

From Universal Grammar to Universal Didactics: Theoretical Foundations and Pedagogical Perspectives

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Abstract:

This article explores the concept of Universal Didactics (UD) in foreign language teaching by articulating linguistic theory and cognitive constraints. Drawing mainly on Chomsky's Universal Grammar, it examines how language acquisition is governed by inherent cognitive limits, structured hierarchically and progressively. The study reviews second language acquisition research, emphasizing interlanguage development, input comprehensibility, interactional adjustments, and the role of attention (noticing) and cognitive load. UD is proposed as a framework identifying pedagogical invariants—such as structured progression, cognitive load management, form-meaning integration, feedback, and systemic coherence—without prescribing uniform methods. Methodologically, the article synthesizes theoretical, empirical, and cognitive approaches to formalize a model (UG/DU) linking linguistic constraints to teaching principles. The findings suggest that effective language pedagogy can provide a stable foundation for instructional design, especially in hybrid and technology-mediated environments.

Keywords: Universal Didactics, Universal Grammar, Second Language Acquisition, Cognitive Load, Language, Pedagogy, Pedagogical Invariants, UG/DU.

Introduction

For more than half a century, foreign language didactics has been situated between two theoretical poles whose tension still structures contemporary debates. On the one hand, there is the search for general principles capable of explaining the universal mechanisms of language acquisition; on the other hand, there is the plurality of sociolinguistic, cultural, and institutional contexts that shape pedagogical practices. From this observation emerges a fundamental epistemological question: should language teaching be conceived as a set of random strategies adapted to variable environments, or can it rely on a foundation of universal cognitive constraints that make it possible to rethink pedagogical practices?

The historical evolution of the field reveals an increasing fragmentation of explanatory models. Pedagogical structuralism, behaviorism, the communicative approach, the action-oriented perspective, task-based pedagogy, and more recently hybrid environments and adaptive digital systems have successively proposed frameworks for intervention linked to sometimes heterogeneous theories of learning. This methodological proliferation has encouraged innovation, but it has also generated conceptual instability. The absence of a unifying epistemological framework makes the evaluation of pedagogical practices difficult.

However, this plurality should not conceal a more fundamental observation: the learner, regardless of their sociocultural environment, is endowed with a biologically determined cognitive architecture. Since the generative revolution initiated by Noam Chomsky, language sciences have profoundly transformed our understanding of this architecture.

The theory of Universal Grammar (UG) proposed by Noam Chomsky maintains that the faculty of language is based on a set of invariant principles and limited parameters that structure observable linguistic diversity. This hypothesis, formulated notably in *Aspects of the Theory of Syntax* (1965), introduced a decisive break with empiricist and behaviorist conceptions of acquisition.

At the heart of the generative argument lies the poverty of the stimulus thesis: the linguistic data to which the child is exposed are insufficient, fragmented, and sometimes erroneous, yet acquisition leads to a structured and creative grammatical system. Such performance implies the existence of a prior mental organization. From this perspective, interlinguistic variation is not arbitrary; it exists within a constrained parametric space. The diversity of languages derives from a limited number of possible configurations within a shared cognitive system. Although generative linguistics has profoundly influenced language theory, its implications for language didactics have been only partially explored systematically. Second Language Acquisition (SLA) research has indeed mobilized generativist notions to analyze interlanguage, but the pedagogical transposition of these structural constraints remains fragmentary. At the same time, emergentist and usage-based approaches have challenged the idea of an innate universal grammar, emphasizing mechanisms of statistical learning, frequency of forms, and the role of social interaction. Nevertheless, even these perspectives implicitly recognize the existence of cognitive limits: working memory is finite, attention is selective, and the simultaneous processing of multiple sources of information is cognitively costly.

Thus, despite the divergence of theoretical frameworks, one point of convergence emerges: language learning cannot be unlimited or completely flexible. It is constrained by human cognitive architecture. This observation opens a fruitful theoretical space for didactics. If language functions according to principles of computational economy and if learning depends on limited attentional resources, then pedagogical engineering cannot be designed independently of these constraints.

Stephen Krashen's theory of comprehensible input emphasized the importance of an optimal gap between current competence and linguistic exposure. Michael Long's interaction hypothesis demonstrated that negotiation of meaning facilitates the adjustment of input. Richard Schmidt's concept of noticing (1990) explains that a learner cannot acquire a linguistic form unless they consciously notice it in the input. In other words, this concept demonstrated that attentional awareness is a condition for the integration of forms. Research on cognitive load has shown that informational overload prevents durable learning. These contributions, although originating from distinct traditions, converge toward a structuring idea: pedagogical effectiveness depends on common fundamental cognitive mechanisms.

At the same time, contemporary didactics places great importance on context, differentiation, and flexibility. The integration of digital technologies, especially in hybrid learning environments, multiplies supports, semiotic modalities, and interactions. This richness, if not regulated, may conflict with the learner's cognitive limits. Multimodality, information density, and task simultaneity may produce cognitive overload incompatible with deep processing of linguistic structures.

It is within this space of tension between cognitive universality and pedagogical diversity that the present contribution is situated. The central hypothesis defended here is that language didactics can be rethought from the perspective of constrained universality. The aim is not to postulate the existence of a universal method applicable identically to all contexts, but rather to identify what is common or universal among learners from diverse backgrounds in order to make use of it in language teaching and learning situations.

This proposal leads to the formulation of the concept of Universal Didactics (UD). By Universal Didactics, we mean a theoretical framework identifying pedagogical invariants derived from linguistic and cognitive constraints. These invariants do not prescribe a single content, but rather define what is common. They concern, in particular, the management of cognitive load, the hierarchical progression of structures, the articulation between form and meaning, the necessity of adaptive feedback, and the gradual integration of syntactic complexity.

While Noam Chomsky focused on an innate human faculty that he calls Universal and Generative Grammar, Jean Piaget and Lev Vygotsky (constructivists) refuted this idea by demonstrating that the child learns through the construction of knowledge and the continuous creation of new "schemas" to correct and construct new knowledge or information. However, no one can deny that there is a degree of truth in Chomsky's hypotheses. In other words, while one speaks of an innate (universal) grammar, the others contradict this view through arguments based on the observation of language acquisition in real contexts (Piaget). This means that didactics is closely linked to contributions from linguistics in general and psycholinguistics in particular.

The contribution of this article is twofold. First, it proposes a rigorous conceptual articulation between Universal Grammar and pedagogical engineering while avoiding reductionist simplifications. Second, it formalizes the notion of Universal Didactics by clearly distinguishing it from normative conceptions of a single universal method.

By proposing this articulation $UG \rightarrow UD$, we seek to move beyond the sterile opposition between universality and contextualization. Universality here is not synonymous with uniformity; rather, it refers to universal cognitive principles or processes that condition all variation. This means that the diversity of pedagogical practices may be situated within a didactic space structured by invariant principles. In other words, biologically speaking, all humans acquire their mother tongues in a remarkably short period of time (between two and four years), whether the language is Chinese, Arabic, French, or any other language. This suggests that learning may obey universal rules or principles.

The epistemological scope of this proposal goes beyond the strict framework of French as a Foreign Language (FLE). It invites us to rethink didactics as a scientific discipline

capable of integrating the findings of cognitive sciences without abandoning the complexity of educational situations. It also suggests that technopedagogical innovation should be evaluated not only in terms of novelty or engagement, but also in terms of cognitive compatibility.

In what follows, we will present the linguistic and cognitive foundations likely to support the hypothesis of Universal Didactics by confronting the contributions of generative linguistics and emergentist approaches. We will then propose a detailed conceptual formalization of the UG → UD model.

I. Linguistic and Cognitive Foundations of Constrained Universality

The hypothesis of Universal Didactics can only be sustained if it is firmly grounded in a theory of language and in a rigorous understanding of human cognitive architecture. It requires a double clarification: on the one hand, the nature of the linguistic constraints identified by theoretical linguistics; on the other hand, the way these constraints interact with the learning mechanisms described by cognitive psychology and second language acquisition research. This articulation is not self-evident. It requires moving beyond doctrinal oppositions in order to identify a common core of principles capable of grounding a coherent didactic model.

1. Universal Grammar: Principles, Parameters, and Computational Economy

The theory of Universal Grammar represents a break with empiricist models according to which language is acquired exclusively through association or imitation. By postulating a specifically human language faculty structured by invariant formal principles, generative linguistics redefined the question of acquisition. The poverty of the stimulus argument remains central: the child succeeds in constructing hierarchical syntactic representations from partial input, which implies the existence of prior constraints guiding the interpretation of data.

The principles-and-parameters model introduced a modular conception of linguistic variation. Principles constitute properties common to all languages, such as the structural dependency of syntactic rules or the hierarchical organization of constituents. Parameters define points of binary or restricted variation, for example the order of syntactic heads or the presence of a null subject. This architecture explains how a diversity of linguistic systems can emerge from a shared foundation.

The minimalist program fits within this framework, as it seeks to understand how language functions by attempting, as much as possible, to determine linguistic functioning with the least effort and in the simplest and most economical way possible. Language is understood as a system that, through an effort of economy, attempts to achieve the maximum effect with minimal effort.

An operation called Merge (Noam Chomsky, 1995) establishes combinations of words within structures organized into sentences. This sentence construction relies both on economic constraints and on relations with thought and with two competencies: perception and production, that is, hearing and speaking. This idea of economy is essential in teaching because it shows that language complexity does not appear as an unstable construction but

rather follows logical structures that allow processing and integration, whether in the learning of new words or new structures of expression.

2. Emergentist Critiques and Implicit Convergences

Usage-based and emergentist approaches have challenged the existence of an innate universal grammar, emphasizing instead the role of frequency, statistical regularities, and social interaction in the structuring of language. According to this perspective, linguistic constructions gradually emerge from usage. Grammar is viewed as a set of abstract schemas derived from frequent patterns.

This critique helped rebalance the debate by highlighting the importance of input, contextual variation, and general learning mechanisms. However, it does not eliminate the question of constraints. Connectionist models, for example, recognize that learning depends on specific computational architectures. Likewise, statistical learning presupposes limited and structured processing capacities.

Thus, the disagreement between generativism and emergentism concerns less the existence of constraints than their ontological status. For the first tradition, constraints are language-specific and biologically determined; for the second, they result from general learning mechanisms. In both cases, the idea of unlimited malleability is rejected. Language remains bounded by structural limits.

This implicit convergence opens a space for synthesis. Universal Didactics does not require exclusive adherence to a strongly innatist ontology. It simply assumes that language learning takes place within a framework of identifiable cognitive constraints.

3. Second Language Acquisition: Interlanguage and Restructuring

Research in second language acquisition has provided crucial empirical data for understanding the dynamics of adult learning. The concept of interlanguage describes an intermediate system possessing its own internal coherence. Learners' errors are not random; they reflect structured hypotheses about the target language.

Long-term studies have shown that certain developmental sequences remain relatively stable across contexts. Grammatical structures are acquired in a predictable order, independently of explicit teaching. This phenomenon suggests the existence of constrained internal developmental processes.

The comprehensible input hypothesis emphasized the necessity of exposure slightly above the learner's current level of competence. The interaction hypothesis demonstrated that negotiation of meaning facilitates adjustment and restructuring. The noticing theory, proposed by Richard Schmidt in the 1990s, highlighted that conscious attention to forms conditions their durable integration.

These studies converge toward a fundamental principle: learning is optimal when input is structured in a way that respects the learner's processing capacities and developmental stages.

4. Cognitive Constraints: Working Memory and Cognitive Load

Cognitive sciences provide complementary insights. Working memory has limited capacity. The simultaneous processing of multiple pieces of information increases intrinsic

and extraneous cognitive load. If this load exceeds available resources, learning is compromised.

Cognitive Load Theory distinguishes between intrinsic load related to task complexity, extraneous load related to information presentation, and germane load associated with schema construction. Effective pedagogical engineering seeks to reduce extraneous load and optimize germane load.

In language learning, this implies segmenting complex structures, avoiding unnecessary multimodality, and introducing grammatical elements progressively and gradually. Information overload, frequent in digital environments, may hinder syntactic automatization.

5. Toward a Synthesis: Constraint, Hierarchization, and Progressivity

All these contributions make it possible to identify three transversal principles. The first is constraint: language and its acquisition are structured by cognitive limitations. The second is hierarchization: syntax functions according to structural dependencies, and learning progresses through gradual restructuring. The third is progressivity: complexity must be introduced according to a sequence compatible with processing capacities.

These principles invite reflection on a framework defining the notion of Universal Didactics. They prescribe neither specific content nor uniform methods; instead, they define a space of cognitive compatibility. Just as linguistic variation is constrained by a limited number of parameters, pedagogical variation may also be constrained by a set of limitations resulting from learners' mental processes and functioning.

Furthermore, all theories of acquisition or learning refer to the learner as a "human being" and never specifically evoke the nature of their language. This could suggest that human nature itself is universal and that reflection on the universality of didactics may further explain the field of language teaching and learning. Thus, some authors, such as Nathalie Rauzduel-Lambourdière (2007), explain that "articulated language is a universal faculty specific to humankind." Such statements highlight the universal anthropological dimension of human language.

II. Conceptual Formalization of Universal Didactics: From Linguistic Constraints to Pedagogical Invariants

While the previous sections established that language and its acquisition are governed by structural and cognitive constraints, it remains necessary to demonstrate how these constraints can be translated into operational principles for didactics. The transition from theoretical linguistics to pedagogical engineering cannot be achieved through simple analogy. It requires rigorous conceptual formalization capable of avoiding abusive simplifications or mechanistic transpositions. The Universal Didactics proposed here neither claims to derive pedagogical practices directly from grammatical theory nor to impose methodological homogenization. Rather, it seeks to identify invariants compatible with human cognitive architecture, capable of structuring pedagogical variation without eliminating it.

1. Definition and Epistemological Status of Universal Didactics

Universal Didactics may be defined as an integrative theoretical framework aimed at identifying invariant pedagogical principles derived from cognitive and linguistic constraints

highlighted by scientific research. It does not correspond to a method in the prescriptive sense of the term, but rather to a matrix for evaluating the cognitive compatibility of teaching systems.

Its epistemological status is that of an intermediate model. It stands between fundamental linguistic theory and concrete pedagogical application. It operates at a meta-didactic level, proposing criteria for evaluating the internal coherence of a teaching system in relation to learning mechanisms. This position avoids two pitfalls: on the one hand, excessive abstraction that would leave didactics without empirical grounding; on the other hand, contextual pragmatism lacking cumulative theoretical foundations.

Universal Didactics is based on the idea that, just as linguistic diversity is constrained by a limited parametric system, the diversity of pedagogical practices can be structured by a restricted set of general constraints. These constraints do not prescribe content but define minimal conditions of compatibility with cognitive functioning.

First Invariant: Hierarchy and Spiral Progression

In grammar, sentences are not simple sequences of words but structures whose elements depend on one another. It is not sufficient to present words one by one for them to be effectively learned.

Spiral progression consists of learning simple elements before increasing structural complexity. For example, before learning sentences containing subordinate clauses, learners must first master agreement rules and dependency relations. Learning therefore progresses step by step while regularly revisiting previously acquired knowledge in increasingly complex situations. This process promotes memorization without saturating the learner's cognitive resources.

Second Invariant: Explicit Management of Cognitive Load

Research on cognitive load demonstrates that excessive extraneous load hinders the durable integration of knowledge. Applied to language didactics, this implies that the design of materials and tasks must limit elements irrelevant to the targeted linguistic objective.

Multimodality, although enriching, must be regulated. The simultaneous superposition of images, sounds, texts, and interactions may divert attention away from targeted morphosyntactic structures. Universal Didactics therefore presupposes semiotic coherence: each modality must serve the linguistic objective rather than dilute it.

Content segmentation also constitutes a strategy for reducing cognitive load. Presenting complex structures in progressive units helps maintain intrinsic load at a level compatible with processing capacities. This segmentation does not oversimplify the content to the point of distortion; rather, it distributes complexity over time.

Third Invariant: Managing Cognitive Load

When we learn, too much information at the same time exhausts the brain and prevents retention. In a language class, it is therefore essential to limit unnecessary overload.

Different supports may be used (images, sounds, texts), but each must have a useful function related to the target language, whether through segmentation or rhythm modulation.

Similarly, dividing content into smaller sequences can help avoid overloading the learner. This does not necessarily make the course easy, but it reduces difficulty over time and facilitates long-term comprehension.

Fourth Invariant: Linking Form and Meaning

Grammatical rules are also rules of meaning. Grammar should not be learned in isolation, separated from communication. Form-focused exercises and communicative activities must therefore be associated.

The learner must be able to understand rules through contextualized situations: learning occurs through action. Feedback is an integral part of the acquisition process because it reveals what is incorrect while allowing interaction to continue. Correction must therefore be implemented at the appropriate moment and within the appropriate context.

Pedagogical differentiation, often justified by motivational considerations, finds here a cognitive legitimacy. Its aim is to align linguistic exposure with each learner's zone of proximal development. Hybrid learning environments may facilitate this adjustment through adaptive pathways. Nevertheless, this adaptation must remain compatible with principles of cognitive load management and structured progression.

Fifth Invariant: Economy and Systemic Coherence

The principle of economy derived from the minimalist program may be interpreted didactically as a requirement for systemic coherence. An effective pedagogical system avoids unnecessary redundancy and methodological contradictions. Objectives, activities, and evaluations must remain aligned.

Such coherence reduces extraneous cognitive load and facilitates the construction of stable schemas. When instructions, materials, and assessment criteria are coherent, learners can concentrate their attentional resources on linguistic processing itself.

7. Systemic Modeling of the UG → UD Framework

The articulation UG → UD may be represented as a process of constrained transposition. At the level of theoretical linguistics, structural principles define the space of possible grammatical systems. At the cognitive level, attentional and mnemonic limits regulate processing. Universal Didactics operates as a filter translating these constraints into pedagogical engineering criteria.

This systemic modeling does not eliminate contextual variation. Thematic content, cultural supports, and technological modalities may vary. However, their internal organization must respect the identified invariants. Pedagogical diversity is thus conceived as variation within a constrained framework, analogous to the parametric variation of languages.

Conceptual Scope and Limitations

It must nevertheless be emphasized that Universal Didactics does not constitute proof of strong innatism associated with Universal Grammar. It rests on a pragmatic convergence: regardless of the origin of constraints, such constraints exist. The model therefore remains open to adjustments resulting from future research, particularly in neurolinguistics and social cognition.

Moreover, this framework does not imply abandoning the affective and sociocultural dimensions of learning. It merely proposes that these dimensions be integrated without contradicting fundamental cognitive requirements.

General Conclusion

Foreign language didactics has long developed within a tension between contextual innovation and the search for stabilizing principles. Contemporary methodological diversity demonstrates the vitality of the field of language teaching and learning, but it also reveals a theoretical fragmentation capable of weakening the cumulative scientific foundations of the discipline.

This article proposed to reconfigure this tension through a principle of constrained universality. By articulating contributions from generative grammar, emergentist approaches, and cognitive sciences, we argued that language teaching and learning operate within a framework structured by cognitive limitations and hierarchical principles. These constraints, regardless of their exact ontological status, delimit the space of pedagogical systems compatible with the social, psychological, and contextual condition of human beings.

Beyond the framework of French as a Foreign Language (FLE), this proposal opens interdisciplinary perspectives. It invites stronger dialogue between theoretical linguistics, cognitive psychology, educational sciences, and educational engineering. In a context increasingly dominated by digital environments and artificial intelligence, the question of cognitive compatibility becomes crucial. A technology that is pedagogically innovative but cognitively incompatible risks producing confusion rather than learning.

Ultimately, universality in didactics should not be understood as uniformity, but rather as reflection on a common foundation capable of organizing variation. Just as linguistic diversity exists within a limited parametric space, pedagogical diversity may also be conceived as variation within a constrained framework.

Future comparative, longitudinal, and interdisciplinary research will make it possible to test the robustness of the UG → UD model and clarify its contours. If these investigations confirm its relevance, Universal Didactics could provide a stabilizing theoretical foundation for language didactics in the age of educational complexity.

Bibliographie

ABDELILAH-BAUER, B. (2006). *Le défi des enfants bilingues : Grandir et vivre en parlant plusieurs langues*. Paris : La Découverte.

ANCTIL, D. (2005). *Maîtrise du lexique chez les étudiants universitaires : Typologie des problèmes lexicaux et analyse des stratégies de résolution de problèmes lexicaux*. Université de Montréal.

BARE DE MIGNIAC, C. (1996). *Vers une didactique de l'écriture*. Paris : De Boeck.

BARKAT, M., & LEFRANC, Y. (1997). *La boîte à outils de l'assistant de français au Royaume-Uni*. Londres : Ambassade de France.

BAUTIER, E. (1995). *Pratiques langagières, pratiques sociales*. Paris : L'Harmattan.

BEACCO, J.-C. (2007). *L'approche par compétences dans l'enseignement des langues*. Paris : Didier.

- BEAUDET, C. (2015). Littéracie universitaire, patchwriting et impéritie. *Le français aujourd'hui*, 2015/3(190), 99-114.
- BERWICK, R. C., & CHOMSKY, N. (2016). *Pourquoi nous seuls : langage et évolution* (Trad. française). Paris : Seuil.
- CHOMSKY, N. (1971). *Aspects de la théorie syntaxique* (J. Bacot & P. H. Mounin, Trad.). Paris : Seuil.
- CHOMSKY, N. (1995). *La connaissance du langage : sa nature, son origine et son usage* (J. Bacot, Trad.). Paris : Seuil. Chomsky, N. (1995). *Le programme minimaliste* (P. H. Mounin, Trad.). Paris : Seuil.
- GAULENE, M. (2021). Anthropologie linguistique : le tournant sémiotique. *Langage & société*, 172, 267-269. <https://doi.org/10.4000/lhomme.48046>
- PIAGET, J. (1965). *Le langage et la pensée chez l'enfant* (3e éd.). Neuchâtel
- PINKER, S. (2013). *L'instinct du langage : Comment l'esprit crée le langage* (M.-F. Desjeux, trad.). Paris : Odile Jacob. (Œuvre originale publiée en 1994).
- VYGOTSKY, L. S. (1985). *Pensée et langage* (Trad. française). Paris : Éditions Sociales.