

МЕЖДИСЦИПЛИНАРНЫЕ ИССЛЕДОВАНИЯ КОГНИТИВНЫХ ПРОЦЕССОВ / INTERDISCIPLINARY RESEARCH ON COGNITIVE PROCESSES

DOI: <https://doi.org/10.60797/IRJ.2024.150.89>

MULTIMODAL TEXT AS A TOOL FOR ENHANCING FOREIGN LANGUAGE LEARNING: COGNITIVE AND PSYCHOLINGUISTIC PERSPECTIVES

Research article

Matveev M.O.<sup>1,\*</sup>, Shipova E.A.<sup>2</sup>

<sup>1</sup>ORCID : 0000-0003-3629-1332;

<sup>1</sup>Moscow Institute of Physics and Technology, Moscow, Russian Federation

<sup>2</sup>Moscow State Linguistic University, Moscow, Russian Federation

\* Corresponding author (mike-matveev[at]mail.ru)

**Abstract**

This study deals with the importance of multimodal texts in foreign language learning from cognitive and psycholinguistic perspectives. The integration of the verbal, visual and auditory modes in multimodal texts can activate sensorimotor and active neural networks which may facilitate a deeper language processing leading to better comprehension as well retention of those fragments. In addition to involvement perceptual styles, we believe that these approaches are important for English Language Teaching since bilingual hearing ability might be increased. Building upon Mayer's Cognitive Theory of Multimedia Learning, Paivio's Dual Coding Theory and Sweller's Cognitive Load Theory this paper attempts to reveal how support can be sought from these theories and is in favor of the use of multimedia text in education. Furthermore, a comparison of empirical research studies shows the potential outcomes and difficulties with multimodal writing processes. The paper covers practical applications and strategies for integrating multimodal texts into foreign language curricula. It describes the holes in current research and offers directions for future study.

**Keywords:** multimodal texts, foreign language learning, cognitive psychology, psycholinguistics, multimedia learning.

МУЛЬТИМОДАЛЬНЫЙ ТЕКСТ КАК ИНСТРУМЕНТ ДЛЯ ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ ОБУЧЕНИЯ ИНОСТРАННЫМ ЯЗЫКАМ: КОГНИТИВНЫЕ И ПСИХОЛИНГВИСТИЧЕСКИЕ ПЕРСПЕКТИВЫ

Научная статья

Матвеев М.О.<sup>1,\*</sup>, Шипова Е.А.<sup>2</sup>

<sup>1</sup>ORCID : 0000-0003-3629-1332;

<sup>1</sup>Московский физико-технический институт, Москва, Российская Федерация

<sup>2</sup>Московский государственный лингвистический университет, Москва, Российская Федерация

\* Копирующая автор (mike-matveev[at]mail.ru)

**Аннотация**

В данном исследовании рассматривается важность мультимодальных текстов в изучении иностранного языка с когнитивной и психолингвистической точек зрения. Интеграция вербального, визуального и слухового стилей в мультимодальных текстах может активизировать сенсомоторные и активные нейронные сети, которые могут способствовать более глубокой проработке языка, что приводит к лучшему пониманию и запоминанию отрывков. Помимо вовлечения стилей восприятия, мы считаем, что эти подходы важны для преподавания английского языка, так как могут повысить способность двуязычного восприятия. Опираясь на когнитивную теорию мультимедийного обучения Майера, теорию двойного кодирования Пайвио и теорию когнитивной нагрузки Свеллера, в данной статье мы попытаемся показать, как можно использовать эти теории в пользу применения мультимедийных текстов в образовании. Кроме того, сравнение эмпирических исследований демонстрирует потенциальные результаты и трудности, связанные с мультимодальными процессами письма. В статье рассматриваются практические приложения и стратегии интеграции мультимодальных текстов в учебные программы по иностранным языкам. Описываются пробелы в текущих исследованиях и предлагаются направления для будущих исследований.

**Ключевые слова:** мультимодальные тексты, изучение иностранных языков, когнитивная психология, психолингвистика, мультимедийное обучение.

**Introduction**

The rapid advancement of digital tools in education necessitates the development of methods that align with both cognitive and psychophysiological processes. While foreign language acquisition has traditionally relied on text-centric methods, there is a growing recognition of the limitations inherent in unimodal approaches. Multimodal texts – those integrating written, visual, auditory, and interactive elements – offer a solution by engaging multiple cognitive and sensory systems.

The primary research problem addressed in this article is the lack of clarity regarding how and why multimodal texts facilitate language acquisition more effectively than traditional methods. This issue is particularly pertinent for language educators seeking to improve learner outcomes amidst increasing cognitive and social demands.

This article contributes to the field by:

- Providing a comprehensive review of cognitive and psychophysiological theories relevant to multimodal learning.
- Analysing empirical evidence on the effectiveness of multimodal texts for diverse learner profiles.

Proposing practical methodologies to align multimodal learning strategies with classroom objectives.

### **Theoretical Foundations of Multimodality in Learning**

It is rooted in multiple theories of cognition that suggest different sensory and cognitive channels must be activated in order for students to truly learn. Mayer's Cognitive Theory of Multimedia Learning [1] is one of the best frameworks, suggests learners process information more effectively when it presented through both visual and auditory paths. Mayer maintains that the human mind has two separate processing channels, one for words and another for visuals. Using both channels appropriately will ensure that learners engage mentally, which in turn makes it more likely they will retain the new information and more difficult to forget.

From the perspective of Dual Coding Theory (Paivio, 1986) [2], it appears that both verbal and non-verbal systems are processed in parallel activating each other. Which is why, in the dual coding theory of memory developed by Paivio, a learner who experiences such pairings — like words with their images — are more likely to encode and recall that info. This is incredibly useful in languages education, where learning new vocabulary and connecting it with pictures can allow learners to associate words with abstract or foreign ideas/sounds.

Social constructivism, as put forth by Vygotsky [3], also aligns with multimodal texts to create a collaborative and interactive environment where learning occurs when individuals interact socially based on given contextual input. Vygotsky proposed that cognitive development occurs through interaction with more knowledgeable others and is a product of social learning. Multimodal texts allow for more diverse and robust interaction options that learners can use to work with peers, as well as content.

### **Cognitive and Psycholinguistic Mechanisms**

Multimodal texts, on the other hand, light up important parts of our brains that can help improve language acquisition from a cognitive and psycholinguistic point-of-view. For one, multimodal materials sustain learners' attention more successfully than unimodal text. This increased focus is necessary for learning new information, which has been demonstrated by Sweller's research [4] on Cognitive Load Theory. Sweller maintained that learners have a constraining cognitive architecture — designing for unbidden paltry capacity (due to life-long) and fail to maximize learning by not trying fundamentally unnecessary elements of design which provide evolutionary enhancements. Well-designed multimodal texts deploy cognitive and receptive resources to different reception domains, allowing learners the space in working memory necessary for attending meaningfully to a text.

Beyond this, multimodal learning targets different memory types – both short-term and long-term. This is evidenced by Baddeley's studies on working memory [5], who found that multimodal inputs (inputs through more than one sense) utilizing both the phonological and visuo-spatial components of working memory allow learners to process new information while maintaining/ processing those modules simultaneously. For instance, if a word is heard at the same time as its corresponding image is seen by a learner's eyes, they will have encoded that internally in two different ways which then likely encourages keeping this information into long-term memory.

From a psycholinguistic point of view, multimodal text supports the development of linguistic competence because it provides learners with more contextual clues. This is in line with Halliday's Systemic Functional Linguistics [6], which posit that meaning-making in language cannot be considered purely as a matter of grammar and syntax, but emerges from the blend of multiple semiotic modes. Multimodal texts — those that create meaning textually, visually and aurally; helping learners make sense of languages in more complex and sophisticated ways.

### **Applications of Multimodal Texts in Foreign Language Education**

These multimodal texts can be used in a myriad of ways, purposefully relating to the goals for foreign language education given the learner's proficiency levels. One common mechanism is by means of subtitled video to help with listening and reading. Vanderplank [7] discovered that learners who watched videos with subtitles are found to have enhanced new vocabulary learning and better listening confidence. The uniquely multimodal exercise allows students to see a sign or phrase in written and spoken form, which adds multiple signals that help learners take the words from ears (auditory skills) through eyes (visual feedback) into the brain for added mental reinforcement.

Digital storytelling is something that also creatively combines visual, audio and text to provides an account of learning experience. Research by Smeda et al. A study by Chang et al. (8) reports that digital storytelling is effective not only for enhancing language skill but also heightening creativity and engagement. The meaning making process is built through learner engagement, not memorization.

Moreover, infographics work especially well for teaching intricate grammatical rules or vocabulary. Infographics, which visually depict a relationship between words or concepts, can help learners understand complex abstract linguistic principles more effectively. Infographics have been found to develop a higher information retention than the traditional text-based learning because they involve different areas of brain working simultaneously [9].

Nevertheless, whilst multimodal texts support a number of advantages, it is crucial to think critically about how this may be difficult for beginner learners. A major concern with this approach, that of cognitive overload as outlined by Sweller [4], is well-established. Novices might find it difficult to handle many streams of information at once, and more confusion than comprehension will be the result. To prevent this attrition, educators need to thoughtfully construct multimodal materials that are adapted (in terms of complexity and language proficiency) according to the cognitive resources available in the learners' first language.

Empirical Evidence and Practical Applications.

Benefits of Multimodal Texts.

Multimodal texts have been shown to:

- Increase learner engagement by presenting material in diverse formats.
- Reduce cognitive load by simplifying complex information through visual aids.
- Enhance memory retention by activating dual coding mechanisms.

**Classroom Applications:**

1. For Beginners: Use highly contextualised materials, such as images with basic vocabulary or videos with subtitles, to facilitate initial language exposure.
2. For Advanced Learners: Incorporate complex multimodal texts, such as infographics and interactive simulations, to challenge cognitive and linguistic skills.

**Adaptive Techniques:** Adjust the complexity of multimodal inputs based on learners' proficiency and cognitive capacity.

**Discussion: Comparative Analysis of Research Findings**

A number of empirical studies have examined the effects of multimodal text on foreign language learning, showing some benefits and reservations. Plass et al. For instance, [10] showed that multimedia-enhanced contexts benefitted language learners' comprehension and immediate recall of texts. For example, their research demonstrated that misaligning visual and verbal elements lead to cognitive dissonance. If visual signals matched the verbal signal, a learner did not appear to struggle with comprehension. The modal inconsistency in such multimodal findings highlights the importance of seamless integration for consistency, and clarity.

However, research by Chandler and Sweller [11] has raised questions about the presence of extraneous cognitive load if too many stimuli are presented to learners simultaneously. They found that using a multimodal text in moderation, meaning to guide student attention toward the learning objective and divert their focus when it is necessary into categorizing information — from irrelevant material on topic side shows or animations. This is consistent with the findings of Paas et al. That instructional materials need to be adapted for individual learner's cognitive load capabilities, as elaborated by [12].

In contrast, Gee (2004) stressed the motivational advantages of multimodal learning, especially in the case of digital games and interactive media. He stated that the multimodal environments provide immersive and engaging learning experiences, which are necessary to keep students motivated in the long run. While some are working passively in the background, what they have to offer is a huge motivation for language learners which — as we all know right now during the Polyglot Conference event where so many encouraging speakers mention this again and again — you simply need if it just wouldn't be possible no matter of how much work or somewhat hopelessness you already may feel reaching C2.

The findings of this article confirm that multimodal texts significantly enhance foreign language learning outcomes, as supported by established theories such as Mayer's and Paivio's frameworks. However, the novelty of this study lies in its psychophysiological approach, which links the activation of sensory systems with cognitive processes during multimodal learning. For instance, combining auditory input with visual imagery not only reduces cognitive load but also stimulates memory encoding by engaging both hemispheres of the brain.

Additionally, this study introduces a tiered model for implementing multimodal strategies in the classroom. For beginners, emphasis is placed on simple and highly contextualised materials, such as images paired with basic vocabulary. For advanced learners, complex multimodal texts, such as infographics and interactive videos, are proposed to challenge cognitive and linguistic skills.

**Conclusion**

This article underscores the importance of multimodal texts in foreign language education, particularly their ability to engage learners at both cognitive and sensory levels. The psychophysiological perspective introduced here provides a fresh lens through which educators can understand the mechanisms driving effective learning.

Future research should explore how emerging technologies, such as virtual and augmented reality, can further extend the benefits of multimodal approaches. Additionally, longitudinal studies are needed to assess the long-term impact of multimodal texts on language retention and fluency. Finally, studies on other kinds of multimodal texts, such as interactive media and virtual or augmented reality enriched resources that are rarely explored in language education. Contexts also need more attention. The rise of digital technologies makes multimodal learning methods increasingly available, opening up new exciting opportunities for better and more interactive approaches to language teaching.

**Конфликт интересов**

Не указан.

**Рецензия**

Сообщество рецензентов Международного научно-исследовательского журнала  
DOI: <https://doi.org/10.60797/IRJ.2024.150.89.1>

**Conflict of Interest**

None declared.

**Review**

International Research Journal Reviewers Community  
DOI: <https://doi.org/10.60797/IRJ.2024.150.89.1>

**Список литературы на английском языке / References in English**

1. Mayer R.E. Multimedia Learning / R.E. Mayer. — Cambridge University Press, 2009.
2. Paivio A. Mental Representations: A Dual Coding Approach / A. Paivio. — Oxford University Press, 1986.
3. Vygotsky L.S. Mind in Society: The Development of Higher Psychological Processes / L.S. Vygotsky. — Harvard University Press, 1978.
4. Sweller J. Cognitive Load Theory, Learning Difficulty, and Instructional Design / J. Sweller // Learning and Instruction. — 1994. — № 4 (4). — P. 295–312.
5. Baddeley A.D. Working Memory / A.D. Baddeley // Science. — 1992. — № 255 (5044). — P. 556–559.
6. Halliday M.A.K. Language as Social Semiotic: The Social Interpretation of Language and Meaning / M.A.K. Halliday. — Edward Arnold, 1978.

7. Vanderplank R. *Captioned Media in Foreign Language Learning and Teaching: Subtitles for the Deaf and Hard-of-Hearing as Tools for Language Learning* / R. Vanderplank. — Palgrave Macmillan, 2016.
8. Smeda N. *Digital Storytelling with Web 2.0 Tools for Collaborative Learning* / N. Smeda, E. Dakich, N. Sharda // *Educational Technology Research and Development*. — 2014. — № 62 (1). — P. 71–91.
9. Moreno R. *Interactive Multimodal Learning Environments* / R. Moreno, R.E. Mayer // *Educational Psychology Review*. — 2007. — № 19. — P. 309–326.
10. Plass J.L. *Cognitive Load in Reading a Foreign Language Text with Multimedia Aids and the Influence of Verbal Ability* / J.L. Plass, D.M. Chun, R.E. Mayer [et al.] // *Computers in Human Behavior*. — 2003. — № 19 (2). — P. 221–243.
11. Chandler P. *Cognitive Load Theory and the Format of Instruction* / P. Chandler, J. Sweller // *Cognition and Instruction*. — 1991. — № 8 (4). — P. 293–332.
12. Paas F. *Cognitive Load Theory and Instructional Design: Recent Developments* / F. Paas, A. Renkl, J. Sweller // *Educational Psychologist*, — 2003. — № 38 (1). — P. 1–4.
13. Gee J.P. *What Video Games Have to Teach Us About Learning and Literacy* / J.P. Gee. — Palgrave Macmillan, 2007.