Journal of West African Languages

Volume 48.1 (2021)

# EMBODIED CONCEPTUALISATION IN YORÙBÁ: EVIDENCE FROM SPATIAL TOPOLOGY

Tosin Akerele
Alex Ekwueme Federal University Ndufu-Alike
akerele.tosin@funai.edu.ng

**Abstract**
This study takes evidence from the domain of space to demonstrate that conceptualisation in Yorùbá is grounded in embodied cognition. Analysing data drawn from a corpus of more than one million words, we find that the construction of spatial concepts in Yorùbá is motivated by the anatomical structure and functions of salient body topological models. These include median, coronal, horizontal and container schemas as well as thirteen body organs. These models invoke simulation for spatial concepts through the words primarily associated with their intrinsic biological attributes and values. The conceptual relationship we establish between the human body and the expression of space leads us to one conclusion about the protean nature of body-part words in the Yorùbá language: they are polysemous rather than heterosemous.

**Keywords**: Embodiment, Conceptualisation, Simulation, Axial schemas, Topology, Yorùbá

## 1. Introduction

This paper provides an alternative perspective to doing the semantics of Yorùbá using methods in Cognitive Linguistics. Specifically, using evidence from spatial topology, the paper offers a perspective on the embodiment of conceptual events in the language drawing on a large corpus of language data. Our thesis is that conceptualisation in Yorùbá is grounded in embodied cognition.

Conceptualisation is the construction of meaning from mental representations known as concepts (Barsalou 2017). Linguistic items such as tonemes, morphemes, words, phrases and sentences have meaning contents, which represent aspects of concepts that make it possible for a group of people, say the Yorùbá speech community, within one culture to talk about the sense they make out of the concepts derived from their specific physical environment (Dirven 2013). By saying linguistic symbols represent *aspects* of concepts, then it implies that concepts are far richer and broader than what language encodes. This also has the consequence that conceptualisation, meaning construction even in language itself entails deeply engraved realities in the human brain beyond linguistic information. "After all, language as a representational system, consisting of symbolic units, is simply not equipped to directly encode the rich, multimodal aspects of perceptual experience" (Evans 2009: 30).

This study hopes to invoke a change of perspective in doing the linguistics, especially semantics of the Yorùbá language. For decades, specifically from Bowdich's collection of Yorùbá words in 1817 onward (Okolo 1981), great efforts have been made by individuals and organisations to collect and study the meaning of Yorùbá words as well as how they combine to form meaningful sentences. Great feats have thus been achieved especially in formal linguistics enterprise, which emphasises the nature of linguistic symbols such as phonemes, morphemes, individual words, as well as larger strings as in grammar and text. A search through volumes of literature on the Yorùbá language only reveal one truth, that attention of scholars has been overly paid to describing levels of disembodied amodal symbols against the study of embodied multimodal meaning in the language. The present study takes insights from cognitive science to redirect scholars' attention to an alternative lens useful for capturing details of semantic contents of words in the language. We do this by accounting for how the human body structures conceptualisation in Yorùbá. Our objective therefore is to identify body attributes that motivate the selection of body-part words, then explain how these attributes structure the prototype effects of the words on spatial conceptualisation attested to in the language.

This work is structured into six sections. Mentioned earlier, the study is grounded in cognitive science, employing cognitive linguistics as a window. This grounding forms the subject matter of sections (2) and (3) where we present a succinct review of scholars' thoughts on conceptualisation and the embodiment thesis, which inform our analysis. Section (4) presents the methodology we adopted in gathering and analysing the data for the study. In that

section, we introduce the work as being largely, but not completely, corpus driven. Our analysis is contained in section (5). Based on the conceptual relationship we establish between the human body and the expression of space in the previous sections, we conclude in section (6) that the protean nature of body-part words in the Yorùbá language attests to one fact: they are polysemous rather than heterosemous.

## 2. Cognitive science and the Yorùbá language

In cognitive science, there are two broad approaches to explaining linguistic conceptualisation: formal (also known as objectivist or classical) approach and Embodied Cognition (EC) (subjectivist) approach (Zlatev 2007 & 2009; Yu 2014; Scorolli 2009, 2014; Barsalou 2017). Though the understanding that concepts are not exact abstract entities entirely represented by language units is a shared knowledge between the two approaches, this knowledge as conceived and interpreted by the former differs greatly from the latter. In the formal approach, the objectivist or classical cognitive science traditions, such as represented in linguistics by Generative Transformational Grammar of Noam Chomsky (Chomsky 1965, and beyond), and a number of others have a central idea that "concepts are generated by abstract, arbitrary and amodal symbols" (Scorolli 2009:15). This view considers the human mind as a kind of a mechanism for syntactically manipulating symbols, such as an information-processing device or procedures operating on theoretical primitives in order to produce the complete set of linguistic possibilities in each language (Evans & Green 2006). This view is consistently linked to René Descartes' argument that mind and body are distinct entities. To him, the mind is a non-material substance that exists independently of the body (Maiese 2011). With this, the conclusion is reached that since concepts are abstract entities in the mind organised in a stable linguistic way, they are formed by amodal propositional features completely disconnected from the body. That is, there is nothing in the world 'out there' that influences concepts formation. Instead, concepts are primarily formed in the completely disembodied mind then represent the world (Marghetis & Bergen 2015). Therefore, every linguistic symbol (morphemes and words in particular) carries with it features in the lexicon that determine its phonological, syntactic and semantic specifications. In short, mental or innate primitives determine conceptualisation.

There is no contending that conceptualisation involves mental processes. However, a body of evidence shows that concepts are not primarily projected from the mind as claimed in the mentalist account mentioned above. Instead, beginning with the position held by philosophers as Locke and Hume, they are constructed by reactivation (or simulation) of bodily activities in cognition (Caruana 2013; Marghetis & Bergen 2015;). The Yorùbá language provides ample evidence that validates this position, that is the physical body possessed by organisms determines their cognitive processes. In this paper, with the description of expressions of spatial topology in Yorùbá, we will demonstrate the indivisibility of the mind, body and language.

Following the conclusion in "second generation" cognitive sciences, which holds that the creation of meaning is intimately tied to the body, or rather, bodies (Short 2016; Johnson 1987 & 2017), the present work contends that meaning making in Yorùbá is seldom solitary, that the prototypical linguistic contents of symbolic units involve multiple interacting agents working together to negotiate shared meaning. Interlocutors use their bodies as fully fleshed out semiotic resources during situated talk (Goodwin 2000; McNeill 2005; Marghetis & Bergen, 2015). Unfortunately, despite how deeply the body plays roles in structuring every aspect of the Yorùbá culture, the heap of literature over many decades does not reflect that Yorùbá language scholars have been thinking about this. These roles are especially salient with respect to how spatial conceptualisation is structured and expressed. Consider the examples in (1-3) below, where time is encoded in three motor Yorùbá verbs with a central concept of [MOTION].

(1) **Ọjọ́ ń *lọ* lórí mi**
day ASP **go** in-head my'
'Day goes off in my head' (I am aging)

(2) **Àkókò *súré* tete**.
time **run** quickly
'Time flies'
(3) **Ìgbà ológo ń *bọ̀* ni olúwa wí**.
time glorious ASP **come** COP lord say
'A glorious time is coming', says the lord'

In (1) ***lọ*** is the Yorùbá verb for forward movement of an organism, best translated into English 'go'. ***Ọjọ́*** (day) is shown to be walking forward in somebody's ***orí*** (head). In (2), ***súré*** is not just some slow movement forward, it marks a race. While (1) relates to movements *within* the body of the ego, and (2) away from ego centre, from the speaker, (3) involves ***bọ̀,*** the Yorùbá verb for motion *towards* the ego. Here in (3), ***Ìgbà*** (time), is moving towards the ego. In these examples, the concept of TIME IS MOTION OF OBJECTS IN SPACE is not projected in some mental innate device but a kind of simulation of embodied action of actual movement in the physical world, which could be within a spatial region, away from or attracting towards a particular location. The abstract experience of passage of time is conceptualised as though a physical agent is engaged in some forward and backward movement towards and away from another. Going by the formalist account of concepts, it would be extremely difficult, even impossible to explain how this concept is derived from some disembodied mental features.

The same is true of encoding spatial topologies in Yorùbá. Regions in space, as in (4) below, are expressed with words primarily associated with parts of human body. As far as we are aware, Dingemanse (2006) is the first to acknowledge that in Yorùbá, these body-part terms play a crucial role in spatial conceptualisation. Prior to Dingemanse (2006), the relationship between space and the body was usually mentioned in the 'passing' (as in Ogunbọwale 1967, Rowlands 1969 and Sachnine 1997). Taking a step beyond those earlier reports, Dingemanse (2006:65) specifically states that "the body has served as a source domain for words expressing spatial relations". Despite this acknowledgement however, Dingemanse (2006) treats the meaning of these words as exhibiting distinct sense units associated with them when they profile body parts and when they index regions in space, disconnecting the body from the language almost completely. For instance, commenting on the kind of example given in (4) below, he argues that *properly speaking*, body words (such as ***iwájú)*** are *not* about body-part terms. Instead they are *heterosemous*. This means that ***iwájú*** in a sense refers to a part of the body ('front'), while in the utterance below denotes a *fully distinct sense,* a region contiguous to a part of another entity (Dingemanse 2006:32).

(4) **Iwajú igi**
front tree
'Front of a tree'

Given this observation, the study views the adoption of body terms to express components of space in Yorùbá as a matter of history with no significant conceptual connections, and concludes that "these spatial relational nominals do not function like ordinary body-part terms… it seems that this spatial relational sense is best regarded as only historically related to the body-part term" (Dingemanse 2006:32). The present study does not think this conclusion accurately explains the relationship between the Yorùbá language and the body. We will here contend for a strong conceptual relationship between the body, space and the Yorùbá language.

We believe that speakers' ability to see and express the world through the body is made possible by a mental process called simulation (Evans 2007; Lupyan & Bergen 2015), which invokes stored image schemas of attributes of cognitive models or conceptual entities at the use of any of the body-part words either in speech or any other modes of communication. In our analysis hereunder, we will present two premises to justify this position. First, we argue that the body axial frame fundamentally structures the conceptualisation of spatial axes. Second, we will advance this argument with an additional claim that the body does more than structure axial conceptualisation. With words used to identify its regional parts, it stimulates

simulation, providing access to multimodal contents derived basically from two categories of systems, systems which Evans (2009:105) describes thus.

> First, are sensory-motor systems, systems that recruit information relating to the external environment and the human individuals' interaction with the environment. Second are proprioceptual systems, which are the systems that recruit information relating to the motor aspects of the body's own functioning — and subjective experience — which includes experiences ranging from emotions, temporal and other cognitive states, to the visceral sense.

Therefore, words do not just name specific body parts, as in *ojú* merely naming the organ of vision, the eye. It profiles the entirety of the organ's (1) sensory-motor systems, systems that recruit information relating to, for just one example, photoreceptors of the eye that receive the penetration of light, stipulating the nature of the interaction of the eye to the external environment and the human individuals' interaction with the environment with respect to vision. For example, an attribute of vision involves the micro-penetration of light, and the interpretation of the contents of this. This nature of penetration makes it possible for the word associated with the organ of vision in Yorùbá to invoke simulation for the conceptualisation and construal of small spatial portion of any entity that receives the penetration of another object as the eye of that entity. See examples (5-7) below.

(5) **Ó rọrùn fún ràkúnmí láti gba *ojú abẹ́rẹ́* kọjá**
3SG easy for camel to follow **eye needle** through
'It is easier for a camel to get through a needle's eye.'

(6) **Míkálì mú Dáfídì sọ̀kalẹ̀ gba *ojú fèrèsé***
Michal make David descend follow **eye window**
'Michal let David down through the window.'

(7) **Wọ́n sọ́ ọ́ kalẹ̀ ní òru gba *ojú ihò* kan lára ògiri**
They let 3SG down by night through **eye hole** an on-body wall
'They let him down by night through an opening in the wall.'

In these examples, the penetrable portion of such entities as needle, window and hole is indexed by the word that primarily profiles the organ of vision of the body. However, it is observed that instead of profiling every feature or system that makes up the organ, just one interactive system is indexed and transferred to non-body entities, that of penetrability. This is only possible with the simulative ignition of the stored image schema relating to how the eye itself receives penetration of light, which is transferred to conceptualise the micro-portions of non-body entities receiving similar penetrations.

In a similar way, the word stimulates simulation for the second kind of system with respect to the organ of vision, proprioceptual systems; systems that, for one instance, relate to subjective experience of the eye's own functioning, which may be a positive or negative (poor) *state* of the organ. These antonymous states condition the use of the word under consideration as in the examples (8-9) below. In the (8) utterance, gaining favour; a positive state of affair is said to be 'good eye' while in the (9) instance the 'bad state' of eye indexes terrible state of affairs.

(8) **Ẹ fi *ojú rere* díẹ̀ hàn sí mi**.
2PL use **eye good** little show to me
'Show me some favour.'

(9) **Mo máa ń fi *ojú burúkú* wo àwọn Ẹlẹ́rìí Jèhófà**.
I ASP ASP use **eye bad** look 3PL Witness Jehovah
'I formed a very negative view of Jehovah's Witnesses.'

Therefore, the linguistic items that *name* the body attributes are considered mere conceptual vehicles that have within them the potential to profile or index cognitive attributes

or sub-attributes that are capable of invoking specific conceptualisations depending on the conceptual components of an entity involved in instances of situated communication.

## 3. Conceptual foundation for meaning construction: the embodiment thesis

This study leans heavily on the position that linguistic conceptualisation is grounded in culturally conditioned embodied realism. Studies in cognitive linguistics and other cognitive sciences have validated this position. One important way they do this is by providing empirically supported answers to the question of what specific systems in the body are involved in linguistic conceptualisation in cognition. According to the views from most studies on Embodied Cognition (EC), concepts are grounded in three systems: perception, motor, and emotion systems (Altman 2009; Borghi & Pecher 2011; Davis & Markman 2012; Marghetis & Bergen 2015; Bier 2015). Cervel (2013) presents detailed study on the conceptualisation of embodied emotional systems. Similarly, the literature burgeons on the embodiment of motor activities (or actions), their grounding in cognition and their crucial roles in conceptualisation (see Praetorius 2000; Hauk, Johnsrude & Pulvermuller 2004; Arbib 2005; Tettamanti et al. 2005; Aziz-Zadeh et al. 2006; Boulenger et al. 2006; Kemmerer, Gonzalez Castillo, Talavage, Patterson, & Wiley 2008; Gentilucci & Campione 2012; Craighero 2014). These systems have been hypothesised to connect to language and memory through ***simulation*** (Barsalou 1999; Bergen & Chang 2007; Fauconnier & Turner 2007, 2008; Gallese 2005; Bergen 2015; Marghetis & Bergen 2015; Liu & Bergen 2016). The totality of our discussion is confined in the concept of simulation.

"Simulation is the human ability to mentally activate or rehearse perceptual images such as particular sensations or experiences in the absence of the external perceptual stimulus which gives rise to the images" (Evans 2007:199). When people perform mental simulation, they use neural circuitry dedicated to action and perception to envision performing actions or perceiving percepts (Liu & Bergen 2016). These mental states can be thought of as schemas in that some degree of perceptual detail, such as shape, size, orientation, distance, and perhaps colour, appears to be engaged, but superficially represented (Lupyan & Bergen 2015).

Bergen, (2015) shows that the fundamental idea underlying the embodied simulation hypothesis is a remarkably old one. He traces the idea to Carl Wernicke's (1874) description that "the concept of the word "bell," for example, is formed by the associated memory images of visual, tactual and auditory perceptions. These memory images represent the essential characteristic features of the object, bell." (*Wernicke 1977 [1874], p. 117,* in Bergen: 2015:142). This hypothesis is of primary importance in cognitive semantics. Here, meaning directly derives from conceptualisation, which is the simulation of perceptual inputs. Writing about this, Bergen (2015:143) explains:

> Cognitive semanticists argue that meaning is tantamount to conceptualisation—that is, it is a mental phenomenon in which an individual brings their encyclopedic experience to bear on a piece of language. Making meaning for a word like *antelope* involves activating conceptual knowledge about what antelopes are like based on one's own experience, which may vary across individuals as a function of their cultural and idiosyncratic backgrounds. The idea of embodied simulation dovetails neatly with this encyclopedic, individual, experiential view of meaning, and cognitive semanticists were among the early proponents of a reinvigorated embodied simulation hypothesis.

Given the above extract, what evidence do cognitive semanticists have to infer that conceptualisation is embodied simulation, or more precisely, how does simulation work to output linguistic meaning? Bergen (2015) provides six premises, all of which are supported by empirical attestations. These are behavioural evidence, imaging, neuropsychology, Transcranial Magnetic Stimulation (TMS), adaptation computational and modelling (see detailed explications of these in Bergen 2015). An underlying idea that runs through all these is that a mental schematic image is invoked when a linguistic unit is used. In the present study,

we observe that reflects of this image can be isolated from the words Yorùbá speakers use for encoding locations in space.

Consequently, leaning on the idea of embodied simulation, the current study argues that aspects of conceptualisation attested in Yorùbá are grounded not in the bundles of primitive features but on the association links between the simulation of bodily compositions, activities and anatomical systems, and encyclopaedic cultural phenomena. This echoes a central conclusion in cognitive linguistics that "the meanings associated with words are flexible, open-ended, and highly sensitive to utterance context" (Evans 2009:22). This conclusion is inferred from observations in a large volume of studies (as in Goffman 1981; Clark 1983, 1996; Herskovits 1986; Lakoff & Johnson, 1980 & 1999; Langacker 1987 & 2008; Croft 1993, 2000; Fauconnier 1997; Sweetser 1999; Carston 2002; Cruse 2002; Allwood 2003; Tyler & Evans 2003; Croft & Cruse 2004; Evans 2004; Dancygier & Sweeter 2005).

In line with the views above, and in agreement with Gumperz and Levinson (1996:230) who argue that "we cannot think of a 'world-view' as inherent in a language, somehow detached from all the practices established for its use", simulation in the present study is seen in the light of the fusion of underlying embodied sensorimotor systems and cultural background (also see Soliman & Glenberg 2014; Stahl 2014; Theiner 2014). This means the images evoked at the use of a word accommodate both the bodily systems and the cultural phenomena, traits associated with not just the word in isolation but all other words that goes with it in an utterance, especially those contiguous.

## 4. Data and method

The Yorùbá language accesses the body largely through visual perception. This constrains what organs or parts we observed participate in conceptual structuring, especially the spatial cognitive domains the language profiles with body-part words. Thus, except for *ọkàn* 'heart' and *inú* ''abdomen', we observed that words for internal organs do not usually participate in conceptualisation. Therefore, in addition to these two, we found 18 words for largely visually perceptible organs and axial positions that activate simulation for various kinds of spatial conceptualisations. These are summarised on table 1 below.

**Table 1 Body-part words analysed in the study**

| | ***Word type*** | ***Token*** |
|---|---|---|
| *1.* | inú 'abdomen/inside' | 2361 |
| *2.* | ọkàn 'heart' | 2244 |
| *3.* | ojú 'eye' | 2150 |
| *4.* | ọwọ́ 'hand' | 1759 |
| *5.* | orí 'head' | 920 |
| *6.* | òkè 'up' | 752 |
| *7.* | ẹnu 'mouth' | 739 |
| *8.* | àárín 'centre' | 579 |
| *9.* | ìdí 'buttock' | 535 |
| *10.* | ẹsẹ̀ 'leg' | 418 |
| *11.* | ẹ̀yìn 'back' | 393 |
| *12.* | iwájú 'front' | 378 |
| *13.* | ìhà 'ribs' | 369 |
| *14.* | etí 'ear' | 358 |
| *15.* | òsì 'left' | 340 |
| *16.* | ọ̀tún 'right' | 236 |
| *17.* | ẹ̀gbẹ́ 'side' | 153 |
| *18.* | ọrùn 'neck' | 123 |
| *19.* | *abẹ́* 'under' | 110 |
| *20.* | ìsàlẹ̀ 'down' | 83 |
| | **TOTAL** | **15000** |

With Anthony's (2019) *AntConc* software tool, we extracted 15000 tokens of these words from a corpus of 1121930 words in the 1997 edition of the Yorùbá version of *New World Translation of the Holy Scriptures* published and freely made available online by Watch Tower Bible and Tract Society (see jw.org/yo). We then considered the extracted forms qualitatively. We are aware that drawing a corpus of data largely from the Holy Bible must strike some as odd. This is particularly true when one considers the fact that there are bound to be instances of calque expressions in translated versions of the Bible which could influence the data so gathered and the resulting analysis. This is one of the reasons for choosing this particular version published by Jehovah's witnesses, which was prepared basically for the general public, especially its simplicity and nearness to what obtains on the street. Another reason is that this version of the Bible is in the public domain, which helps anybody interested to verify the examples used to illustrate the concepts discussed. To make things even easier, in the analysis each of the illustrations drawn from the Bible has written against it the specific verse where it can be found. Where necessary in our analysis, the extracted tokens are complemented with illustrations derived from introspection and elicitation.

In the rest of this study, we will present descriptive analysis of the words on table 1 above, specifically explaining how the peripheral anatomical attributes of the body organs and regions associated with each of the words invoke simulation for spatial conceptualisation. This is done following Wineski's (2019) *Human Anatomy by Regions*. Our adoption of Wineski's (2019) study focuses on only extremely schematic aspects of the human anatomy that are saliently accessible to the perceptions of speakers of Yorùbá. Thus, Wineski's anatomy provides us the basic terms we will employ in pinning the body to the expressions of spatial structures while the analysis itself is informed by Evans' (2009, and beyond) Lexical Concepts and Cognitive Models (LCCM) theory. See detailed review of LCCM in Akerele (to appear).

## 5. Conceptualising spatial topology in Yorùbá

Mentioned earlier, this study leans on the description of the body structure and functions in the field of Anatomy to show the embodied grounding of spatial conceptualisation in Yorùbá. In Wineski's (2019) study, the human body is described based on a reference posture technically termed the *anatomical position* (p.16). The anatomical position in that study views a person facing forward and standing erect with the soles of the feet on the ground; upper limbs by the sides in a way that the palms of the hands are directed forward; then lower limbs are together in a similar fashion, with the toes pointing forward. In the present study, the description of the human body is also based on this posture. However, we should mention that the adaptation of Wineski's (2019) description, which is done identifying three geometric planes, is conditioned by how cognitive domains within the planes are distinctively indexed in the Yorùbá language. These are (1) the *median plane*, a vertical plane passing through the centre of the body, dividing it into equal right and left halves; (2) the *coronal (frontal) plane*, also a vertical plane but situated at a right angle to the median plane, thereby partitioning the body into anterior (front) and posterior (back) portions; and (3) the *horizontal plane* that lies at right angles to both the median and the coronal planes, separating the body into upper and lower parts. In addition to these three planes, given lexical profiling in Yorùbá, we will assume an additional relative position, or part which has similar bipolar semantic implications as those represented by the externally conditioned planes mentioned above. We will simply call this *container schema*, which divides the body into interior and exterior parts. Though the interior component constitutes an exception to our superficial position classification, it forms the basic polar end of the exterior position, thereby an intricate component. For this reason, we have added it here despite being a deep cognitive domain.

These three planes and the container schema are highly productive in invoking simulation for semantic conceptualisation in the Yorùbá language. Specifically, they function as bidirectional structuring mechanisms for spatial conceptualisation, with each having two opposing cognitive domains. They largely determine what meaning words indexing body parts get even when the plane to which an organ belongs is covertly represented in an utterance. On table 2, we present the primary lemmas of the words that index each of the two cognitive domains of the planes and the container schema.

**Table 2 Corpus lemmas for body planes and cognitive domains**

| | *Lemma form [Lf]* | *Cognitive Domain [C(d)]* |
|---|---|---|
| *1.* | òkè | superior (of horizontal plane) |
| *2.* | ìsàlẹ̀ | inferior (of horizontal plane) |
| *3.* | Iwájú | anterior (of coronal plane) |
| *4.* | ẹ̀yìn | posterior (of coronal plane) |
| *5.* | inú | interior (of container schema) |
| *6.* | Èyìn | exterior (of container schema) |
| *7.* | Ọ̀tún | right (of medial plane) |
| *8.* | òsì | left (of medial plane) |
| *9.* | ẹ̀gbẹ́ | contralateral (of medial plane) |
| *10.* | àárín | sagittal (of medial plane) |

Table 2 shows at least two things. First, each of the cognitive domains associated with the four body positions, the three planes and container schema, are profiled lexically in Yorùbá. Second, there are just four bipolar directions indexed in the language, which structure directions of conceptualisation in the domain of space (up/down; left/right; front/back and in/out). You may want to quickly view examples (10-18) below, which illustrate the occurrences of the profiling words in utterances. Despite specifying just four bipolar directions, the table above has ten lemmas instead of eight. This is representative of the nature of the medial plane. This plane has special conceptual properties.

The medial plane is productively indexed in the Yorùbá language with two specific components: *ẹ̀gbẹ́* (unspecified sides of the lateral) and *àárín* (the (central) sagittal middle). The contralateral sides when specifically, profiled are indexed by these words, *ọ̀tún* and *òsì* (for 'right' and 'left' respectively). Therefore, while *ọ̀tún* and *òsì* feature as the final two of examples (17-18), we will consider these to be representative of *ẹ̀gbẹ́*, which is the word associated with unspecified sides of the lateral cognitive domain. Also, *àárín* as illustrated in example (16) below, indexes the sagittal middle of the medial plane. However, this is not the only cognitive domain Yorùbá indexes with this word. It includes the central core of any of the other planes: coronal and horizontal as well as the container schema. While we assume that the word *àárín* is basically polysemous, with prototypical *centre* meaning, we believe that its sagittal concept, as in *àárín ara* (*vertical* sagittal *centre* of the body) is most fundamental.

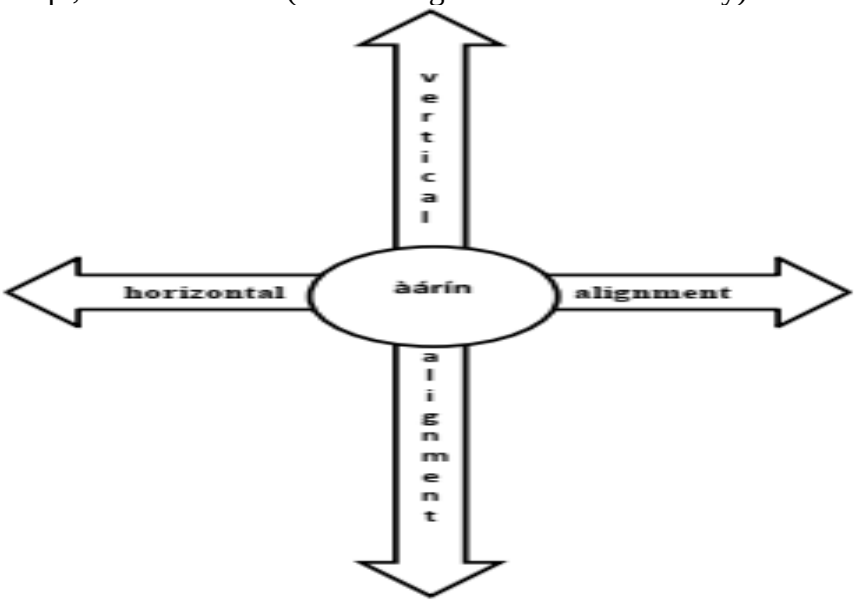


**Fig. 1 Multidirectionality of àárín**

The specific *centre* meaning among the various directional alignments that gets activated in an utterance will depend largely on the inherent spatial elements of the entity it co-profiles in the utterances. Certainly, *àárín alagbalúgbú òkun* (at the depths of the sea) defers significantly from *àárín gbogbo ojú ìṣàn omi ilẹ̀ náà* (in the centre of all the streams of the land), where the former aligns vertically with respect to the depth of the water but the latter horizontally with the surface. Our intuition is that *àárín* indexes *central position* of all the identified planes. Now consider examples of how the attributes of all the schemas identified are attested in our corpus.

(10) **Apá ọ̀tún mi ṣẹ́ kúrò ní egungun *apá òkè***. (Job 31:22)
Arm right my break away from bone **arm superior**
'And let my right arm be broken at the elbow.'
[SUPERIOR attribute relating to bone]

(11) **Fi í sí *ìsàlẹ̀* *etí* ọ̀tún Áárónì**. (Leviticus 8:23)
Put it on **inferior ear** right Aaron
'Put it on Aaron's right earlobe'
[INFERIOR attribute relating to ear]

(12) **Ẹ̀tẹ̀ yọ ní *iwájú* *orí* rẹ̀**. (2 Chronicles 26:19)
leprosy appear at **anterior head** your
'Leprosy broke out on his forehead'
[ANTERIOR attribute relating to head]

(13) **Ẹ gbé ẹsẹ̀ yín lé *ẹ̀yìn* *ọrùn* àwọn ọba yìí**. (Joshua 10:24)
2PL carry leg your on **posterior neck** 3PL kings these
'Place your feet on the backs of the necks of these kings.'
[POSTERIOR attribute relating to neck]

(14) **Ẹni tí ó ti ń ràn ọ́ lọ́wọ́ láti *inú* *ikùn***. (Isaiah 44:2)

Person that HTS that ASP help you in-hand from **interior stomach**
'The one who has helped you from the womb.'
[INTERIOR attribute relating to stomach]

(15) **Ọba sì rí *ẹ̀yìn* *ọwọ́* tí ó ń kọ̀wé**. (Daniel 5:5)
King then see **exterior hand** that HTS ASP writing
'The king could see the back of the hand as it was writing'
[EXTERIOR attribute relating to hand]

(16) ***Àárín ọmú* mi ni yóò sùn mọ́jú.** (Song of Solomon 1:13)
**centre breast** my is ASP sleep till-dawn.'
'Will spend the night between my breasts.'
[CENTRE attribute relating to breast]

(17) ***Ọwọ́ ọ̀tún* Jóábù gbá irùngbọ̀n Ámásà mú**. (2 Samuel 20:9)
**hand right** Joʹab hold beard A·maʹsa hold
'Joʹab's right hand took hold of A·maʹsa's beard'
[RIGHT attribute relating to hand]

(18) **Wọ́n sì ń lo *ọwọ́ òsì* láti fi ta òkúta**. (1 Chronicles 12:2)
3PL then ASP use **hand left** to use sling stone
'They are using their left hand to sling stones.'
[LEFT attribute relating to hand]

Note that the highlighted words in (10-18) above with which the mentioned positional words co-occur are specific organs (or regions) of the body, and that the positional words only provide core cognitive domain attributes to those organs or parts. These attributes are core to spatial conceptualisation and all advanced forms of space-based meaning constructions in the Yorùbá language. In fact, as we will begin to see soon, there is no utterance involving any of

these words that would not in some way bear the attribute that the word carries, thereby invoking simulation for spatial concepts.

Observe examples (19-27) below. As shown in those examples, the cognitive domains remain conceptually constant in instances where the words profiling them overtly occur in the utterances, even when human body parts are no longer involved.

(19) **Wọ́n mú un lọ sí *ìyẹ̀wù òkè***, (Acts 9:39)
they led him go to **room superior**
'They led him up into the upper room.'
[SUPERIOR attribute relating to room]

(20) **Da *ẹ̀jẹ̀* rẹ̀ sí ìhà *ìsàlẹ̀* *pẹ̀pẹ̀***. (Leviticus 4:25)
pour blood 2PS at ribs **inferior altar**'
'Pour its blood at the base of the altar'
[INFERIOR attribute relating to alter]

(21) ***Iwájú* *pẹ̀pẹ̀* yìí ni kí ẹ ti máa tẹ̀rí ba**. (2 Kings 18:22)
**anterior altar** this FOC should 3PL that ASP bow low
'You should bow down before this altar.'
[ANTERIOR attribute relating to alter]

(22) **Bọlá fún un ní *ẹ̀yìn* *ìgbà* náà** (Isaiah 9:1)
honour for 3SG at **posterior time** the
'Honour it after then.'
[POSTERIOR attribute relating to time]

(23) **Ó ti dé *inú* *ilé* gogoro ibùgbé wa**. (Jeremiah 9:21)
3SG ASP arrive **interior house** tall dwelling-place our
'It has entered our fortified towers.'
[INTERIOR attribute relating to house]

(24) **Wọ́n wọ́ ọ lọ sí *ẹ̀yìn* *tẹ́ńpìlì***. (Acts 21:30)
3PL drag 3SG go to **exterior temple**
'They dragged him outside the temple.'
[EXTERIOR attribute relating to temple]

(25) *Wọ́n kó wọn kúrò ní* **àárín àgọ́** *náà* (Joshua 7:23)
3PL pack 3PL away at **centre tent** the
'They took the things out of the middle of the tent.'
[CENTRE attribute relating to tent]

(26) **Ó jókòó ní ọwọ́ *ọ̀tún* *ìtẹ́* Ọba Ọlọ́lá** (Hebrews 8:1)
3SG sit at hand **right throne** king Majesty
'He sat down at the right hand of the throne of the Majesty'
[RIGHT attribute relating to throne]

(27) **Márùn-ún sí ìhà *òsì* *ilé* náà**. (1 Kings 7:39)
five on ribs **left house** the
'Five on the left side of the house'
[LEFT attribute relating to Israel]

In all the examples above, the explicit use of certain word forms primarily associated with identifiable body positions naturally attracts and invokes positional cognitive domains, which significantly contribute to how the sentences are interpreted. Often, the words associated with the cognitive domains must not be present in an utterance to invoke the presence and influence of body positional attributes on meaning. This is because some other words by virtue of their anatomical structure carry specific attributes with them. Take for instance *ẹnu*, the word primarily associated with the organ 'mouth' in Yorùbá. Anatomically, this organ is structured at the *anterior* of the body, within the coronal plane. This implies that often when the word *ẹnu*

is used in an utterance in Yorùbá, its selection is usually sanctioned by the anterior cognitive domain of the coronal plane, which stimulate simulation for retrieving all the attributes of this region for conceptualisation. This means that one of the basic schematic images one gets simulated in the mind when one hears *ẹnu* is the fact that it is sanctioned by an organ at the anterior region of the body, even when anterior is not explicitly indexed in the sentence by overt occurrence of *iwájú*, the word associated with this positional attribute. This picture invokes the construction of a concept, which we have termed ANTERIOR, which forms part of the concepts associated with the word. See examples (28-30) below.

(28) **Wọ́n yí òkúta dí *ẹnu* *ihò* náà**. (Daniel 6:17)
3PL roll stone cover **mouth pit** the'
'They rolled a stone over the entrance of the pit.'

(29) **Wọ́n gbé e sí tòsí *ẹnu* *ilẹ̀kùn* tẹ́ńpìlì** (Acts 3:2)
3PL carry 3SG to near **mouth door** temple
'They would put him near the temple door.'

(30) **Wọ́n tẹ́ ìtẹ́gun ní *ẹnu* *ọ̀nà* ìlú ńlá náà** (1 Chronicles 19:9)
3PL spread battle-formation at **mouth road** city big the
'They drew up in battle formation at the entrance of the city.'

In these examples, the anterior value of the organ of the body that *enụ* primarily profiles is invoked at the use of the linguistic unit, leading to a particular meaning unit associated with it when it collocates with such entities as 'pit', 'door' and 'entrance', indexing this same value with respect to the entities. However, the word, *iwájú*, that specifically indexes anteriority is not included in those sentences. Therefore, while the words associated with anatomical attributes relating to positions are variables, the cognitive domains the attributes index are constants in utterances where words that index body parts or positions occur.

Similar to *ẹnu* above, all the planes have multiple indexing words depending on large moving organs at a region of a plane or a cognitively significant though small organ or part. For example, the *right* side of the median plane, like the other side, has two competing large moving organs, arm (hand) and leg, and significantly visual organ, the ribs. Therefore, instead of saying *ẹ̀gbẹ́ ọ̀tún* for the 'right side' for instance, with *ẹ̀gbẹ́* specifically indexing lateral attribute in Yorùbá, speakers usually choose a salient moving organ or other visible and sensually significant organ to index *side* then followed by the word for the specific side for which is encoded, as in *ọwọ́ ọ̀tún* 'right hand', *apá ọ̀tún* 'right arm', and in some cases *ẹsẹ̀ ọ̀tún* 'right leg', *ìhà ọ̀tún* 'right rib', *etí ọ̀tún* 'right ear', *ojú ọ̀tún* 'right eye' or simply *ọ̀tún* 'right'. Therefore, all the examples in (31-36) below point to one *side* of the body medial plane, predominantly invoking similar conceptual image schema with the word primarily associated with the lateral attribute, *ẹ̀gbẹ́*, omitted.

(31) **Ó gbé kẹ̀kẹ́-ẹrù márùn-ún sí *ìhà ọ̀tún ilé* náà** (1 Kings 7:39)
3SG carry carriages five on **rib right house** the
'He put five carriages on the right side.'

(32) **Àwọn kérúbù náà sì dúró ní *apá ọ̀tún* ilé náà** (Ezekiel 10:3)
3PL cherubs the then stand to **arm right** house the
'The cherubs were standing to the right of the house.'

(33) **Ó jókòó ní *ọwọ́ ọ̀tún ìtẹ́* Ọba Ọlọ́lá** (Hebrews 8:1)
3SG sit at **hand right throne** king Majesty
'He sat down at the right hand of the throne of the Majesty.'

(34) **Yàbárá sí *ọ̀tún rẹ* tàbí sí òsì rẹ** (2 Samuel 2: 21)
Veer to **right 3PL** or to left 3PL.
'Veer to your right or to your left.'

(35) **Idà yóò wà ní apá rẹ̀ àti ní *ojú ọ̀tún* rẹ̀.** (Zechariah 11:16)
sword will be at arm 3PL and at **eye right** 3PL

'A sword will strike his arm and his right eye.'

(36) **Fi í sí ìsàlẹ̀ *etí ọ̀tún* Áárónì** (Exodus 29:20)
Put 3SG on down **ear right** Aaron
'Put it on Aaron's right earlobe.'

While we agree completely that at the micro-level, each of the words indexing specific organs in examples (31-36) has its own peculiar conceptual structure, the word *ẹ̀gbẹ́* is deleted whenever they have *lateral* as a component of their interpretations because the language senses the redundancy in combining them with *ẹ̀gbẹ́*; those organs are structured at each of the sides. Therefore, as we mentioned earlier, the primary conceptual relevance of attributes that relate to positions is that they structure the direction of conceptualisation.

## 6. Conclusion

The analysis presented in this study provides an alternative perspective to doing the semantics of Yorùbá, a route far removed from the traditional practices in the linguistics of the language. Whenever asked why the semantics of Yorùbá has not enjoyed much attention like phonology, morphology and syntax, scholars and teachers of the language usually respond that meaning is elusive, with phenomena not open to objective evaluation. Given this kind of perception, one is tempted to agree with these scholars who believe that doing semantics of the language may not bear much fruit because of the indefinable nature of the meaning of words. However, it seems to make better sense that it is actually the influence of structuralist linguistics as well as Chomskyan Generative Transformational linguistics strongly and dominantly advocated over the years that has precluded the study of meaning in the language, making it ostensibly mysterious. Those classical traditions, structural and generative-transformational linguistics, employ principles of formal logic as instruments of scientific explanations, including linguistic phenomena, promoting only the identification and description of the behaviour of amodal symbols. These principles have over the past seven decades or more found favoured ground in doing the phonology and morphosyntax of Yorùbá. Unfortunately, the semantics of the language has proven to be adamantly challenging because the rules of logic that easily find their interpretations in identifying formal symbols in other languages, especially Indo-European languages where these have enjoyed a measure of success, do not seem to apply very well to the study of meaning in Yorùbá. The result has been an undesirable neglect of semantics of the language.

We hope the analysis presented here-above would raise many questions, issues that should ignite the rethinking of our past and current understanding of all aspects of the language. As such, while gratefully acknowledging the great contributions of early scholars (e.g. Ajiboye, Awobuluyi, Awoyale, Bamgbose, Ilori, Oye, Oyebade, among many others), one notices one truth that seems to escape the curious minds of Yorùbá linguists, particularly since the 1950s: the fundamental influence of the (human) body on conceptualisation in the language. This truth led the current study in a completely different route. Here, we have demonstrated that an accurate understanding of the system of symbolic units in Yorùbá, such as body-part words, is grounded in the body systems of its speakers. Meaning and symbolic units are here explained to derive directly from the anatomy and the interactions of the human body with external environments. The body (its structure, componential functions of its members and their relational activities with the world at large) is the foundation of especially the meanings of words and other larger constructs, especially those basically associated with it. Therefore, we believe that an accurate knowledge of any aspects of the language from sound to meaning might not be possible without sincerely acknowledging the roles of the bodies of the speakers in conceptualising the world and also expressing these concepts in the language through their bodies. At the end, it is hoped that this work would persuade scholars working on the Yorùbá language to start rethinking both the structure and meaning of linguistic items or symbolic units in the acquisition, understanding and use of the language.

Take this as an example. The conceptual relationship we have so far established in this study between the human body and the expression of space can at least teach us one lesson about the protean nature of body-part words in the Yorùbá language: they are ***polysemous***

rather than ***heterosemous***! If one considers the use of a word like *ìdí* in utterances (37-42) below, one may be fast to conclude that the word has discrete lexical sense in each example. This is because used in isolation, the form *ìdí* is essentially associated with the human body's buttocks, the posterior superficial area dominated by the anal triangle of the body perineum. That is the image that gets simulated in the mind of a Yorùbá listener when (s)he hears the form as a single lexical item. However, this image seems to be associated with the meaning only in (37) below. The form of the word as shown in examples (38-42) is associated with objects with completely distinct material features. In (38), it is associated with the tongue, which is far from the location of the buttocks in the body. In (39), it is with abstract kinship relationship. In (40), it has to do with abstract *reason* of a discourse. Examples (41) and (42) have the form associated with ship but in a completely different manner: it is the stern which is an inherent part of the ship in the former while in the later it is the port where the ship is stationed. In all of the examples, it seems largely that only the context of its occurrence plays crucial roles in facilitating the meaning associated with the form at every point of use. Such context is usually analysed to include several factors such as the other words that make up each utterance, the background knowledge shared by the speaker and hearer, the physical venue and temporal setting of the utterance, and the communicative intention of the speaker (Evans 2009). While the influence of context seems unarguably factual, it does not explain why this form should mean what it means in each of the utterances and the reason for the choice of a word for the buttocks but not any of the other body organs such as mouth, eye, heart, etc.

(37) **Ó sì gé ẹ̀wù wọn ní ààbọ̀ dé *ìdí* wọn**.
3SG then cut garments their in half to **buttocks** their
'He then cut their garments in half at their buttocks'

(38) **Ahọ́n mi lẹ̀ mọ́ ẹran *ìdí* eyín mi**.
tongue my stick to flesh **buttocks** teeth my
'My tongue sticks to my gums.'

(39) **Arákùnrin kan láti *ìdí* ilé baba mi wọlé tọ̀ mí wá**
Man a from **buttocks** house father my enter follow me come
'A man from my father's family came to me.'

(40) **Fún *ìdí* yìí a fẹ́ wá sọ́dọ̀ yín**.
for **buttocks** this, we want come to-liver you
'For this reason we wanted to come to you.'

(41) ***Ìdí* ọkọ̀ ojú omi fọ́ sí wẹ́wẹ́**
**buttocks** motor eye water break to pieces
'The ship's stern broke to pieces'

(42) **Wọ́n sìn ín dé *ìdí* ọkọ̀ ojú omi**.
They accompany 3SG arrive **buttocks** motor eye water
'They accompanied him to the ship.'

Our discussions so far provide a means of accounting for these instances. If we agree that these meanings of *ìdí* in these examples attest to polysemous relation, with conceptual underpinning that relates all the seemingly distinct meanings to the human buttocks, then we would only be faced with one challenge. We must seek to identify the specific anatomical attribute or a set of physical values of the human buttocks that motivates each of the senses. Doing this will help us in one significant way with respect to doing Yorùbá semantics: we can conveniently account for the protean nature of ALL body related words in the language regardless of divergences in the cognitive domains where a word may be used. Let us illuminate this with space just one more time.

We did mention in section (2) above that until relatively recently, models of language analysis applied to Yorùbá typically failed to identify and acknowledge the huge relevance of the body words in spatial conceptualisation in the Yorùbá language. Thus, the study of spatial profiling potentials of these words in particular did not form a major focus in the linguistics of the language. Therefore, prior to Dingemanse (2006), the relationship between space and the body was usually mentioned in the 'passing' (as it was the case in Ogunbọwale 1967, Rowlands

1969 and Sachnine 1997). Even Dingemanse (2006), as reviewed earlier in section 1, despite paying in-depth attention to the relevance of the body in the Yorùbá language to space (and other notions), treated the meaning of these words as though they have distinct sense units associated with them. Consider one more example from Dingemanse (2006:32).

(43) ***Orí*** *igi*
head tree
'Tree top'

Dingemanse argues that *properly speaking*, words, as ***orí,*** are *not* about body-part terms. Instead they are *heterosemous*. Dingemanse's (2006) analysis is similar to a model of semantic representation Evans (2009:66) identifies as sense-enumerative approach to word meaning, which suggests a proliferation of discrete sense units associated with a given form. One difficulty that this analysis posts is that it makes it extremely difficult to predict and account for the range of senses associated with each of the words that profile both body and space in the Yorùbá language. For instance, the word ***orí*** is also used in expressions such as the utterances in (44-46) below.

(44) ***Orí*** **ilé**
**head** house
'Roof'

(45) ***Orí*** **ọ̀rọ̀**
**head** word
'Most important point'

(46) ***Orí*** **ipò ìjọba àgbègbè**
**head** position government province
'The position of head of a province'

Following the heterosemous analysis of Dingemanse (2006), one would say that each of the distinct instances of the use of the word constitutes an independent meaning in the language without any relationship at all to each other. This is far from being the case. These seemingly distinct meanings are all conceptually linked one to the other, sometimes indexing the same value of the 'head' attribute, and at some other time a distinct cognitive value, which is also fundamentally linked to the body-part primarily profiled by the word. If we take a closer look at (44) for instance, we will notice that the roof of a building is the topmost structural attribute of the building. In that example, the spatial structural value 'topmost' is indexed by the word for the same value for the body anatomical attribute *orí* 'head' in the Yorùbá language. Anatomically or axially, the head is the topmost part of the body. This cognitive value of the head serves as the association area for conceptualising the same value of a spatial scene in the (44) utterance. As we have mentioned before, this is not restricted to the (44) utterance alone in the Yorùbá language. All instances of spatial topmost values of any entities are indexed with the same word in the language.

However, in utterance (45), the anatomical structural value of the head does not hold as the applicable association area for the conceptualisation of 'most important or *leading* point'. This conceptualisation specifically relates to the functional attribute of the head of the body. The head functionally serves as the most important part of the body, which through being the container for the brain and having such important organs as the eye, ear, nose and mouth coordinates all other body functions. Consequently, to conceptualise an important 'organ' which coordinates points of argument by a speaker, *ori* is employed. This functional value of the head serves as the association area to all kinds of coordinating 'organs' of conceptual entities such as are found in human organisations or institutions as in family, communities, societies, governments, cooperate enterprises, to mention just some. The person in charge is always the head!

These two values or attributes, both anatomical structure and function of the head, can also be combined in a complex conceptualisation such as illustrated in utterance (46) above.

The 'head position' of a government is both structurally located at the topmost part of its organisational hierarchy and functionally the coordinating organ.

Body words in Yorùbá are not heterosemous with discrete meanings at every instance of use but polysemous, having conceptual links to the structural, functional and interactional values of body anatomy.

**References**

Allwood, J. 2003. Meaning potentials and context: Some consequences for the analysis of variation in meaning. In Hubert Cuyckens, Rene´ Dirven and John R. Taylor (eds.), *Cognitive approaches to lexical semantics*, 29-66. Berlin: Mouton de Gruyter.

Altman, M. 2009. Understanding embodiment: Psychophysiological models in traditional medical systems. In Vyvyan Evans and Stephanie Pourcel (eds.), *New directions in cognitive linguistics*, 311-329. Amsterdam: John Benjamins Publishing Company.

Anthony, L. 2019. *AntConc 3.5.8 (Windows)*. Waseda University. Tokyo.

Arbib, M. 2005. From monkey-like action recognition to human language: An evolutionary framework for neurolinguistics. *Behavioral and brain sciences* 28(02). 105-24. doi: 10.1017/s0140525x05000038.

Aziz-Zadeh, L, Wilson, S.M., Rizzolatti, G & Iacoboni, M. 2006. Congruent embodied representations for visually presented actions and linguistic phrases describing actions. *Current biology* 16(18). 1818–1823. doi: 10.1016/j.cub.2006.07.060

Barsalou, L. 1999. Perceptual symbol systems. *Behavioral and brain sciences* 22(4). 577–660. doi:10.1017/s0140525x99002149

Barsalou, L. 2017. Cognitively plausible theories of concept composition. In J.A. Hampton & Y. Winter (eds.), *Compositionality and concepts in linguistics and psychology, language, cognition, and mind*, 9-31. DOl: 10.1007/978-3-319-45977-6_2

Bergen, B & Chang, N. 2007. Embodied construction grammar in simulation-based language understanding. In Vyvyan Evans, Benjamin K. Bergen and Jörg Zinken (eds.), *The cognitive linguistics reader*, 601-638. London: Equinox Publishing Ltd.

Bergen, B. 2015. Embodiment, simulation, and meaning. In Nick Riemer (ed.) *The Routledge handbook of semantics*, 142-157. New York: Routledge.

Bier, A. 2015. An Exploration of the Link between Language and Cognition: From Vygotsky's Sociocultural Theory to CLIL'. *EL.LE* 4(1). 71-84. http://doi.org/10.14277/2280-6792/124

Borghi, A & Pecher, D. 2011. Introduction to the special topic embodied and grounded cognition. *Frontiers in psychology* 2(187). 1-3. doi:10.3389/fpsyg.2011.00187

Boulenger, V, Roy, A, Paulignan, Y, Deprez, V, Jeannerod, M & Nazir, T. 2006. Crosstalk between language processes and overt motor behavior in the first 200 msec of processing. *Journal of cognitive neuroscience* 18(10). 1607–1615. doi: 10.1162/jocn.2006.18.10.1607

Carston, R. 2002. *Thoughts and utterances: The pragmatics of explicit communication*. Oxford: Blackwell.

Caruana, B. 2013. Embodiment theories. *International Encyclopedia on Social and Behavioral Neuroscience*.

Cervel, S. 2013. A cognitive approach to the role of body parts in the conceptualization of emotion metaphors. *Epos: Revista de Filología 17.* 245-260. doi:10.5944/epos.17.2001.10188

Chomsky, N. 1965. *Aspects of the theory of syntax*. Cambridge MA: MIT Press

Clark, H.1983. Making sense of nonce sense. In Flores D'Arcais & R.J. Jarvella (eds.), *The process of language understanding*, 297-332. Chichester: John Wiley.

Clark, H. 1996. *Using language*. Cambridge: Cambridge University Press.

Craighero, L. 2014. The role of the motor system in cognitive functions. In Lawrence Shapiro (ed.), *The Routledge handbook of embodied cognition*, 51-58. New York: Routledge.

Croft, W. 1993. The role of domains in the interpretation of metaphors and metonymies. *Cognitive linguistics* 4(4). 335–370. doi:10.1515/cogl.1993.4.4.335

Croft, W. 2000. *Explaining language change: An evolutionary approach.* London: Longman.

Croft, W & Cruse, A. 2004. *Cognitive linguistics*. Cambridge: Cambridge University Press.

Cruse, A. 2002. Aspects of the micro-structure of word meanings. In Yael Ravin, Claudia Leacock (eds.), *Polysemy: Theoretical and computational approaches,* 30-51. Oxford: Oxford University Press.

Dancygier, B & Sweetser, E. 2005. *Mental spaces in grammar. Conditional constructions.* Cambridge: Cambridge University Press.

Davis, J. I, & Markman, A. B. 2012. Embodied cognition as a practical paradigm: Introduction to the topic, the future of embodied cognition. *Topics in cognitive science* 4(4). 685–691. doi:10.1111/j.1756-8765.2012.01227.x

Dingemanse, M. 2006. *The body in Yorùbá: A linguistic study*. Leiden: Universiteit Leiden.
Dirven, R. 2013. Caleb Everett linguistic relativity: Evidence across languages and cognitive domains. *Applications of cognitive linguistics 25.* Eds. G. Kristiansen, & Ruiz de Mendoza Ibáñez Berlin: Walter de Gruyter GmbH.
Evans, V & Green, M. 2006. *Cognitive linguistics: An introduction*. Edinburgh: Edinburgh University Press.
Evans, V. 2004. *The structure of time: Language, meaning and cognition*. Amsterdam: John Benjamins.
Evans, V. 2007. *A glossary of cognitive linguistics.* Edinburgh: Edinburgh University Press.
Evans, V. 2007b. Conceptual structure in language. Introduction. In Vyvyan Evans, Benjamin K. Bergen and Jörg Zinken (eds.), *The cognitive linguistics reader*, 675-679. London: Equinox Publishing Ltd.
Evans, V. 2009. *How words mean: Lexical concepts, cognitive models, and meaning construction*. Oxford: Oxford University Press.
Fauconnier, G & Turner, M. 2007. Conceptual integration networks. In Vyvyan Evans, Benjamin K. Bergen and Jörg Zinken (eds.), *The cognitive linguistics reader,* 360-419. London: Equinox Publishing Ltd.
Fauconnier, G & Turner, M. 2008. Rethinking metaphor. In Raymond W. Gibbs (Ed.), *Cambridge handbook of metaphor and thought,* 53-66. Cambridge: Cambridge University Press.
Fauconnier, G. 1997. *Mappings in thought and language*. Cambridge: Cambridge University Press.
Gallese, V. 2005. The International attument hypothesis: The mirror neuron system and its role in interpersonal relations. In Wermter, Stefan., Palm, Günther., Weber, Cornelius., Elshaw, Mark. (eds.), *Biomimetic natural learning for intelligent robots. lecture notes in computer science* vol. 3575. 19-30. Berlin, Heidelberg: Springer.
Gentilucci, M & Campione, G. 2012. From action to speech. In Yann Coello and Angela Bartolo (eds.), *Language and action in cognitive neuroscience. Contemporary topics in cognitive neuroscience series,* 61-83. New York and London: Psychology Press.
Goffman, E. 1981. *Forms of talk.* Philadelphia: University of Pennsylvania Press.
Goodwin, C. 2000. Action and embodiment within situated human interaction. *Journal of pragmatics 32*(10). 1489-1522.
Gumperz, J, & Levinson, S. 1996. Introduction to Part III. In Gumperz, John and Levinson, Stephen (eds.), *Rethinking linguistic relativity,* 225-231. Cambridge: Cambridge University Press.
Hauk, O, Johnsrude, I, & Pulvermüller, F. 2004. Somatotopic representation of action words in human motor and premotor cortex. *Neuron* 41(2). 301–307. doi:10.1016/s0896-6273(03)00838-9
Herskovits, A. 1986. *Language and spatial cognition.* Cambridge: Cambridge University Press.
Johnson, M. 1987. *The Body in the mind: The bodily basis of meaning, imagination, and reason*. Chicago: University of Chicago Press.
Johnson, M. 2017. *Embodied mind, meaning, and reason: How our bodies give rise to understanding*. Chicago: The University of Chicago Press.
Kemmerer, D, Castillo, J.G, Talavage, T, Patterson, S, & Wiley, C. 2008. Neuroanatomical distribution of five semantic components of verbs: Evidence from fMRI. *Brain and language* 107(1). 16–43. doi:10.1016/j.bandl.2007.09.003
Lakoff, G & Johnson, M. 1980. *Metaphors we live by*. Chicago: University of Chicago Press.
Lakoff, G & Johnson, M. 1999. *Philosophy in the flesh*: *The embodied mind and its challenge to Western thought.* New York: Basic Books.
Langacker, R. 1987. *Foundations of cognitive grammar: Volume I: Theoretical prerequisites*. CA. Stanford.
Langacker, R. 2008. *Cognitive grammar: A basic introduction*. Oxford: Oxford University Press.
Liu, N & Bergen, B. 2016. When do language comprehenders mentally simulate locations? *Cognitive linguistics* 27(2). 1-23. doi:10.1515/cog-2015-0123
Lupyan, G & Bergen, B. 2015. How language programs the mind. *Topics in cognitive science* 8: 1–17. doi: 10.1111/tops.12155
Maiese, M. 2011. *Embodiment, emotion, and cognition*. England: Macmillan Publishers Limited.
Marghetis, T & Bergen, B. 2015. Embodied meaning, inside and out: The coupling of gesture and mental simulation. In C. Mueller, A. Cienki, E. Fricke, S.H. Ladewig, D. McNeill and S. Tessendorf (eds.), *Body language communication,* 2000-2007. New York: Mouton de Gruyter. http://www.cogsci.ucsd.edu/~bkbergen/papers/marghetis_bergen_gesture_simulation.pdf
McNeill, D. 2005. *Gesture and thought*. Chicago: University of Chicago Press.

Okolo, B. 1981. The history of Nigerian linguistics: A preliminary survey. *Kansas working papers in linguistics*, (6). 99-126.
Ogunbọwale, P.O. 1967. *The essentials of the Yoruba language*. London: University of London Press Ltd.
Praetorius, N. 2000. *Principles of cognition, language and action: Essays on the foundations of a science of psychology*. Dordredccht: Kluwer Academic Publishers.
Rowlands, E.C. 1969. *Teach yourself Yoruba.* London: The English Universities Press.
Sachnine, M. 1997. *Dictionnaire yorùbá-français, suivid'un index français-yorùbá*. Paris / Ibadan: Éditions Karthala / Ifra-Ibadan.
Scorolli, C. 2009. *Language and embodiment: Sensory-motor and linguistic-social experience. evidence on sentence comprehension*. Unpublished Ph.D Thesis, Universita' Degli Studi di Bologna.
Scorolli, C. 2014. Embodiment and language. In L. Shapiro (Ed.) *The Routledge handbook of embodied cognition*, 127-138. New York: Routledge.
Short, W. 2016. Introduction. In W.M. Short, (Ed.) *Embodiment in Latin semantics*, 1-14. John Benjamins Publishing Company. https://benjamins.com
Soliman, T & Glenberg, A. 2014. The embodiment of culture. In Lawrence Shapiro (ed.), *The Routledge handbook of embodied cognition*, 207-219. New York: Routledge.
Stahl, G. 2014. The constitution of group cognition. In Lawrence Shapiro (ed.), *The Routledge handbook of embodied cognition*, 335-346. New York: Routledge.
Sweetser, E. 1999. Compositionality and blending: Semantic composition, in a cognitively realistic framework. In Theo. Janssen and Gisela Rdeker (eds.), *Cognitive linguistics: Foundations, scope and methodology*, 29-162. Berlin: de Gruyter.
Tettamanti, M, Buccino, G, Saccuman, M.C., Gallese, V, Danna, M, Scifo, P, Fazio, F, Rizzolatti, G, Cappa, S.F. & Perani, D .2005. Listening to Action-related Sentences Activates Fronto-parietal Motor Circuits. *Journal of cognitive neuroscience* 17(2). 273–281. doi:10.1162/0898929053124965
Theiner, G. 2014. Varieties of group cognition. In Lawrence Shapiro (ed.), *The Routledge handbook of embodied cognition*, 347-358. New York: Routledge.
Tyler, A & Evans, V. 2003. *The semantics of English prepositions: Spatial scenes, embodied meaning and cognition*. Cambridge: Cambridge University Press.
Watch Tower Bible and Tract Society. 1997. *Iwé mímọ́ ní ìtumọ̀ ayé tuntun.* New York. Watch Tower Bible and Tract Society. jw.org/yo
Wineski, L. 2019. *Snell's clinical anatomy by regions (tenth edition)*. Philadelphia: Wolters Kluwer.
Yu, C. 2014. Linking Words to world: An embodiment perspective. In L. Shapiro (Ed.) *The Routledge handbook of embodied cognition*, 139-149. New York: Routledge.
Zlatev, J. 2007. Embodiment, language and mimesis. In T. Ziemke, J. Zlatev & R. Frank (Eds.) *Body, language and mind: Volume 1: Embodiment*, 297-337. Berlin: Mouton de Gruyter.
Zlatev, J. 2009. Levels of meaning, embodiment and communication. *Cybernetics and human knowing 14*(3-4). 149-174