COGNITIVE MECHANISMS OF MEANING CONSTRUCTION IN INFORMATION TECHNOLOGY TERMINOLOGY

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Abstract: *This article analyzes Information Technology (IT) terminology from a cognitive-linguistic perspective, emphasizing that technical terms function as tools of conceptualization rather than mere labels. Drawing on Conceptual Blending Theory and mental model theory, it shows how metaphor-based terms such as cloud and firewall help users understand abstract technological processes. The study also demonstrates that disciplinary and multilingual contexts shape terminological meaning, leading to semantic variation but also enhanced cognitive flexibility. The findings highlight the importance of cognitively informed terminology in education and interdisciplinary communication.*

Keywords: *IT terminology; cognitive linguistics; conceptual blending; mental models; disciplinary discourse*

The rapid expansion of Information Technology (IT) has not only transformed technical infrastructures but has also reshaped the cognitive and linguistic frameworks through which technological knowledge is constructed, communicated, and learned. Contemporary research increasingly recognizes that IT terminology cannot be fully understood through lexical description alone; rather, it must be examined as a cognitively grounded system that reflects how individuals conceptualize abstract technological processes.

From a cognitive-linguistic perspective, IT terms emerge through complex mechanisms such as conceptual blending, mental modeling, and disciplinary meaning-making. These mechanisms explain why technical vocabulary often relies on metaphorical extensions from everyday experience—such as *cloud*, *desktop*, or *firewall*—to render invisible digital processes intelligible. At the same time, such cognitive strategies introduce semantic variability across professional communities, where the same term may activate different conceptual structures depending on disciplinary priorities.

This article situates IT terminology at the intersection of cognition, language, and professional discourse. Drawing on Conceptual Blending Theory, mental model theory, and cognitive semantics, it argues that terminology does not merely label technological realities but actively constructs mental representations and epistemic frameworks. Particular attention is given to multilingual contexts, where cross-linguistic comparison of IT terms fosters deeper conceptual understanding and cognitive flexibility.

By framing IT terminology as a cognitive and disciplinary tool, the study highlights the importance of terminological awareness in education, interdisciplinary collaboration, and technology-mediated knowledge transfer. Such an approach is especially relevant for contemporary educational environments, where learners and professionals operate across linguistic, cultural, and disciplinary boundaries.

Understanding the evolution and use of Information Technology (IT) terminology requires more than lexical description; it demands insight into the **cognitive mechanisms** that shape how individuals conceptualize abstract technological phenomena. The creation and interpretation of IT terms are deeply tied to human cognition—specifically, to processes of **conceptual blending**, **mental modeling**, and **disciplinary meaning-making**. These mechanisms explain why technical terminology both reflects and constructs the ways professionals think, reason, and communicate within their fields.

One of the most influential frameworks for understanding terminological innovation in IT is Fauconnier and Turner's (2002)[1] **Conceptual Blending Theory (CBT)**, which describes how the mind integrates elements from multiple mental spaces to generate new meanings. Richards (2015) implicitly applies this principle when analyzing *terminological dissonance*, noting that many IT terms emerge from blending disparate conceptual domains. For instance, *cloud computing* blends the domains of **nature** (the cloud as a floating, amorphous mass) and **network infrastructure** (distributed data systems), producing a metaphor that captures both invisibility and interconnectivity. Similarly, *desktop*, *folder*, and *recycle bin* blend the physical workspace with the digital environment, allowing users to map familiar, concrete experiences onto abstract digital processes. These blends function as *cognitive shortcuts*, enabling comprehension of complex systems through analogy and experiential resonance.

Yet, conceptual blending can also contribute to **terminological ambiguity**. When different communities emphasize different input spaces of a blend, meaning diverges. For example, in user experience (UX) design, the *interface* blend foregrounds *interaction and perception*, while in programming, it foregrounds *structure and access*. Each interpretation activates a different mental integration of the same lexical form, producing disciplinary variation. Thus, cognitive blending is both the source of innovation and a potential generator of semantic conflict.

Closely related to blending is the concept of **mental models**—internal representations of how systems or processes work (Johnson-Laird, 1983[2]; Norman, 2013[3]). IT terminology plays a crucial role in constructing these models, serving as linguistic scaffolding for abstract reasoning. When learners encounter terms such as *algorithm*, *network*, or *memory*, they form conceptual models that guide their expectations and problem-solving strategies. Du Toit et al. (2025) demonstrate that

[1] Fauconnier, G., & Turner, M. (2002). *The way we think: Conceptual blending and the mind's hidden complexities*. Basic Books.
[2] Johnson-Laird, P. N. (1983). *Mental models: Towards a cognitive science of language, inference, and consciousness*. Cambridge University Press.
[3] Norman, D. A. (2013). *The design of everyday things* (Revised and expanded ed.). Basic Books.

when these terms are presented in multiple languages, learners build *multilingual mental models*, which integrate cross-linguistic perspectives and enhance cognitive flexibility. For instance, comparing the English *network* with its Uzbek equivalent *tarmoq* (literally "woven structure") invites reflection on different conceptualizations—one emphasizing connectivity, the other pattern and design. Such multilingual reflection supports deeper conceptual understanding, showing that linguistic diversity enriches, rather than confuses, cognitive structure.

In cognitive-linguistic terms, these processes confirm that terminology does not merely label existing knowledge but actively **constructs mental representation**. As Evans and Green (2006)[4] explain, lexical meaning is encyclopedic rather than dictionary-like: every term invokes a network of experiences, schemas, and associations. In IT, this means that terms like *firewall* or *interface* not only designate technical entities but also activate broader schemas of *protection*, *boundary*, and *interaction*. Effective terminology teaching, therefore, must engage with these cognitive associations rather than treat vocabulary as neutral code.

Finally, IT terminology functions as a tool for **disciplinary meaning-making**—the process by which professional communities construct shared epistemologies through language. Richards (2015) notes that within IT subfields, language choices encode epistemic values: programmers emphasize logical precision, network engineers prioritize connectivity, and educators focus on usability and comprehension. Each discipline develops its own **semantic frame** (Faber & León-Araúz, 2016[5]), shaping how members perceive problems and define solutions. This disciplinary framing also explains why terminological mediation is crucial in interdisciplinary projects: without awareness of differing semantic frames, collaboration risks misalignment at the conceptual level.

This study has demonstrated that Information Technology terminology is not a neutral or purely technical system of labels but a cognitively and disciplinarily

[4] Evans, V., & Green, M. (2006). *Cognitive linguistics: An introduction*. Lawrence Erlbaum Associates.
[5] Faber, P., & León-Araúz, P. (2016). Specialized knowledge representation and the lexicon: Representational modules and structures. *Frontiers in Psychology, 7*, 492.

constructed phenomenon. Through the lenses of Conceptual Blending Theory, mental model theory, and cognitive semantics, it becomes evident that IT terms emerge from human efforts to conceptualize abstract, invisible processes by mapping them onto familiar experiential domains. At the same time, the analysis has shown that these same cognitive mechanisms can generate semantic variability and terminological ambiguity. Differences in disciplinary focus—such as programming, user experience design, network engineering, or education—activate distinct mental spaces within the same terminological forms, leading to divergent interpretations. This confirms that terminological meaning is shaped not only by technical definition but also by epistemic values and professional practices embedded in specific communities.

Furthermore, the discussion of mental models highlights the formative role of terminology in shaping how learners and professionals reason about technological systems. IT terms serve as linguistic scaffolds that guide expectations, problem-solving strategies, and conceptual understanding. In multilingual contexts, cross-linguistic comparison of terminology enriches these mental models, promoting cognitive flexibility and deeper conceptual awareness rather than confusion. This finding is particularly significant for educational settings and for societies operating in multilingual digital environments.

In conclusion, the findings reinforce the view that IT terminology actively constructs knowledge rather than merely naming it. Effective terminological practice—especially in education and interdisciplinary collaboration—therefore requires attention to cognitive associations, metaphorical structures, and disciplinary frames. Recognizing the cognitive and epistemic dimensions of IT terminology can contribute to clearer communication, improved learning outcomes, and more productive collaboration across technological and linguistic boundaries.

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