

Using the body to activate the brain. Research trends and issues.

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The aim of this special issue is to build a bridge between Embodied Cognition (EC), Cognitive Linguistic (CL) Theory and language teaching and learning. EC postulates that high-order cognitive processes such as thought and meaning construction are reliant on the same sensory-motor neural circuitries involved in perception and adaptation of/in the environment in which the human being acts (Barsalou, 2008). The activity of our mind is grounded in our bodily experience and concepts are mapped within our sensory-motor system, classically considered a “low” process device in our brain (Gallese & Lakoff, 2005). In Linguistics, the theory of Embodied Semantics, that derives directly from the EC paradigm, states that “linguistic concepts” (propositions) “are represented within the same sensory-motor” (neuronal) “circuitry in which the enactment of the same concept relies” (Aziz-Sadeh & Damasio, 2008, p. 5). According to the Embodied Semantics paradigm, linguistic concepts are represented in the brain within partially overlapping neural substrates recruited to enact and experience the action a word refers to (Kemmerer, 2014; Della Putta, 2018). EC approaches have fruitfully informed applied sciences, among which educational research. The usefulness of incorporating bodily enactment into the teaching of disciplines such as mathematics is demonstrated under the general condition of an effective integration of embodied task in the general teaching plan, i.e. if embodied activities are not isolated from but rooted in and linked to other activities proposed over the whole course (see review in Skulmowski & Rey, 2018). When it comes to language teaching, ever since Asher (1977), the positive role of the enactment of the

body in the process of language learning – at least as far as lexicon retention is concerned - has been demonstrated, but, apart from these first approaches, the role of EC in language teaching has been underestimated or, at least, less empirically researched.

Embodied cognition and educational research

Historically, the Cartesian ontological dualism between *res cogitans* and *res extensa*, namely our mind, deputed to thinking and reasoning, and our body, whose task is to interact with the “outside” world, has influenced cognitive and educational sciences. According to Descartes’ representationalism, the content of sense perception must be distinguished from the cognitive processes it undergoes. Only these processes (i.e. mental elaboration and representations of sensory experience) can be considered reliable because of their mathematical nature: he maintained that concepts are abstract entities holding only a functional relationship with the body. The input our body gives to our mind has therefore to be translated into an arbitrary and symbolic “language of thought” (Fodor, 1975), that is, the bridge between perception and reasoning (Atkinson, 2012).

This view strongly influenced the so-called first-generation cognitive science, which conceived the human mind as a “disembodied machine manipulating amodal symbols according to syntactic (i.e. mathematical) rules” (Jacob, 2013, p. 5), and which recognized a weak, secondary role for the body in cognitive processes. In educational sciences, Descartes’ perspective has supported any position that “takes the body out of the mind” (Rathunde, 2009, p. 70) and that encourages traditional approaches towards learning and teaching. To varying degrees, depending on the educational contexts, these approaches

conceive the learning process as a mental activity guided by a teacher who sets the learning objectives, usually detailed in a discrete-point curriculum assessed through formal and standardized tests. Learners are expected to acquire and master declarative knowledge, i.e. facts presented in a formal way in a rather static learning environment, usually a classroom where students sit immobile for many hours (Rathunde, 2009; Mazzuccato & Argiulo, 2021).

During the last four decades, cognitive theories stemming from Descartes's mind-body dualism have been criticised (Damasio, 1994; Farina, 2021 for a review of the debate) and a solid alternative, called "embodiment" or "the embodied mind paradigm" (Lakoff & Johnson, 1999) has developed rapidly. The embodied stance rejects the Cartesian mind-body dualism, and sees the activity of our mind as grounded in our bodily experience: concepts are mapped within our sensory motor system, which emerges as a fundamental device for knowledge (Lakoff & Johnson, 1999; Gallese & Lakoff, 2005; Pulvermüller, 2008). At the core of this new paradigm lies Barsalou's *perceptual symbol system theory*, according to which our mental representations are "analogically related to the perceptual states that produced them" (Barsalou 1999, p. 578, see discussion in Suñer & Roche, 2021). Thus, the very first step taken toward cognition is a bodily one in which preconscious and non-inferential cognitive activity happens in our brain "as if" we were enacting or experiencing the concepts with our body in the world around us (Gallese, 2008).

As a consequence, the interest of educationalists in the role of the body in learning and teaching has been renewed, and much research has been dedicated in recent years to how

to transfer insights from EC to teaching and learning practices (cf., for a review, Skulmowski & Rey, 2018). The idea of a pedagogy that promotes and favours learning and teaching practices based (also) on action and bodily experience is not new, and can be traced back to preeminent philosophers and educationalists such as Johann Comenius, John Dewey and Maria Montessori (Ceciliani, 2021).

Interestingly, embodied approaches have also informed language teaching, although embodied teaching activities are not new in this field either, having been put forth by authors such as Asher (1977), who suggested that the Total Physical Response method, i.e. physically enacting verbal input in the classroom, could lead to positive effects on language learning. However, it must be said that most of this research has systematically neglected including any linguistic theory. The lack of theoretical grounding might explain why those studies have mainly focused on vocabulary teaching and, in many cases, on teaching target items that describe physical movement anyway. Against this backdrop, the positive results reported in those studies might be less surprising.

Where Cognitive Linguistics meets Embodied Cognition

In recent years a new impetus to investigating the viability and effectiveness of embodied activities in the language classroom has come from the advances in CL, which encompasses different theoretical models with the shared aim of explaining language by considering it as an integrated cognitive ability, not separable therefore from our physical, mental, and cultural experience. Specifically, following some CL paradigms such as Construction Grammar (Goldberg, 2006) or Cognitive Grammar (Langacker, 1988), a

language essentially consists of non-arbitrary symbolic constructions, i.e. associations of forms and meanings whose existence is motivated by general cognitive mechanisms of a perceptual and categorising nature (such as conceptual metaphors) which, ultimately, are constituted and shaped by the individual's physical and social experience. CL-inspired teaching practices aim therefore to foster the recognition, understanding and internalisation of the cognitive mechanisms motivating the behaviour of the morphosyntactic aspects in question by prompting learners to concretely experience them through different kinds of embodied practices such as gesturing, perception or enactment (Mendoza & Agustín, 2016; De Knop, 2020).

Although CL and EC share a common understanding of how the body is connected to conceptual systems, CL-inspired applications have been slow in accepting the usefulness of embodied teaching techniques. In addition, authors also point out that merely using graphs, drawings and gestures representing embodied meaning might not always initiate the necessary cognitive anchoring in learners' mindset. Rather, learners need activities and materials that help them connect those concepts to their physical and sociocultural worlds so as to actively engage in discourse practices of a given speech community (cf. Van Lier, 2010). Most importantly, embodied teaching practices can produce the expected added value if they are semantically related to the target items and are implemented as an integrative component of tasks, lesson plans, and syllabi (Gallagher & Lindgren, 2015). E.g. using non-representational gestures (gestures that do not evoke any concrete meaning) as a mnemonic strategy to facilitate the recall of the word *gender* in German might not be as efficient as one might think.

Besides these pedagogical recommendations, there is also the necessity to better align empirical research into language teaching and learning with more ecological perspectives (Larsen-Freeman & Cameron, 2008). This concerns primarily the way we define, design and assess learning quality in interventional studies. Acknowledging that linguistic symbols emerge from and evolve through actual language usage and that language learning should translate into life skills (or at least into the ability to communicate in real life), it is surprising that learning is often assessed by means of form-based task formats. This is not only problematic with regard to the transferability of findings into the practice (ecological validity) but also bypasses the potential of CL-inspired and thus produces in some way biased results. Finally, the implementation of such approaches should also consider cross-linguistic differences as source of variation and diversity. In this regard, insights from linguistic typology, contrastive linguistics, context linguistics and language acquisition research can contribute to better anticipating and dealing with learning difficulties along the learning process.

The present issue

Against the backdrop of the conclusions from previous literature, this special issue is intended to broaden and deepen the debate about the role of bodily enactment (through its pictorial representation, its direct activation and/or gestures or its virtual representation by means of educational technology) in language teaching.

The article by Elena Comisso and Paolo Della Putta centers around the effectiveness of a CL approach to teaching the motion verbs system in Russian. Traditionally, the motion

verbs have been taught by means of tables that overemphasize formal aspects and neglect the underlying embodied meaning. Surprisingly, most recent textbooks still adopt such outdated approaches and supplement them by reproductive and repetitive exercises. In contrast, the authors propose an approach that takes the conceptual motivation of the motion verbs system and makes use of embodied techniques to illustrate their underlying embodied meaning. The between-group research design of the study includes three different elicitation task formats to measure learning outcomes and an evaluative questionnaire on learners' perceptions of the intervention. Taken together, the results show a great success of the CL approach using embodied techniques compared to the more form-based approach. Learners also indicate that the embodied techniques helped them get better access to the motion express by some of the prefixes, which in turn had a positive impact on memorization and understanding.

In her article, Cecilia Andorno presents a case study on the use of metaphor-based gestures in a plurilingual classroom in an Italian school. The focus of the analysis lies on the functions fulfilled by teacher's speech-gesture units based on the TIME IS SPACE metaphor. Those speech-gesture units aim to help learners better conceptualize and organize specific notions and terms related to the topic of the origin and evolution of life on Earth (time span subdivision, categorizing, ordering of facts, etc.). The analysis reveals that metaphor-based gesturing was systematically implemented across different communicative modalities and fulfilled differentiated functions. The results are in line with other studies in educational research that stress the importance of using semantically related speech-gesture units so as to reinforce or enrich the conceptual organization in a given topic domain.

The article by Ferran Suñer, Jörg Roche, and Liesbeth Van Vossel reports on an interventional study that investigates the effectiveness of two embodied teaching practices that include a different degree of bodily engagement. A first group of learners was presented with a CL approach to the modal verb system in German that described the underlying embodied meaning from a force-dynamic perspective (Talmy, 2000) and was supplemented with materials requiring low bodily engagement (multimedia animations). A second group of learners worked with the same cognitive approach but received materials that included high bodily engagement (performance of bodily movement). The results show that both embodied teaching practices led to similar results and that an increase in bodily engagement did not go along with an increase in learning. Furthermore, the results also suggest that learners' beliefs towards the way grammar was taught affected the test performance, which opens up new perspectives on how the learning process can best be supported.

The articles in this issue tackle key issues about the designing, implementing and assessing the combination of embodied techniques and CL-inspired teaching approaches in the (foreign) language teaching context. They all stress the importance of considering the complexity of the learning process and integrating linguistic theory, insights from language acquisition research, most recent advances in language pedagogy and ecological research designs (Roche & Suñer, 2016; Wirag et al., 2022). We hope that the issue will contribute to the research agenda in applied CL and to strengthening the links between all those neighbouring, but still estranged disciplines.

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