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MENTAL MODELS OF THE RUSSIAN–UKRAINIAN WAR: A POPULAR SCIENCE PERSPECTIVE

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This article discusses the specificity of mental modeling of the Russian-Ukrainian War based on articles from the English popular science media platform The Conversation. A triangulation model for the study of popular science discourse is proposed, conceptualizing it as a complex integrative cognitive-communicative-semiotic formation aimed at popularizing specialized scientific knowledge for a broad non-professional audience and constructing recipients’ mental models for its comprehension. The mental structuring of the events of the Russian-Ukrainian War is carried out through a landscape model, which represents war experience as a multidimensional cognitive space integrating the landscapes of actions, reflections, emotions, and bodily-physiological experience, verbalized through linguistic and discursive means at both micro- and macro-levels. The action landscape models the glocal dynamics of the conflict; the reflective landscape objectifies the analysis of military-political decisions and the features of their individual and collective interpretation; the emotional landscape represents affective responses to wartime events; the bodily-physiological landscape reflects the transformation of cognitive risk assessments into states of anxiety and tension. All landscapes are verbalized through the prism of political, psychological, economic, media, and historical discourses, integrating into a unified transdiscursive configuration.

Keywords: *popular science discourse, Russian–Ukrainian War, cognitive-discursive analysis, communication, mental model.*

Ізотова Н. П. Ментальні моделі російсько-української війни в науково-популярній перспективі.

Статтю присвячено дослідженню специфіки ментального моделювання російсько-української війни на матеріалі статей англійськомовної науково-популярної медіаплатформи The Conversation. Запропоновано тріангуляційну модель вивчення науково-популярного дискурсу, що репрезентує його як складне інтегративне когнітивно-комунікативно-семіотичне утворення, спрямоване на популяризацію спеціального наукового знання для широкої непрофесійної аудиторії та формування в адресата ментальних моделей для його осмислення. Ментальне структурування подій російсько-української війни здійснюється із застосуванням ландшафтної моделі, яка представляє досвід російсько-української війни як багатовимірний когнітивний простір, що поєднує ландшафти дій, рефлексій, емоцій і тілесно-фізіологічного

досвіду, репрезентовані мовно-дискурсивними засобами на мікро- та макрорівнях. Діяльнісний ландшафт актуалізує глокальну динаміку конфлікту; рефлексивний – опредметнює аналіз військово-політичних рішень та особливості їх індивідуального й колективного осмислення; емоційний – розкриває афективні реакції на воєнні події; почуттєво-тілесний – відбиває трансформацію когнітивних оцінок ризику в станах тривоги й напруження. Усі ландшафти вербалізуються крізь призму політичного, психологічного, економічного, медійного та історичного дискурсів, інтегруючись в єдину трансдискурсивну конфігурацію.

Ключові слова: *науково-популярний дискурс, російсько-українська війна, когнітивно-дискурсивний аналіз, комунікація, ментальна модель.*

Introduction

The emergence of new research fields often follows significant socio-political and cultural upheavals. One such rapidly developing transdisciplinary domain in both Ukrainian and international humanities is ***the semiotics of war***, which explores how the Russian-Ukrainian war is conceptualized and communicated through a variety of semiotic resources (Kot et al., 2024; Izotova & Sytenka, 2024; Potapenko & Andriiko, 2025; Taranenko, 2023).

The ***relevance*** of this study is motivated by several factors: first, the need for a transdisciplinary analysis of Ukrainian war discourse, integrating insights from discourse semiotics, cognitive linguistics, and the psychology of perception; second, the necessity to reassess the communicative-pragmatic potential of English popular science discourse, which not only informs and explains but also constructs mental models of events; third, the aim of developing analytical approaches to the cognitive-emotional modeling of war experience; and fourth, the task of elaborating methodological frameworks for the study of Ukrainian war discourse.

Previous research on Ukrainian war discourse has mainly focused on political, media, and ideological representations, examining rhetorical strategies (Potapenko & Andriiko, 2025), conceptual structures (Izotova & Sytenka, 2024), multimodal features (Kot et al., 2024; Izotova & Sytenka, 2024), and axiological dimensions (Taranenko, 2023). However, few studies have explored popular science discourse as a lens for understanding war experience, and little research has addressed how this discourse represents the cognitive and emotional aspects of war events, actions, and feelings. Consequently, a gap remains in the analysis of the cognitive-discursive structuring of war experience in texts that aim not only to inform and explain but also to engage a broad audience.

This paper employs mental models (Johnson-Laird, 1980; van Dijk, 2008) as a central theoretical tool, which in English popular science discourse represent the cognitive, emotional, and embodied experience of the Russian-Ukrainian war. ***The***

novelty of this study lies in explaining how English popular science discourse not only conveys information but actively represents the Russian-Ukrainian war experience through an analyzable framework of mental modeling.

The aim of this article is to reconstruct the mental models embedded in English popular science texts about the Russian-Ukrainian war by thoroughly examining the linguistic and discursive means used to communicate cognitive, emotional, and embodied aspects of war experience.

To achieve this aim, the study ***seeks***: (1) to define the concept of Ukrainian war discourse within a cognitive-discursive framework; (2) to justify the applicability of mental modeling for its analysis; (3) to outline the key features of English popular science discourse; (4) to propose and substantiate the effectiveness of the landscape mental model for structuring war experience; and (5) to identify the linguistic and discursive means that manifest landscape mental models in representing war experience.

Materials

The study analyzed a corpus of English popular science discourse addressing the Russian-Ukrainian war and its broader geopolitical implications. The corpus includes selected articles published in 2022–2026, with a focus on texts from the English-language popular science media platform *The Conversation*.

Theoretical background

In the dictionary, the verb *to popularize* is defined as "to make something known or understood to ordinary people." (Cambridge English Dictionary) In the context of science communication, popularization refers to the creative activity of adapting scientific knowledge to the level of understanding of a general audience and disseminating it throughout society.

In his work, Liebert (2019) identifies a number of features characteristic of science popularization. These include its context-dependence, addressee orientation, functional nature, dynamism in the media environment, participatory character, and its orientation toward attracting attention. First and foremost, the popularization of science, according to Liebert, cannot be considered "a uniform strategy," (p. 399) as it is always relative to bundles of factors. This means that the forms of popular discourse vary depending on the addressee, the media, and the communicative situation. In line with this, knowledge in popular discourse is structured to match the audience’s level of expertise and expectations, since "popularization strategies are

always functionally linked to certain communicative goals that focus on addressees and their (knowledge) needs" (p. 411).

This audience-oriented approach is closely connected to the functional nature of science popularization, as the choice of strategies and methods for presenting knowledge is guided by specific communicative purposes: "popularization strategies are always functionally linked to certain communicative goals." (p. 402) At the same time, contemporary popular discourse is highly dynamic, shaped by processes of mediatization, which "is leading to a radical change in the popularization of science." (p. 399) Finally, these strategies often highlight the importance of maintaining audience interest, reflecting the participatory and attention-driven character of popular science communication, as Liebert observes that it "emphasize[s] elements that attract the audience's attention." (p. 400)

As modern popular scientific communication is not a monolithic entity but rather constitutes a complex semiotic space in which multiple discourses coexist and interact, the question arises as to how these different discourse types are integrated and function together in popular scientific texts. This phenomenon can be effectively described in terms of *transdiscursivity*, which challenges fixed boundaries between distinct discourses by highlighting their capacity to interact and transform across contexts. It promotes an understanding of meaning as a dynamic process in which discourse employs, combines, and reinterprets diverse traditions, genres, and communicative practices. (Izotova, 2025, pp. 44-45)

In this study, transdiscursivity is understood as a cognitive-semiotic principle of organizing popular scientific discourse, which consists in the integration of different discourses, resulting in a transformation of their semantic-functional and pragma-stylistic roles in accordance with the new communicative context.

The starting point for the analysis of popular scientific texts in terms of mental models is the assumption that "text recall does not seem to be based on semantic representations of texts, but rather on the mental model construed or updated of the event the text is about." (van Dijk, 2008)

According to Johnson-Laird (1980), a model represents a state of affairs, and its structure directly reflects the relevant aspects of that state of affairs in the world (p. 98). He explains that "models introduce a minimal analogical role for structure, using elements to stand for individuals and links to denote identities between them" and that they allow "an arbitrary number of elements representing exemplary members of a set." (p. 99) Moreover, "models can possess richer analogical and dimensional structures, being two- or three-dimensional, dynamic, and in some cases even higher-

dimensional," (p. 100) and "the heuristic advantages of models for reasoning are complemented by the need for procedures that test the conclusions derived from them" (p. 99). Finally, Johnson-Laird notes that "mental models can be constructed from both verbal and perceptual information, and may underlie thought processes even without emerging as conscious images" (p. 101).

As van Dijk (2008) emphasizes, mental models "embody the interface between episodic, personal knowledge of events, on the one hand, and the socially shared beliefs of groups" (p. 190). He also notes that "mental models, while being representations of personal experiences, in fact also provide a more detailed and empirical account of some aspects of the notion of consciousness. That is, being conscious of an event, action, object or person, and their properties, involves the construction or updating of episodic models" (p. 190).

This paper proposes a triangulation model of popular science discourse, according to which it is understood as a complex, integrative cognitive-communicative-semiotic formation. On the one hand, it aims to popularize specialized scientific knowledge for a broad, non-professional audience, and on the other hand, to construct mental models in the addressee to facilitate comprehension and processing of this knowledge.

This understanding of popular science discourse delineates a set of research problems, the key among which are: (1) identifying strategies for knowledge popularization, i.e., methods of adapting specialized scientific information for a non-professional audience; (2) in the cognitive dimension, examining the effectiveness of mental models and their functional load; and (3) in the semiotic dimension, investigating the principles of integrating different types of discourse – scientific, media, literary, and conversational – into a unified semiotic space.

Methodological notes

The present study adopts an integrative cognitive-discursive and semantic-stylistic approach to analyze mental landscapes in English popular science texts on the Russian-Ukrainian war. The methodology is grounded in the landscape model of mental modeling, which allows for reconstructing four interrelated dimensions of the war understanding: *the action landscape*, including strategies, goals, and decisions related to the Russian-Ukrainian war, *the reflective landscape*, objectifying its cognitive and moral interpretations, *the emotional landscape* that reveals psycho-emotional perception of this war, and *the bodily-experiential landscape*, marking bodily and somatic responses to the experience of war.

A central methodological tool is the "nodal points" method (Izotova, 2025), which treats selected text fragments as analytical units signaling critical moments where mental models are encoded in language. Nodal points combine linguistic, stylistic, and discursive cues, which allows the analysis to systematically identify cognitive evaluations, moral judgments, emotional reactions, and embodied responses to the Russian-Ukrainian war.

The methodology also incorporates semantic-stylistic analysis to examine lexical, syntactical, and stylistic markers of evaluation, affect, and bodily experience, alongside a contextual-interpretative cognitive-discursive approach to situate these markers within the broader text and transdiscursive context. In addition, attention distribution theory (Talmy, 2007) is applied to analyze how textual features guide the reader's focus, highlighting key linguistic cues relevant for the construction of mental models.

Results and discussion

This paper shifts the focus from examining how popular science explains the Russian-Ukrainian war to analyzing how it structures and models the experience of war. Such a shift emphasizes not only the transmission of knowledge, but also the ways in which popular science texts construct representations of the conflict in readers' minds.

This research proposes a mental landscape model inspired by Greimas's narrative landscapes (Greimas, 1976, pp. 436–440), adapted for the analysis of popular science texts on the Russian-Ukrainian war. The model conceptualizes the experience of this war as a structured cognitive space integrating multiple interrelated dimensions of experience – *actions, reflections, emotions, and embodied states*. Each mental landscape unfolds on two levels. *The micro-level* represents the local dimension of war experience, depicting individual actions, thoughts, emotions, and bodily reactions as they are directly experienced by the participants in the conflict. *The macro-level* reflects the global dimension, encompassing broader patterns, relational dynamics, and the wider geopolitical context in which events unfold. This dual-level structure allows the mental landscape to model how war experiences are construed both as immediate, personal encounters and as part of a larger, globally situated reality, highlighting the interplay between local perceptions and global understanding.

The action landscape embodies the glocal dynamics of the conflict, including events, behaviors, motivations, goals, strategies, and causes of inaction. It represents how agency is depicted and structured within the English popular science discourse,

showing both individual and collective actions in the Russian-Ukrainian war. For example,

1) *"Ukraine's control of these parts of Donetsk goes beyond symbolic value. These areas consist of terrain and fortifications that are ideal for defensive operations. If Ukraine surrendered this territory to Russia, central Ukraine would be left vulnerable to rapid Russian assaults in the future."* (Horncastle, 2025)

2) *"Over the past four years, the EU has risen to become Ukraine's most important supporter. <…> The French embrace of European strategic autonomy may have been less surprising than in the German case. However, Paris recently announced concrete steps to expand its nuclear weapons arsenal and extend the French nuclear umbrella to eight European allies."* (Wolff & Whitman, 2026)

The selected excerpts from the popular science media platform *The Conversation* illustrate action landscape at both micro- and macro-levels, demonstrating how local and global strategies of territorial management, defense, and international engagement influence the cognitive-emotional understanding of the Russian-Ukrainian war. At the micro level, the action landscape is expressed through lexical units denoting control and military operations (*control, terrain, fortifications, defensive operations, surrendered, assaults*), a lexicon of risk and threat (*threat, vulnerable*), the marker of rapidity (*rapid*), as well as evaluative adjectives (*vulnerable, rapid, ideal*), and conditional constructions (*If Ukraine surrendered this territory to Russia*). At the macro level, the action landscape encompasses global strategic actions, such as the EU's positioning, France's nuclear capabilities , and European strategic autonomy. Linguistically, this is manifested through nominal groups representing collective and institutional agencies (*the EU, European strategic autonomy, nuclear weapons arsenal, French nuclear umbrella*), verbs indicating active strategies and decisions (*has risen, announced, extend, expand*), and modal constructions signaling potential consequences of actions (*may have been less surprising, could leave central Ukraine vulnerable*).

The transdiscursivity of these passages is evident in the interplay of several discourses that jointly construct a cognitive-emotional understanding of the conflict. Specifically, the analysis integrates political discourse, realized through lexical units denoting international relations, strategic positions, and institutions (*the EU, European strategic autonomy, France, allies, announced, declared*), military discourse, which describes tactical and operational actions, territorial control, armaments, and defense (*control, terrain, fortifications, defensive operations, surrendered, assaults, nuclear weapons arsenal, extend, expand*), and evaluative-

emotional discourse, conveying moral or affective assessments of events (*symbolic value, ideal, vulnerable, less surprising, important supporter*).

The *reflective landscape* illustrates how individuals and collectives interpret, appraise, and evaluate military and political decisions related to the Russian-Ukrainian war. It explains how people understand these decisions in cognitive and moral ways, and also how they think about the conflict, its causes, and its results. For example,

1) *"Specifically, President Volodymyr Zelenskyy has said that the territorial aspects of the proposed agreement are the most troublesome"* (Horncastle, 2025).

2) "Trump and Putin have delivered major shocks to the political psyche of European leaders. While this continues to be a painful process, Europe as a whole cannot afford a breakdown in the hard-won consensus over the need to support Ukraine" (Wolff & Whitman, 2026).

These excerpts illustrate both micro- and macro-level reflective landscapes related to the Russian-Ukrainian war. At the micro level, the text conveys personal cognitive and moral evaluations through lexical units (e.g., *most troublesome, said, proposed agreement*), creating both semantic and emotional tension around the territorial dimensions of proposed political decisions (*President Volodymyr Zelenskyy has said that the territorial aspects of the proposed agreement are the most troublesome*). At the macro level, the text communicates the collective reflection of the European leaders on strategic shocks (*Trump and Putin have delivered major shocks to the political psyche of European leaders. While this continues to be a painful process, Europe as a whole cannot afford a breakdown in the hard-won consensus over the need to support Ukraine*). Nominal groups (*European leaders, Europe, consensus*) represent collective agencies and shared values, verbs (*cannot afford, have delivered, continues*) convey assessment and moral judgment, and evaluative adjectives and phrases (*major shocks, painful process, hard-won*) signal cognitive-moral tension.

These excerpts show how political, evaluative-moral, and emotional discourses work in tandem. Political language conveys strategic decisions and institutional positions (*Ukrainian and European leaders, decisions, consensus, support*), evaluative-moral words signal judgments and concerns about consequences (*most troublesome, cannot afford, painful process, hard-won*), and psycho-emotional expressions depict reactions to shocks and stress (*shocks, political psyche, painful process*). Together, these discourses create a reflective landscape, where the audience

can cognitively and emotionally engage with the unfolding conflict and its broader implications.

The emotional landscape represents people's affective states, moods, and emotional reactions triggered by events of the Russian-Ukrainian war. It demonstrates how popular science texts involve readers on the emotional level, guiding their understanding and interpretation of the conflict. For example,

1) *"If Ukrainian officials outright reject it, Trump will probably abandon Ukraine at a moment of need. If Ukraine fully acquiesces, it will be left vulnerable to future aggression"* (Horncastle, 2025).

2) *"Such public spats between top EU officials are highly unusual. <...> The EU's age of innocence is now over"* (Wolff & Whitman, 2026).

The selected excerpts from the popular science platform *The Conversation* represent micro- and macro-level emotional landscapes related to the Russian-Ukrainian war. At the micro level, conditional constructions (*If Ukrainian officials outright reject it*, *If Ukraine fully acquiesces*) generate semantic tension, verbalizing the potential risks and emotional uncertainty of Ukrainian decisions. The lexicon of threat and vulnerability (*abandon, vulnerable, future aggression*) triggers affective perception, syntactic parallelism and antonymic opposition (*reject – acquiesce*) amplify psychological strain, merging cognitive risk assessment with embodied experiences of anxiety. At the macro level, the depiction of public disputes and metaphorical evaluation of the EU's condition (*highly unusual*, *age of innocence is now over*) conveys a collective emotional reaction to political and strategic shocks, where nominal groups (*top EU officials, the EU, Europe)* mark collective and institutional actors, while evaluative adjectives and metaphors reflect perceived instability, escalating tension, and heightened awareness of a transformed geopolitical landscape. The transdiscursivity of these fragments is manifested through the combination of political discourse (*Ukrainian officials, top EU officials, the EU)),* risk and threat discourse (*abandon, vulnerable, future aggression, If Ukrainian officials outright reject <...>, If Ukraine fully acquiesces <...>*), and evaluative-emotional discourse (*highly unusual, the EU's age of innocence is now over*), constructing a multidimensional emotional mental model of a holistic understanding of the conflict.

The bodily-experiential landscape represents the physical and sensory experiences that accompany the cognitive and emotional engagement with wartime events. It shows how perceptions of risk, threat, or uncertainty are embodied, producing states of anxiety, tension, and heightened alertness. For example,

1. *"Russia has bombed residential neighbourhoods with no military infrastructure and reportedly resorted to the use of illegal cluster munitions in the Donbas. It has also targeted critical infrastructure – dropping bombs on farms, oil refineries and food storage facilities, disrupting the sowing season to create unlivable conditions and bring famine to Ukraine, once known as 'the breadbasket of the world'"*

2. *"After being pushed back from the Kyiv region, Russian soldiers are reported to have left mass graves and corpses of civilians with their hands tied behind their backs and bullets in their heads. There are also reports of naked female bodies that had been raped and partly burned, and mutilated bodies of children"* (Kudlenko, 2022).

These examples show the bodily-experiential landscape through two levels of representation: environmental destruction and direct bodily violence. In the first fragment, bodily experience is shown indirectly through damage to places that support everyday life. Lexical units such as *residential neighborhoods, farms, food storage facilities, and oil refineries* refer to spaces necessary for survival. Expressions like *unlivable conditions* and *famine* indicate collective bodily suffering at a general level, where harm is mediated through the destruction of living environments rather than individual bodies.

In the second case, direct bodily violence is foregrounded. The human body becomes the central point of representation. Lexical units such as *mass graves*, *corpses*, *naked female bodies*, and *mutilated bodies of children* describe physical destruction in a direct and explicit way. The phrase *are reported to have* shows mediated information, but it does not reduce the strong focus on bodily damage and death.

The transdiscursive character of these examples appears in the interaction of infrastructural, humanitarian, and forensic discourses. The first case connects war with environmental and economic destruction affecting conditions of survival. The second focuses on forensic representation of bodies and death. Together, they construct a layered bodily-experiential landscape that combines indirect environmental harm with direct physical violence.

Conclusions and prospects

The study showed that popular scientific English-language discourse on the Russian-Ukrainian war represents complex cognitive, emotional, and bodily-affective models of conflict perception through the integration of local and global discourses.

Using the landscape model of mental modeling, four interrelated dimensions of understanding the war were reconstructed: actions, reflections, emotions, and bodily-physiological experiences. The action landscape captures local and global strategies and decision-making; the reflective landscape represents cognitive and moral interpretations of military-political decisions by individuals and groups; the emotional landscape conveys affective responses to wartime events; and the bodily-experiential landscape explains how linguistic-discursive signals transform cognitive risk assessments into somatic experiences of anxiety and tension. Together, these landscapes are realized through political, psychological, economic, media, and historical discourses, integrating them into a unified cognitive-emotional framework. This positions popular scientific discourse on the Russian-Ukrainian war as a complex transdiscursive formation that not only informs but also constructs multidimensional mental models of wartime experience at both micro- and macro-discursive levels. Future research could explore the application of mental landscaping to multimodal popular science discourse in order to assess the effectiveness of various semiotic resources in facilitating the communication and popularization of scientific knowledge.

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