., & Dressler, W. (1985). Cross-linguistic comparison and the development of grammatical meaning Suppletion in word-formation. In J. Fisiak (Ed.), *Historical Semantics - Historical Word-Formation* (pp. 59-84). De Gruyter Mouton.
- Bowden, J. (1992). *Behind the preposition: Grammaticalisation of locatives in Oceanic languages*. Australian National University.

- Berendt, E. A., & Tanita, K. (2011). The 'Heart' of things: A conceptual metaphoric analysis of heart and related body parts in Thai, Japanese and English. *Intercultural Communication Studies*, 20(1), 65-77.
- Heine, B., & Reh, M. (1984). *Grammaticalization and reanalysis in African languages*. Helmut Buske Verlag GmbH.
- Heine, B., Claudi, U., & Hünemeyer, F. (1991a). *From cognition to grammar: Evidence from African languages*. John Benjamins Publishing.
- Heine, B., Claudi, U., & Hünemeyer, F. (1991b). *Grammaticalization: A conceptual framework*. University of Chicago Press.
- Heine, B. (1997). *Cognitive foundations of grammar*. Oxford University Press.
- Hagège, C. (2011). *Adpositions: Function-marking in human languages*. Oxford University Press.
- Lakoff, G., & Johnson, M. (1980). The metaphorical structure of the human conceptual system. *Cognitive science*, 4(2), 195-208.
- Levinson, S. C. (1994). Vision, shape, and linguistic description: Tzeltal body-part terminology and object description. *Linguistics*, 32(4-5), 791.
- Lim, J. R. (2008). *Exploration of Semantics in Cognitive Linguistics*. Korean Literature Inc.
- Lehmann, C. (2022). Foundations of body-part grammar, In R. Zariquiey & P. M. Valenzuela (Eds.), *The Grammar of body-part expressions: A view from the Americas* (pp. 14–76). Oxford University Press.
- Lu, X. H., & Park, K. E. (2019). A cognitive linguistic study on polysemy of body part term hũa 'head' in Thai. *Southeast Asia Journal*, 28(3), 71-122.
- Lu, X. H., & Khumsat, T. (2022). The application of metonymic cognitive mechanism to construct non-body part meanings using body parts words: A case study of hũa and mw: in Thai. *Chinese Journal of Social Science and Management*, 6(2), 183-195.

- Lu, X. H., Khumsat, T., Liu, Y., & Luttamon. H. (2024). Cognitive motivations of the construction of space-time concepts of Thai body part words nâ: and lăj and their prepositionalization phenomenon. *Foreign Language Studies National Chengchi University*, (39), 89-114.
- Martinez, R., & Schmitt, N. (2012). A phrasal expressions list. *Applied linguistics*, 33(3), 299-320.
- Perekhvalskaya, E. (2011). Body parts and their metaphoric meanings in Mwan and other South Mande languages. *Human Studies*, 8(1), 53-62.
- Rhee, S. H. (1988). *Understanding Grammaticalization*. Korean Literature Inc.
- Svorou, S. (1994). *The grammar of space*. John Benjamins Publishing.
- Wang, Y. (1999). *On the iconicity of linguistic signs: A challenge and supplement to Saussure's theory of arbitrariness*. Xinhua Publishing.