

Embodied Cognition and Learning

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Annotation: This article outlines some basic principles of cognitive linguistics and some differences between that model of language and others that have been used as the basis for work in the school classroom. It is also informed the notion of embodied cognition in more detail and outline some of its main principles. In doing this, I emphasise the value of a cognitive linguistic approach in the classroom and explain how embodied learning activities can be used by the teacher to support students' understanding of grammatical and linguistic concepts and terminology.

Keywords: Embodied Cognition, Proprioception, Schema, Source-Path Goal, Self-Motion, Caused-Motion Container;

At its most basic level, the notion of embodied cognition refutes the idea that the mind is disassociated from the body, and instead proposes that our bodies' movements through and interactions with their immediate physical environment influence the ways in which our minds operate. It also acknowledges the interactive dimension of human communication by stressing that the ways in which we conceptualise, think and speak are shaped by the fact that our embodied brains are situated in social contexts. Thus both our bodies and their interaction in physical and social space provide kinds of structures from which we organise and articulate our experiences and present our 'reality' of the world. As George Lakoff and Mark Johnson argue:

- ❖ Our sense of what is real begins with and depends crucially upon our bodies, especially our sensorimotor apparatus, which enables us to perceive, move, and manipulate, and the detailed structures of our brains, which have been shaped by both evolution and experience. [1,17]

One of the primary ways in which embodied cognition manifests itself is in the phenomenon of *proprioception*, which explains how and why we manage to be aware both of our bodies' position in space and the relative position of our limbs, without needing to have them specifically in our visual field. [2,45]. This is evident in our ability to undertake tasks, such as driving a car, where we can maintain awareness of the position of our arms and legs and use them to steer, accelerate and brake, without having to keep our eyes on them and consequently divert our attention from the road. In a more extreme example, if we reach out to turn a lamp on in a dark room, proprioception explains how we are always aware of our hand's position in relation to our body even if we can't see it or the lamp. You can test this out in another way by closing your eyes and putting your hand firstly in front of you, then above, to the left and so on. Even though you won't be able to see your hand, you'll be aware of its relative position to the rest of your body. In fact, under normal circumstances, it's impossible for this awareness not to be present.

The fact that we have a species-specific anatomy provides certain affordances and constraints that affect the way that we conceptualise and use language. One of the ways that this is apparent is in our reliance on internalised structures that are based on spatial relationships to organise the way we understand and explore concepts. For example, our bodies can be understood as types of containers that have 'insides' and are marked by a boundary. This basic *schema* provides a basis for both physical and conceptual relationships to be expressed.

Linguistically a relationship between an entity and the container is encoded through the use of prepositions such as 'in' and 'out'. This allows expressions to have both a functional significance as in 'the water is in the bucket' and explain more abstract concepts that rely on a physical basis to give them meaning; for example, the idea of falling 'in' or 'out' of love. The way in which we rely on bodily projections to structure conceptual content offers further insight into the embodied nature of our minds. For example, Lakoff and Johnson [3, 34] explain that the front-back orientation of our bodies is important in the way we project fronts and backs onto objects. They argue that for a stationary object such as a television, we understand the front to be the side that we would normally face when viewing, while for moving objects

such as cars, the front is understood to be the part that faces the way it moves and in which we travel either as a driver or passenger. In both examples, the projecting of a 'front' and 'back' is based on understanding and conceptualizing these objects in the context of our own bodies, i.e. we interact with people face to face, and generally walk or run in a forwards motion so that the fronts of our bodies face the direction in which we travel. The world with which we interact, and the objects within that world, are thus configured in a way so that they are understood through our embodied selves.

Another very basic schema is derived from our body's movement through space and time along a journey from a starting to a destination point. This '*source-path goal* schema' extends from our knowledge of our physical movement into more abstract concepts, which are understood in the terms of its inherent structure. As Lakoff and Johnson explain, this schema has the built-in properties of something moving from a starting point towards a destination along a defined route. This basic structure is derived from the ways in which our own bodies move in the physical world, and provides a knowledge base for understanding the relative meaning of more advanced concepts expressed by prepositions such as 'toward', 'away', and 'along' as relationships between entities and/or events relative to a line of movement [4,32].

The *container* and *source-path-goal* schemas are two examples of what Jean Mandler terms *image schemas*, primitive analogue structures that are based on physical interaction, and from which we understand our conceptual world. Image schemas derive from our early sensor motor experiences and interactions with the world as young infants. Mandler argues that instances of perceptual information, from vision, touch and hearing, become conceptualised in these schemas that 'hold' basic meanings such as that of containment, the movement of a path through space, the nature of up down orientation and various kinds and degrees of interactional force. [5, 87].

These develop Embodied cognition and learning Projection of 'front' and 'back' onto objects. The prepositions 'towards', 'away' and 'along' based on a '*source-path-goal*' schema into templates to facilitate first thought and then subsequently speech. Mandler argues that language use is derived from this conceptual basis and linguistic behaviour shows evidence of being underpinned by image schemas.

As an example, she traces how a child might construct a 'path' image schema from her immediate experience with the physical world. She suggests that this originates from infants around one month after birth being able to see the simple movements of objects through space and following repeated instances of this, conceptualising these movements into a more abstract schema of movement from one point to another (a path image schema). This schema is inherently meaningful since it is a summative representation of how something operates in the physical world, and is dynamic in the sense that it can be reconfigured based on subsequent experiences. In this way image schemas can be viewed as providing platforms for future learning to take place. In time, the primitive concept of a *path* becomes more developed and the original image schema can be used to formulate both embedded schemas (for example that paths have separate structures such as beginnings, middles and ends), and further information that is directly based on observed experience. For example, from around four to six months, research has shown that a child begins to be able to differentiate between a path schema that is followed by an entity of its own accord (e.g. a person walking) or one that is the result of external force or pressure from another entity (e.g. someone kicking a football). In this example, the information is 'recoded' into image schemas of *self-motion* and *caused-motion*, the latter providing the basis of meaning for concepts related to force, later realized in language by verbs of causation and lexical and auxiliary modal verbs.

The ways in which these experience-based physical structures are used to support the understanding of more abstract concepts have been explored in a number of research studies that have examined the ways in which embodied cognition is a part of everyday life. For example, Boroditsky and Ramscar [7, 132] demonstrate how people's understanding of the abstract concept of time was reliant on their knowledge of spatial experience. They asked the ambiguous question 'Next Wednesday's meeting has been moved forward two days. What day is the meeting now that it has been rescheduled?' to participants in a number of different contexts, among them waiting in a lunch queue and arriving or departing from an airport. The question is ambiguous since it depends on whether time is perceived as an entity we move towards or one that moves towards us, and consequently, the 'answer' can equally be either 'Friday' or 'Monday'. In all of the contexts, the participants' movements just before or during being asked the question influenced their

responses. The researchers found that participants who had been asked the question in the lunch queue were more likely to answer 'Friday' the further they had travelled along the queue. In a similar way, there was a clear difference in responses when participants were asked the question at the airport. Those who had just flown in from another location, and who had consequently just experienced moving through space, were more likely to answer 'Friday' than those who were waiting to depart. However, those waiting to depart, were also more likely to answer 'Friday' than those waiting simply to pick a friend or relative up, suggesting that as well as experiencing movement, even thinking about it resulted in a certain way of providing structure to and promoting understanding of an abstract concept.

Similar findings and conclusions were drawn from a series of experiments undertaken by Ackerman. They found that the body's interaction with objects through touch provided a scaffolding structure for the ways in which participants responded to a series of questions around social judgments and decisions. Participants were more likely to judge curriculum vitae as being from a strong and a more interested candidate for an interview post if it was presented to them on a heavy clipboard rather than a light one. In this instance, physical heaviness provided a structure for more metaphorical concepts such as the quality and seriousness of the application (as opposed to a 'lighter' less impressive and less serious one). In another test, participants were asked to complete a jigsaw puzzle immediately before being asked to judge an ambiguously presented conversation between two speakers as being either a discussion or an argument. Those participants whose jigsaw pieces were covered in rough sandpaper consistently rated the conversation as being harsher than those who had completed a jigsaw where the pieces were in a natural smooth state. The implication from this study is that the hand's interaction with the physical world not only provides a structure for conceptual understanding but also influences the kinds of mental operations that are undertaken. [8, 87]

Recent research on the role and function of 'mirror neurons' also supports the idea of an embodied mind. Researchers have discovered that watching another individual undertaking a physical action activates a sub-set of the same neurons in our brain that would be 'fired up' as a result of actually undertaking that action. Furthermore, the acts of saying, hearing or reading groups of words related to actions activate the same areas of the brain as when those actions are actually carried out. In fact, other tests have shown that even listening to others activates the same motor area that is activated through speech. Mirror neurons provide a good example of how cognition is inherently embodied since they operate by providing a link between the perception of an action, its consequent internal simulation and its subsequent articulation in language. Indeed, the role of mirror neurons as an vital facilitating entity in communication itself is also evidenced in their role in allowing speakers in conversations to negotiate turns in dialogue, feed off others' gaze, gestures and posture and contextualise words and meanings precisely without any need for elaborate definitions. As a consequence, mirror neurons are also thought to be largely responsible for our ability to empathise with others. [9, 73]

Gesture – Mandler's notion of the image schema emphasises the role that an infant's early and exploratory interactions with the physical world play in establishing templates from which further conceptual understanding can be based. In these interactions, the hands are the primary functional tool for young children to navigate the external world both to gather information (e.g. touching things with a view to exploring what they are) and to initiate changes to the environment (e.g. pushing things over). The importance attached to the hands is also evident in the role that gesture plays to support speech in expressive acts, where it has been argued that there is a tight synchrony of speech and gesture operating as part of a single system for communication. Since gestures rely on physical movement and the demonstration of spatial relationships relying on physical imagery, they provide a good example of the 'external manifestation of embodied cognition in interaction'. [10, 134]

Corballis promotes the centrality of gesture as part of an integrated human communication system by arguing that vocal language evolved from manual gestures. He cites the natural potential offered by hands and arms to communicate in four dimensional space and time, and the ways in which we often revert to pantomime when faced with the difficulty of talking to someone who doesn't speak our language as evidence of the inherent communicative potential of gesture. The importance of gesture can be seen in the way that gesture precedes speech as a communicative tool in children, acting as a kind of

scaffold from which vocal language can be built. [11, 213]. For example, in studying the acquisition of speech in young children, Tomasello (2007) argues that pointing; a specific kind of gesture is a complex precursor to language and relies on the same kinds of co-operative skills and practices that typify adult speech. Other studies have suggested that the physical mechanics of speech – the movement of the tongue and lips in articulating sounds – means that it should be viewed as a kind of gesture in its own right. This physicality can also be seen in examples of mappings between physical articulation and meaning. Corballis for instance draws attention to how in some languages words relating to the second person (e.g. ‘you’ in English; ‘tu’ in French) involve an outwards pushing of the lips towards the addressee while those relating to the first person (e.g. ‘me’ in English; ‘moi’ in French) involve the lips opening towards the person speaking. Such phonological iconicity is often a key feature of poetry, and can be seen in the following lines from Robert Browning’s ‘Meeting at night’, a poem that describes a journey the speaker makes to meet his lover.

Embodied cognition and education The use of drama activities in English classrooms is of course well established and much has been written about the effectiveness of using activities that encourage a focus on movement, mime and role-play. However, the explicit use of embodied learning in teaching knowledge about language and grammar has received very little if any attention in the context of the secondary classroom. By contrast, and as I have stated at previous points in this book, the application of insights from the notion of embodied cognition has continued to receive good coverage in approaches to second language learning that build on the premise that meaning is derived from physical experience that can be translated into classroom activities that utilize movement and physical imagery. In these pedagogies, speech, gesture and images combine as meaning-making tools for students to use as resources for learning and as resources through which they can express their learning in the classroom, each with its own particular characteristics and affordances and limitations, or ‘functional specialisms’. In the context of the language classroom, the premise of this book of course is that these specialisms can offer a great deal. There have been a number of studies that have highlighted the effectiveness of gesture in supporting comprehension and in enabling speakers to interact and communicate more effectively. Broaders explore the impact of gesture to support learning and teaching more generally by examining how gesture brings implicit knowledge, the knowledge that a student has but is unable to articulate or explain, to the surface so that it can be explicitly stated and more clearly discussed and shared with others. The researchers were interested in how the use of gesture as a carrier of meaning would help to students to articulate this implicit knowledge in ways that speech and writing were unable to.

Their results concluded that students who were encouraged to use gesture as they explained their learning were not only able to articulate their knowledge in meaningful Embodied cognition and learning 51 ways, but also could support them in developing new strategies for learning and problem solving, and reflect on their usefulness for subsequent tasks and activities. In a related study, they also found that teachers who used gesture to support their verbal explanations of mathematical concepts were more successful in relating those concepts to their students, who in turn were more likely to use gesture to support their own learning.[12, 223]

Students are often able to demonstrate their knowledge of concepts by using gesture as a learning resource before they are able to articulate that knowledge in words; gesture can therefore help make the implicit explicit. This would seem to be a major factor in the context of learners working on descriptive and analytical work in the grammar of their native language (i.e. in secondary and sixth form English classrooms), since in these situations students clearly know a great deal about language and grammar but need to be able to express that understanding in the context of undertaking discourse and text analysis, and in answering questions on examination papers. So, one of the main challenges for the English teacher is to plan for classroom activities that encourage students to make this implicit and unconscious knowledge about how language and grammar operate more explicit. Given that the use of gesture has empirical evidence to support its efficiency, embodied activities that use gesture as a learning tool would seem to have great potential benefits.

Conclusion

Understanding cognition as embodied allows the teacher to attach importance to gesture and drawing as meaning-making resources and to the nature of grammar as a type of performance, where meaning is derived from physical experience. It also offers imaginative ways for the teacher to exploit the potential of the human body to encourage students to understand concepts and externalise them in meaningful ways. I would argue that these ways of thinking about cognition, embodiment and its potential relationship to teaching awareness of grammar, structure and meaning present opportunities for teachers to explore language teaching in ways that traditional approaches do not afford. They allow students to experience at first hand the embodied nature of meaning and provide a genuine way for externalising implicit knowledge. In the article I draw these ideas together to present some teaching ideas that use the notion of embodied cognition and some important cognitive linguistic topics as a way of enabling students to understand and be able to discuss some important topics. In doing so, I draw on the work I have discussed in this article to propose a pedagogy for teaching about grammar, structure and meaning.

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