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Original Paper

Integrating Embodied Insights into Second Language Learning: Emerging Trends and Future Directions

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Abstract

This study explores the relationship between second language learning and embodied cognition theory, highlighting the vital role that physical and sensory engagement plays in language learning. We discuss the practical consequences of embodied cognition for L2 teaching and learning, as well as its theoretical foundations. The review compares and contrasts L1 and L2 learning, looking at the advantages of embodied techniques for L2 learners. We also investigate how learning experiences affect L2 embodied cognition, proposing that technology-enhanced, multimodal, social interaction-based approaches can greatly improve L2 learning outcomes. To construct immersive L2 learning settings that mimic real-world language use, the study concludes by noting present limits and suggesting future research options, including the possibilities of virtual and augmented reality as well as the Metaverse.

Keywords

embodied cognition, second language learning, multimodal, social interaction, technology-based learning

1. Introduction

Embodied cognition emphasizes the significance of the physical and social context for learning by arguing that cognitive processes are fundamentally anchored in the body's interactions with the environment. This viewpoint contradicts conventional beliefs asserting that cognition is an abstract, disembodied activity. Significant implications arise for learning first (L1) and second (L2) languages from this embodied perspective. The contrast and comparison of embodied learning across first- and second-language acquisition draws attention to the dynamic interaction between language development and physical experience. By taking into account these processes, instructional techniques that support

language's embodied nature can be improved, increasing the effectiveness and efficiency of language learning opportunities.

The concepts of embodied cognition provide a new perspective on the difficulties involved in learning a non-native language when it comes to second language acquisition. According to the notion, using the body in the learning process might improve linguistic competency by fostering a deeper, more contextualized grasp of the language. This method is in line with how people naturally pick up their native language—through engaging and immersive experiences (Li & Jeong, 2020). In this way, our bodily experiences and physical interactions with the outside world are fundamental to our understanding of and use of language.

There are ramifications for second language acquisition and pedagogical practice from embodied language learning. Theoretical frameworks for gesture-based language acquisition, multimodal learning, and social second language learning have all integrated embodied insights. Based on these ideas, a variety of technology approaches to improve L2 instruction and learning have emerged. There are now more opportunities to investigate the embodied aspect of language learning thanks to the development of technologies like Virtual Reality (VR), Augmented Reality (AR), and the emerging idea of the metaverse. These platforms provide learners with immersive environments that closely resemble real-world interactions while interacting with a second language. The use of technology in second language instruction and learning presents a fresh strategy consistent with embodied cognition theories.

The integration of embodied insights into the field of second language acquisition will be explored in this paper, along with the new trends and directions that this interdisciplinary discipline is likely to take. We will look at how social interaction plays a part in language learning, how embodied cognition concepts can be used to improve language acquisition, and how emerging technologies like virtual reality and augmented reality can help create more engaging and productive language learning environments.

2. Embodied Cognition and Language Learning

2.1 An Overview of Embodied Cognition Theory

In the evolution of cognitive science, Lakoff and Johnson (1999) have divided this interdisciplinary field into two distinct stages: the first generation of cognitive science, characterized by computer simulation and symbolic processing; the second generation of cognitive science, which introduced the philosophy of experience, emphasizing the close connection between cognition and bodily experience. With Howard (2004) proposing the concept of the third generation of cognitive science, embodied cognitive linguistics emerged (Liao & Weng, 2024), inheriting not only the philosophical foundation of the philosophy of experience but also integrating the research results of computer technology, neuroscience, and brain science. This emerging discipline has enriched our understanding of human cognitive processes and revealed the formation and development mechanisms of the brain's higher

functions, providing a new path for us to explore the mysteries of the human mind.

In the study of linguistics and language acquisition, one of the highly debated issues is how semantic information of a language is represented, decoded and further accessed in the human brain. According to the theories in cognitive science, we summarized two major interpretations regarding this topic. The traditionally prevalent view of cognition asserts that semantic information is stored in our brain as abstract and amodal symbols, such as numbers and letters, which carry scarce physical, perceptual, or affective information. So language comprehension is a process of retrieving those abstract and symbolic meanings. This process is primarily operated in language domain-specific areas which are independent of other cognitive systems for perception and action (Fodor, 1975). This assumption aligns well with the disembodied view of language, considering language processing as computations of abstract and amodal symbols, which do not interact with information from sensorimotor modalities.

Nonetheless, the embodied cognition theory that emerged during the last two decades challenged the traditional symbolic view by postulating that language processing is grounded in sensorimotor systems in the human brain (Barsalou, 2008). According to the predominant embodied view, semantic information is represented as concrete and multimodal forms, which are associated with auditory, visual, affective, and motor experiences. Language comprehension is to mentally simulate those sensorimotor experiences and situations, instead of retrieving abstract and amodal symbols (Fischer & Zwaan, 2008).

2.2 Embodied Cognition and its Relevance to Language Learning

According to the embodied account of language processing, it is suggested that meaning should be interpreted in the context of interactions with the body and environment (Barsalou, 2008). For example, children can understand the meaning of the verb "drink" via drinking water. In this process, they can obtain some perceptual (e.g., color, smell, and taste of water), motor (e.g., movement of the mouth), and affective (e.g., drinking water makes them feel refreshed) experiences, which are then integrated into a multimodal representation. Later when hearing, reading, or imagining "drink", the corresponding areas associated with the multimodal representation of the experience in the brain will be evoked, the action of drinking is mentally simulated, and further its meaning is understood.

To date, substantial research has shown that L1 semantic processing is intimately linked with the sensorimotor system. These studies unanimously indicated that the link between meaning and action/perception is well established in L1 (e.g., Marino et al., 2014). However, studies pertaining to the role of the sensorimotor system in L2 semantic processing remain relatively insufficient (Kühne & Gianelli, 2019). Currently, a number of studies suggest that L2 embodiment is similar to that of L1 processing (e.g., Buccino et al., 2017). However, there is also evidence that L2 embodiment might be less (Zhang et al., 2020) or even missing.

2.3 The Comparison and Contrast of L1 and L2 Embodied Learning

The robust L1 embodiment might grow out of the learning experience of L1: we acquire our L1 daily in an interactive manner with various scenarios and integrated multimodal exposures (Li & Jeong, 2020),

so this concept is readily observable as children learn language through physical engagement with their environment. For instance, the acquisition of spatial vocabulary is often facilitated by direct manipulation of objects and exploration of space. However, most bilinguals lack multimodal exposure during L2 learning, especially late bilinguals. They usually learn their L2 in the classroom setting with an L1 translation equivalent. Therefore, their L2 semantic representations might involve less sensorimotor information and are less related to real-life experiences.

Generally, the L1 embodiment is robust and reasonable in that it is usually acquired daily in an interactive manner. But typically characterized by the late age of acquisition and a lack of multimodal exposure in L2 learning, the semantic representation of L2 is assumed to recruit less sensorimotor information. Thus these fundamentally distinct learning experiences lead embodied semantic representations between L1 and L2 to differ in quality and quantity.

In summary, the comparison and contrast of embodied learning in L1 and L2 acquisition highlight the dynamic interplay between physical experience and language development. Understanding these processes can inform pedagogical approaches that cater to the embodied nature of language, enhancing both the efficiency and effectiveness of language learning experiences.

2.4 Effects of Second Language Learning Experience on L2 Embodied Learning

A critical comparison between L1 and L2 embodied learning considers that although both are experientially grounded, L2 learning contexts normally require more cognitive resources to map the new linguistic forms onto existing or newly constructed embodied schemas. These mappings may be modulated by the degree of cognitive overlap between L1 and L2, motivations by a learner, age of acquisition, and amount of exposure to L2.

Among different dimensions of bilingual experience, L2 proficiency is a widely identified component contributing to the degree of L2 embodiment (e.g., Buccino et al., 2017). Typically, access to L2 representations usually entails L1 mediation, thus leading to a later sensorimotor involvement especially when L2 proficiency is low. In this way, the degree of L2 embodiment will be attenuated with L2 proficiency decreases. Specifically, some studies found embodiment effects during L2 comprehension were positively correlated with L2 proficiency (see Kühne & Gianelli, 2019 for a review). In addition to L2 proficiency, L2 AoA is assumed to be another factor accounting for the degree of L2 embodiment. In the case of an early AoA, L2 lexico-semantic processing would engage sensorimotor to the same degree as L1 (Monaco et al., 2019).

Although the L2 learner does not have early-life exposure to the language, they can use their already existing experiential knowledge in L1 to construct new linguistic frameworks. However, embodied knowledge transfer from L1 into L2 does not simply take place, since cultural and experiential differences naturally result in variability concerning the conceptualization of perceptual, motor, and other relational terms.

3. Emerging Trends in Embodied Cognition and L2 Learning

3.1 Multimodal Learning

Multimodal learning is an educational approach that integrates various sensory modalities—visual, auditory, and kinesthetic—to enhance the learning experience. It leverages the brain's ability to process information through multiple channels simultaneously, which can lead to a more comprehensive understanding and retention of knowledge.

Multimodal information presentations are becoming more and more common in foreign language schools due to advancements in multimedia technology (Yang, 2025). Multimodal learning initially developed from gesture-based learning. The concept of embodied cognition posits that our understanding and use of language are deeply rooted in our bodily experiences and physical interactions with the world. A number of studies have demonstrated that active gestural or physical engagement can improve memory for new words or phrases in a second language (Macedonia et al., 2011). As such, experience-based strategies such as the use of gestures and body positioning should be encouraged in second language learning to complement traditional approaches.

By integrating gestures with other visual and auditory modalities, multimodal learning can significantly affect attention, memory, and comprehension. Different information presentations enable learners to pay attention more efficiently and remember for a longer period. This is especially true for language retention, where pronunciation listening, text viewing, and speaking can consolidate the acquisition of a language.

In other words, multimodal learning allows one to look at education in a more holistic way, taking into account the complexity of human cognition and the multifaceted nature of learning. The value of multimodal learning lies in its offering scope for greater diversity in individual learning needs and preferences, thus allowing for more effective and inclusive practice, especially within the critical domain of language learning.

3.2 Social Context-based L2 Learning

Embodied language learning is indeed a very promising avenue to attain efficiency in L2 learning, and embodied insights may benefit models of L2 acquisition and development to further improve L2 learning. For example, Li and Jeong (2020) advocated an approach based on the rationale of situating L2 learning in social interaction, which they refer to as Social L2 Learning (SL2), conceptualizing language learning not only as a computational but also as a social process. The SL2 model is presented here as a theoretical framework, with an emphasis on the role of social interaction in L2 learning. It suggests that learning will be more effective if it is naturally obtained through real-life or simulated environments in which the learners are engaged with objects and people.

Moreover, a study conducted by Jeong et al. (2021) investigated the neural underpinning of L2 learning, specifically exploring how social context strengthens semantic representations. The research attempts to explain how adults are able to learn L2 within social contexts and what neural correlates underpin

this form of learning. Brain activation was measured by using a functional magnetic resonance imaging approach in 36 adult native Japanese speakers with no prior experience in Korean. Participants were exposed to L2 Korean words through translation learning and social learning via simulated interactive videos. As the results indicated, there was a significant difference in brain activation between the two learning methods. Indeed, social learning showed higher activation in areas including bilateral superior temporal sulcus, posterior middle temporal gyri, and right inferior parietal lobule.

These studies suggest that social learning may strengthen the neural link between novel L2 forms and dense semantic representations, thereby promoting superior memory consolidation and retrieval. This result supports the idea that learning within a social context might lead to more embodied, multimodal, and contextualized memory properties, which are critical for L2 vocabulary acquisition. Such an idea that grounds second language learning in social interaction meets the ideas of multimodal learning, wherein convergence of these various sensory inputs fosters deeper cognitive engagement and effective memory consolidation.

In short, Jeong et al.'s research underlines the importance of social contexts in L2 learning and provides evidence that social embedding in multimodal learning experience has a positive impact on language acquisition and retention at the neural basis; therefore, it fits nicely into a broader understanding of how educational strategies combined with cognitive neuroscience can build much more effective pedagogical methodologies based on cognitive and neural processes of language learning.

3.3 Virtual and Augmented Reality in L2 Learning

The concepts of social L2 learning and multimodal learning have been used by researchers to put these discoveries into reality. Researchers are starting to look into how computer-assisted and other educational technologies affect brain mechanisms and cognitive processing when learning a second language (Yang, 2025). Considering immersive technologies like VR and AR have the potential to improve educational experiences from an embodied cognition perspective, their integration in the context of second language learning and teaching has received a lot of attention. With the use of these immersive technologies, second language learners can combine multimodal experiences and engage with the simulated environment, forming embodied L2 semantic representations. Legault et al.'s (2019) thorough analysis of VR's potential as a teaching and learning tool for L2 was promising. This study provides information about how well Virtual Reality (VR) creates engaging and interactive learning settings that can improve L2 learning outcomes.

From the perspective of embodied cognition, the VR environment helps with second language acquisition by imitating real-world scenarios, which allows students to interact more naturally with the language. Legault et al. (2019) emphasize the value of immersion and interaction—two essential VR features—in fostering successful learning. According to the study, learners who received VR-based instruction outperformed those who studied through conventional word-word paired association techniques in terms of accuracy when it came to recognizing Mandarin Chinese words. This conclusion

is especially significant for less successful learners, who showed a pronounced enhancement from VR education. It implies that VR could play a significant role in leveling the playing field for people who usually have difficulty acquiring a second language.

The other immersive technology, Augmented Reality (AR), has also gained popularity. It combines virtual and real-world data to provide an immersive and interactive learning environment that is consistent with embodied cognition. A focused examination of the application of AR for vocabulary acquisition is presented by Ibrahim et al. (2018). The majority of participants in the survey think that AR is not only more productive than traditional flashcard approaches but also more pleasant. Through the use of virtual labels superimposed on real-world objects, the AR system helped participants acquire nouns in a foreign language they were unfamiliar with. This improved their performance on both immediate and delayed memory assessments significantly. These results demonstrate how AR has the ability to produce enriched learning experiences that leverage spatial and contextual cues, which are essential aspects of embodied cognition.

More specifically, VR/AR as a learning tool can provide richer learning opportunities that tally with the basic tenet of embodied cognition. Indeed, the immersive and interactive features of VR/AR can simulate real-life contexts, providing learners with perceptually grounded experiences that facilitate the process of L2 learning. The AR can enable the creation of an interactive and immersive learning environment. It has great potential to enhance engagement, retention, and recall of vocabulary by language learners and is hence a very promising track for future research and development in educational technology.

3.4 Metaverse Based L2 Learning

The emerging idea of the metaverse, which has its roots in cognitive research, offers a revolutionary method for teaching and learning second languages. The effects of Metaverse-Based Language Teaching (MBLT) on high school students' acquisition and recall of L2 vocabulary were investigated by Çelik and Baturay (2024). They used a quasi-experimental design to examine how MBLT and conventional instruction affected high school English language learners in Turkey. The results show that the immersive quality of the metaverse enhances vocabulary learning outcomes and retention, implying that the metaverse's interactive and gamified teaching methods can result in notable gains in language proficiency.

Li and Yu (2023) explored the possibility of blended English learning through the metaverse. This study offers evidence of how metaverse can increase learner participation, improving the performance of the learner by developing virtual learning settings. The authors indicate that digital literacy among instructors and learners is vital; the extent of virtual learning depends on it. The paper calls for further research to update the models of blended English learning on metaverse, providing more specific guidance for educators.

Su and Ye (2023) explore the metaverse's theoretical foundations from the standpoint of cognitive science. The major forms of the metaverse are divided into three categories: "enactive metaverse", "embodied metaverse", and "disembodied metaverse". They contend that the body is treated as a "sense-making body" by the metaverse when it is combined with enactive cognition, potentially resolving the meaning-making problems in metaverse civilization.

When viewed through the lens of embodied cognition, the use of metaverse technology in L2 instruction offers a revolutionary chance for language acquisition. Enhancing L2 vocabulary learning and retention may be possible with the metaverse's immersive and interactive experiences, which are in line with the ideas of embodied cognition. It provides creative avenues for immersing students in interactive language experiences that enhance their comprehension and application of the target language.

4. Current Limitations and Future Directions

The integration of technologies in second language learning, while promising, is not without its challenges and limitations. One of the foremost issues is technological accessibility; not all educational institutions or learners have equal access to the required hardware and software. The cost of implementing virtual technology can also be a significant barrier, particularly for schools operating with limited budgets.

Another important consideration is user experience; if the technology is not entertaining and easy to use, it may hinder learning. Because virtual environments are multimodal, there is a risk that learners will experience a higher cognitive load as they attempt to absorb the abundance of information presented to them. Furthermore, while the novelty of virtual technologies may at first increase engagement, it is still difficult to sustain attention over time.

Individual differences in cognitive ability may also have an impact on VR's effectiveness in second language learning. Consequently, even though VR has the potential to completely transform L2 teaching and learning, future studies should think about customizing VR apps to fit the various cognitive profiles of students in order to optimize learning outcomes. In addition, future research projects ought to carry out comparison assessments between traditional and technology-based learning outcomes, as well as empirical investigations that assess the efficacy of these innovative language learning platforms.

5. Conclusion

This paper discusses the combination of embodied cognition with the process of second language learning within an embodied framework. Our exploration has underscored the significance of physical and sensory engagement in the learning process, highlighting how such an approach can contribute to a deeper and more nuanced understanding of linguistic structures and their usage.

Furthermore, this study has illuminated the role of social interaction in the context of second language learning, especially when augmented by emerging technologies such as VR, AR, and the Metaverse. The integration of these technologies has been shown to offer unique opportunities for learners to engage in immersive and interactive experiences, thereby enhancing the learning of a second language in a manner that is reflective of real-world applications.

Throughout the current literature review and identification of recent research, we underlined new advancements and state-of-the-art trends regarding embodied second language learning. We also underlined possible future directions for research and development within the scope of the field. Although the integration of technology into embodied cognition opens various promising avenues for language learning, much research is needed in relation to determining the best method of exploiting the technologies. Future studies should focus more on optimization in designing the platform of VR, AR, and Metaverse according to a wide range of diverse needs from language learners and personalization of learning experiences to meet individual learner differences.

In conclusion, the juncture of embodied cognition and technology in second language learning is an area full of dynamics and potential for educational innovation. By continuing to explore and develop the applications of these technologies, we can enhance the learning experience, making it more engaging, accessible, and effective for a wide range of learners. It is imperative for scholars and practitioners alike to consider the implications of embodied cognition and technological innovation for the enhancement of second language learning experiences.

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References

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology*, *59*, 617-645.

Buccino, G., Marino, B. F., Bulgarelli, C., & Mezzadri, M. (2017). Fluent speakers of a second language process graspable nouns expressed in L2 like in their native language. *Frontiers in Psychology*, *8*, 2-8.

Çelik, F., & Baturay, M. H. (2024). The effect of metaverse on L2 vocabulary learning, retention, student engagement, presence, and community feeling. *BMC Psychology*, *12*(1), 58.

Fodor, J. A. (1975). *The Language of Thought*. New York: Crowell.

Fischer, M. H., & Zwaan, R. A. (2008). Embodied Language: A Review of the Role of the Motor System in Language Comprehension. *Quarterly Journal of Experimental Psychology*, *61*(6), 825-850.

Howard, H. (2004). *Neuromimetic Semantics*. Amsterdam: Elsevier.

Ibrahim, A., Huynh, B., Downey, J., Höllerer, T., Chun, D., & O'Donovan, J. (2018). ARbis Pictus: A Study of Vocabulary Learning with Augmented Reality. *IEEE Transactions on Visualization and Computer Graphics*, *24*(11), 2867-2874.

Jeong, H., Li, P., Suzuki, W., Sugiura, M., & Kawashima, R. (2021). Neural mechanisms of language learning from social contexts. *Brain and Language*, *212*, 1-12.

Kühne, K., & Gianelli, C. (2019). Is embodied cognition bilingual? Current evidence and perspectives of the embodied cognition approach to bilingual language processing. *Frontiers in Psychology*, *10*, 1-8.

Li, P., & Jeong, H. (2020). The social brain of language: Grounding second language learning in social interaction. *npj Science of Learning*, *5*(1), 1-9.

Lakoff, G., & M. Johnson. (1999). *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*. Chicago: Chicago University Press.

Liao, Q. Y., & Weng, X. (2024). Frontiers and Developing Trends in International Research on Embodied Cognitive Linguistics. *Modern Foreign Languages*, *47*(1), 137-147.

Li, M., & Yu, Z. (2023). A systematic review on the metaverse-based blended English learning. *Frontiers in Psychology*, *13*, 1-15.

Legault, J., Zhao, J., Chi, Y.-A., Chen, W., Klippel, A., & Li, P. (2019). Immersive virtual reality as an effective tool for second language vocabulary learning. *Languages*, *4*(1), 1-32.

Macedonia, M., Muller, K., & Friederici, A. D. (2011). The impact of iconic gestures on foreign language word learning and its neural substrate. *Human Brain Mapping*, *32*(6), 982-998.

Monaco, E., Jost, L. B., Gygax, P. M., & Annoni, J.-M. (2019). Embodied Semantics in a Second Language: Critical Review and Clinical Implications. *Frontiers in Human Neuroscience*, *13*, 1-21.

Marino, B. F. M., Sirianni, M., Volta, R. D., Magliocco, F., Silipo, F., Quattrone, A., & Buccino, G. (2014). Viewing photos and reading nouns of natural graspable objects similarly modulate motor responses. *Frontiers in Human Neuroscience*, *8*, 1-10.

Su, J. J., & Ye, H. S. (2023). Metaverse and "embodied" cognition. *Psychological Research*, *16*(1), 3-11.

Yang, J. (2025). Neurolinguistic approach to Chinese language education. In J. Jin, & S. Ke (Eds.), *Chinese language education and second language Chinese acquisition: An interface with Chinese Linguistics* (1st ed.). Routledge.

Zhang, X., Yang, J., Wang, R., & Li, P. (2020). A neuroimaging study of semantic representation in first and second languages. *Language, Cognition and Neuroscience*, *35*(10), 1223-1238.