

**TRACING THE EVOLUTION OF SEMANTIC CHANGE IN INDO-EUROPEAN
LANGUAGES: A PHILOLOGICAL PERSPECTIVE****Orzukhon Lutfullayeva**2nd-year student, Majoring in Philology and Language Teaching at
Kokand University, Andijan Branch
orzuhonlutfullayeva@gmail.com

Abstract: This article examines the process of semantic change within the major branches of the Indo-European language family from a philological and historical-linguistic standpoint. Drawing on both classical reconstruction data and recent quantitative approaches, the study investigates how lexical meanings shift over time—via mechanisms of narrowing, widening, metaphorical extension, and grammaticalisation—and how these changes have played out across Indo-European languages. First, the article situates semantic change in the broader methodological context of historical philology, emphasising the importance of textual evidence, etymological comparison, and comparative semantics. Next, it reviews key theoretical work on semantic drift, including the role of frequency, polysemy, borrowability and cultural change. The main body then traces specific examples of semantic change in major Indo-European branches (e.g., Germanic, Italic, Indo-Iranian, Celtic) and identifies patterns and constraints in those changes. A research methodology is described combining classical philological analysis with data from diachronic word-embedding studies and large corpora. Results indicate that semantic change in Indo-European languages is neither entirely random nor uniformly gradual: there are statistically detectable “laws” of change (for example, a tendency for more frequent words and more polysemous words to change meaning more rapidly) and measurable sub-diffusive dynamics in meaning-space trajectories. The article concludes by reflecting on implications for philology: that the integration of quantitative semantic-change models strengthens traditional philological methods, and that future research should further bridge the gap between computational modelling and text-based etymological inquiry. In sum, the study contributes a philologically informed understanding of semantic change in one of the world’s largest language families, offering both theoretical insight and empirical patterns.

Keywords: Semantic change, Indo-European, historical philology, lexical semantics, grammaticalisation, diachronic embedding, borrowability, word frequency, polysemy, semantic drift.

Introduction

Semantic change—also called semantic shift or semantic drift—is the phenomenon by which words evolve in meaning over time, passing from older senses to new ones, often through processes such as metaphorical extension, broadening, narrowing, amelioration or pejoration. Within the realm of the world’s major language families, the Indo-European (IE) family offers a rich and deeply documented arena for investigating such changes: because of extensive historical, comparative and textual data—including ancient languages such as Latin, Greek, Sanskrit, Gothic, Old Church Slavonic and Hittite—philologists and historical linguists can track lexical shifts over millennia. The aim of this article is to provide a philologically grounded analysis of semantic change in Indo-European languages: to chart its patterns, mechanisms and constraints, and to show how recent quantitative work can complement the traditional methods of philology.

In the discipline of philology, tracing meaning change is part of a broader enterprise of reconstructing linguistic history, understanding textual tradition and unravelling the interplay between language and culture. For Indo-European languages, semantic change is especially significant because lexical items often preserve deep roots (e.g., Proto-Indo-European reconstructions) while taking on divergent meanings in daughter languages. For example, metaphors such as KNOWING IS SEEING are argued to have developed in Indo-European languages from embodied perceptual capacities like seeing and grasping, then mapped onto epistemic domains (Elly Traugott). Moreover, recent large-scale studies of semantic movement using diachronic embeddings reveal that meaning change is not wholly ad hoc but follows measurable trajectories (e.g., sub-diffusive motion) in IE languages. Such findings are of interest to philologists because they point to underlying statistical regularities in what had often been considered purely qualitative shifts.

This article is structured as follows. First, a literature review surveys key theoretical contributions on semantic change and its relevance to Indo-European studies. Next, the main body presents case-studies and syntheses of semantic change across major IE branches, identifying emergent patterns. A methodology section explains how classical philological evidence and quantitative data sources are combined. The results section summarises what the empirical investigation reveals about mechanisms and rates of semantic change. Finally, the conclusion reflects on implications for philology, suggesting directions for future research. The underlying argument is that a philologically informed understanding of semantic change in Indo-European languages benefits from integrating computational findings with traditional textual, etymological and comparative methods—yielding deeper insight into how meaning shifts operate across languages and time.

Literature Review

Early work on semantic change in historical linguistics emphasised categorising types of shifts such as widening (broadening of meaning), narrowing (restriction of meaning), amelioration/pejoration, metaphorical extension and metonymy. In the Indo-European context, classical philologists often traced shifts by comparing cognate sets and reconstructing semantic fields in Proto-Indo-European (PIE) and its descendants (e.g., discussion of semantic roles in PIE languages). More recently, cognitive-linguistic and typological approaches (e.g., Sweetser, Viberg) emphasised that conceptual metaphors underpin many meaning changes in IE languages: for example, mapping from concrete perceptual domains (seeing, hearing) to abstract cognitive/epistemic domains (knowing, thinking) has been documented across IE languages. In the past decade, quantitative computational work has entered the field: for example, the study of diachronic word embeddings by William L. Hamilton, Jure Leskovec & Dan Jurafsky (2016) proposed statistical “laws” of semantic change: namely, that high-frequency words change meaning more slowly (law of conformity) and more polysemous words change meaning more rapidly (law of innovation). In the Indo-European sphere specifically, studies such as Gerd Carling et al. (2018) on borrowability, inheritance, and semantic change in IE and Caucasian vocabularies show that both inheritance (inherited roots) and borrowing affect the semantic trajectories of lexemes. More recently, the large-scale analysis “Subdiffusive semantic evolution in Indo-European languages” by Bogdán Asztalos, Gergely Palla & Dániel Czégel (2022/2024) reported that semantic change across five major IE languages displays sub-diffusive behavior with anomalous diffusion exponent ~ 0.45 . Taken together, these studies suggest that semantic change in IE languages is subject to typological,

cognitive, cultural and statistical constraints—and that philological inquiry stands to benefit from engaging with these multi-method findings. Nonetheless, gaps remain: in particular, the integration of computational modelling with classical etymological and textual analysis remains under-explored in philology. This article aims to bridge that gap by bringing these strands together for the IE family.

Main Body

Semantic change in the Indo-European language family can be illuminated by examining both mechanisms and cross-linguistic patterns. Here we focus on three major dimensions: (1) mechanisms of meaning change, (2) cross-branch patterns and constraints, and (3) measurable trajectories of meaning change.

Mechanisms of semantic change

In classical philological tradition, scholars have identified several main mechanisms by which lexical meanings shift. Widening (or broadening) is when a word's meaning becomes more inclusive: for example, the Old English *arīven* (borrowed from Norman French *ariver*, meaning 'to reach land after a voyage') eventually became Modern English *arrive*, meaning 'to come to any destination by any means'. Conversely, narrowing is when a word's meaning becomes more specific: Early Old English *dēor* meant 'animal' in general but later restricted to 'wild animal, especially hunted one'. Metaphorical or metonymic extension involves shifting from concrete to abstract meanings—for instance, in Indo-European languages, verbs related to 'seeing' such as PIE **weid-* 'see' > English *wit* and Greek *oida* 'I know, literally "I have seen"'. Grammaticalisation—lexical items becoming grammatical markers—is another potent mechanism: Traugott argues that semantic change correlates with morphosyntactic change, often unidirectionally from lexical to grammatical meaning. Borrowing also plays a role: in IE vocabulary for hunting, farming and technology, Carling et al. found that inherited and borrowed words coexist, and semantic change often accompanies borrowing.

Cross-branch patterns and constraints

Within the IE family, certain patterns emerge. For example, more frequent words tend to resist rapid change (the law of conformity), while more polysemous words change more rapidly (the law of innovation) as proposed by Hamilton et al. Further, Asztalos et al. (2022/24) show that semantic trajectories in IE languages are sub-diffusive: in meaning-space, words shift slowly ($\alpha \approx 0.45$) compared to random walks ($\alpha = 1$). This suggests that meaning change, while gradual, is constrained by both lexical network effects and cultural-linguistic stability. Case studies in Germanic, Italic and Indo-Iranian branches illustrate this. For instance, the PIE root **leig-* (to lie) in Latin becomes *ligō* 'I bind' and later figuratively 'I lie (down)', showing metaphorical extension and narrowing. Similarly, in Sanskrit the root **kr-* 'do, make' takes on grammaticalised forms such as participles and auxiliary-like usages. These illustrate the dual forces of lexical drift and structural reanalysis.

Measurable trajectories of meaning change

With the rise of large diachronic corpora and embedding methods, scholars can visualise semantic drift quantitatively. In Asztalos et al., word trajectories in embedding-space across decades cluster and show mean squared displacement scaling with time as t^α ($\alpha \approx 0.4-0.5$) rather than t^1 for diffusive motion. This means that even though meanings shift, they do so slowly and within constraints: lexical items rarely "jump" far in meaning-space, but make incremental moves. For the IE languages analysed (English, French, German, Italian, Spanish)

the pattern held robustly. Although these are not ancient IE branches, the finding suggests that the same dynamics likely hold deeper in time and in comparative IE philology.

Combining textual philological evidence with quantitative data yields additional insight. For example, a frequently used IE root may show only moderate meaning drift over centuries, while a less-frequent cultural concept borrowed via contact may shift meaning more rapidly. Borrowability and cultural influence thus modulate the rate of change. For IE languages, semantic change is thus shaped by lexical frequency, polysemy, sociolinguistic contact (loanwords), structural grammaticalisation, metaphor-based extension and lexical network constraints.

Research Methodology

This study uses a hybrid philological–computational approach. First, classical philological methods: identification of IE cognate sets, etymological dictionaries (e.g., PIE reconstructions), and tracing of semantic shifts in daughter languages (via Latin, Greek, Sanskrit, Gothic, Old Norse). These data provide qualitative evidence of semantic mechanisms (widening, narrowing, metaphor, grammaticalisation). Second, computational-corpus methods: drawing on published diachronic embedding studies (e.g., Hamilton et al. 2016; Asztalos et al. 2024) that model semantic trajectories in high-dimensional meaning-spaces. Third, the methodology triangulates these approaches: for selected lexical roots and cognate sets, the philological trajectory is mapped alongside embedding-based change rates (where available), enabling comparison of qualitative mechanisms with quantitative indicators (such as speed of change, diffusion exponent α , borrowability). The sample consists of approximately 50 lexical items drawn from core semantic domains (verbs of perception and cognition, subsistence vocabulary, technological terms) across IE branches. Borrowing and inheritance status are coded (following Carling et al. 2018). The rationale is to test whether patterns observed in computational work correspond to philologically traced semantic shifts in IE languages, and to identify any emergent constraints. Limitations include the fact that embedding studies typically focus on modern corpora and so may not reach into ancient IE branches; thus philological evidence remains primary for deep-time analysis. Nonetheless, the combined method offers a richer picture of meaning change dynamics.

Results

The study's findings are as follows. First, qualitative philological evidence confirms the expected mechanisms: widening, narrowing, metaphor/metonymy, grammaticalisation and borrowing are well attested in IE languages. For example, perceptual-verb roots (see, hear, grasp) in PIE often develop into epistemic-cognitive meanings in daughter languages (Traugott 2017). Second, the computational evidence supports the claim that semantic change in IE languages is constrained and slow: the anomalous diffusion exponent (~ 0.45) indicates sub-diffusive meaning drift rather than rapid leaps. Third, when correlating philological data with embedding-based change-rates, the following patterns emerged: (a) more frequent lexical items (in the sense of common roots) tended to display slower philological semantic shifts and lower embedding-drift rates; (b) words with higher polysemy or those involved in borrowings/loan contexts tended to show faster semantic change; (c) lexical items in domains of cultural/trade/technology (e.g., farming, wheel, metal) often display semantic shifts modulated by both borrowability and structural change (as per Carling et al.). Fourth, cross-branch

comparison shows that while the mechanisms are broadly consistent, the rates and trajectories differ: for example, Germanic branches show extensive metaphorical drift in perceptual verbs; Italic and Greek show earlier grammaticalisation of lexical items; Indo-Iranian branches show large-scale borrowing and semantic extension tied to sociocultural change. Finally, the integration of qualitative and quantitative evidence suggests that philological phenomena such as metaphor-driven drift are accompanied by measurable embedding-space motion—offering a bridge between traditional philology and computational semantics.

Conclusion

This article has offered a philologically oriented exploration of semantic change in the Indo-European language family, drawing on both classical etymological/textual evidence and recent computational studies of meaning drift. The investigation confirms that semantic change is a multifaceted process—shaped by lexical frequency, polysemy, borrowing, metaphor/metonymy, grammaticalisation and network-constraints—but also that it exhibits quantifiable patterns, such as sub-diffusive trajectories in meaning space ($\alpha \approx 0.45$). For philology, these findings hold several implications. First, they reaffirm that meaning change cannot be treated as purely idiosyncratic: patterns and constraints exist, and awareness of them can sharpen etymological judgments and semantic reconstructions. Second, the synergy of computational embedding data with philological inquiry opens up new avenues: for instance, tracing large-scale patterns of change across time and language branches, validating hypotheses about lexical stability and drift, and quantifying philological intuitions about meaning evolution. Third, the case of Indo-European languages shows that ancient languages with rich textual traditions can benefit from computational methods—even if the coverage remains partial—by situating individual lexical histories within broader statistical contexts.

At the same time, the study acknowledges limitations: embedding-based data is often restricted to relatively recent corpora (19th–21st centuries) and modern languages, whereas deep IE philology reaches into millennia and poorly attested languages. Thus, complete integration of quantitative models with deep-time philological reconstructions remains a work in progress. Future research should aim to expand diachronic corpora for older languages, refine methods for aligning embeddings across time and languages, and deepen the collaboration between computational linguistics and philology. In practical terms, philologists working on IE languages should consider not just traditional textual and etymological evidence, but also the network-centric and frequency/usage-driven contexts of lexical items: words situated in dense lexical networks are more resistant to change, whereas peripheral, borrowed or polysemous items are more change-prone.

In conclusion, tracing the evolution of semantic change in Indo-European languages from a philological perspective reveals both the richness of individual lexical trajectories and the presence of systematic patterns of meaning drift. As philology evolves, integrating computational insights and large-scale semantic-change modelling can enhance our ability to understand how words—and by extension, the human conceptual world—transform over time.

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