The Timeline Chart and the Modeling Phase Space of the Voynich Research

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Abstract

In this paper, I provide a concise summary of the past century of the Voynich research in terms of a self-explanatory timeline chart. This demonstrates the main branches of research traits and their shifts. Besides, I also provide a feature chart of the Voynich manuscript displaying the hierarchal progression of its established properties and the pertinent constraints that adequate Voynich models and theories should fulfill.

The Voynich manuscript is considered the most mysterious manuscript ever written [Voynich_Beinecke, D'Imperio78, Schmeh11, Schmeh13]. In spite of its small size and 400+ years of known history, it long baffled erudite scholars and preeminent codebreakers as well. Its modern-day research period began in 1912, when Wilfrid M. Voynich purchased it and brought public attention about.

During the past century, a deluge of theories and decryption claims have been formulated. These render the Voynich text either meaningless or meaningful. The meaningless text hypothesis can further be divided into random gibberish or non-random gibberish options. Furthermore, the meaningful text hypothesis includes the "regular plaintext written in a natural language" and the ciphertext categories. As all statistical evidences are against the random gibberish scenario, I consider only the non-random gibberish hypothesis in the following. This way, we are left with three main categories concerning the possible nature of the Voynich text: meaningful ciphertext, meaningful plaintext written in a natural language, and the meaningless (non-random) gibberish scenario. These main categories are displayed on the x-axis of Figs. 1 and 2.

The early modern Voynich research period, involving some preeminent codebreakers, focused mainly on cryptological approaches [Newbold28, Feely43, Strong45, Friedman44-59, Tiltman51-68, Brumbaugh74-76, Levitov87], but all these efforts turned out inconclusive or wrong. As the age of Voynich parchments has not been determined in this early research period, Roger Bacon was still considered as a possible author [Newbold28, Feely43]. Interestingly, probable Voynich author [Rugg04, Daruka20, Altrideicktus24-25] and enthusiast collector of Bacon's works [James21, D'Imperio78], John Dee advocated Roger Bacon's authorship at a fevered pitch at the court of Emperor Rudolf II in Prague [D'Imperio78]. Parallel to the growing corpus of Voynich studies and codebreaking efforts, several Voynich transliterations were established. These were created by William R. Bennett, Prescott Currier, Jacques Guy, Gabriel Landini, René Zandbergen, Takeshi Takahashi, and Glen Claston [Zandbergen_VMS_Transliteration]. Some other works investigated the grammatical structure of the Voynich words [Stolfi00, Palmer14, Zattera22] and the statistical features of the Voynich text [Landini01]. Furthermore, Currier (1976) suggested the presence of two languages in the Voynich manuscript.

The first decade of the 21st century was dominated by the meaningless hoax hypothesis formulated by Rugg (2004) in terms of his table and grille model. This scenario was supported by Schinner (2007). The year 2009 marked a milestone in the Voynich research as the radiocarbon investigations revealed that the Voynich parchments were created in the first half of the fifteenth century (1404-38) [Sherwood15]. This finding clearly excluded the authorship of Roger Bacon.

In the past two decades, between 2010 and today, the focus of studies shifted toward the detailed investigation of statistical properties of the Voynich text. A remarkable fraction of contributions sided with the natural plaintext scenario [Hauer_Kondrak16, Bowern_Lindemann21, Lindemann22, Ponnaluri25]. However, other studies revealed line- and paragraph-position dependent graphemic properties in the Voynich text [Vogt12, Zandbergen21, Feaster22] suggesting the presence of a meaningful content, possibly conveyed by a polyphonic cipher [Feaster22]. Furthermore, the works of Amancio et al. (2013) and Montemurro and Zanette (2013) revealed highly elaborate statistical features that were also consistent with the presence of a meaningful content in the Voynich text.

The meaningless hoax hypothesis was further supported by the self-citation model of Timm (2014) and Timm and Schinner (2020). This method was able to reproduce the non-Brownian correlation behavior revealed by Schinner (2007) and later corroborated by Daruka (2020). This turned out a crucial, inherent feature of the Voynich text, serving as an *aqua fortis* for efficiently sorting out inadequate Voynich models.

In terms of further decryption efforts, Bax (2014) claimed partial decryption, Altrideicktus (2024, 2025) proposed a full decryption in terms of a polyphonic-homophonic cipher including medieval Latin abbreviations and word-ending truncations. In addition, Greshko (2025) suggested the possible presence of a Naibbe cipher in the Voynich text. However, this latter proposition could not account for the non-Brownian correlations [Schinner07].

Advancing Currier's (1976) two-language hypothesis, the paleographic analysis of Davis (2020) suggested the presence of five scribes in the Voynich manuscript. Based on these findings and comprehensive statistical-linguistic investigations, Altrideicktus (2025b) provided quantitative, clear-cut evidences for the presence of at least four dialects in the Voynich text. These evidences included remarkable discontinuities in the letter and syllable densities (frequencies) as well as in the hapax legomena distributions. These findings fully supported the inferences of Davis (2020) concerning the establishment of five writing styles in the Voynich manuscript [Altrideicktus25b]. I note here that Rugg and Taylor (2017) qualitatively observed some of these syllabic discontinuities and interpreted them in the framework of Rugg's (2004) table and grille method. However, this explanation could not account for the elaborate interplay of the involved syllable and hapax legomena densities, hinting at textual cohesion [Altrideicktus25b]. Based on his multilateral quantitative investigations, Altrideicktus (2025, 2025b) regarded these features as salient manifestations of encoding dialects, further supporting the (polyphonic) cipher scenario.

Besides the numerous investigations on the Voynich text, other studies aimed at the identification of plants displayed in the Voynich illustrations [O'Neill44, Tucker_Janick17]. However, these attempts did not turn out successful. Furthermore, the works of Altrideicktus (2024, 2025) and Brewer and Lewis (2024) suggested the presence of erotic contents concealed in the Voynich illustrations.

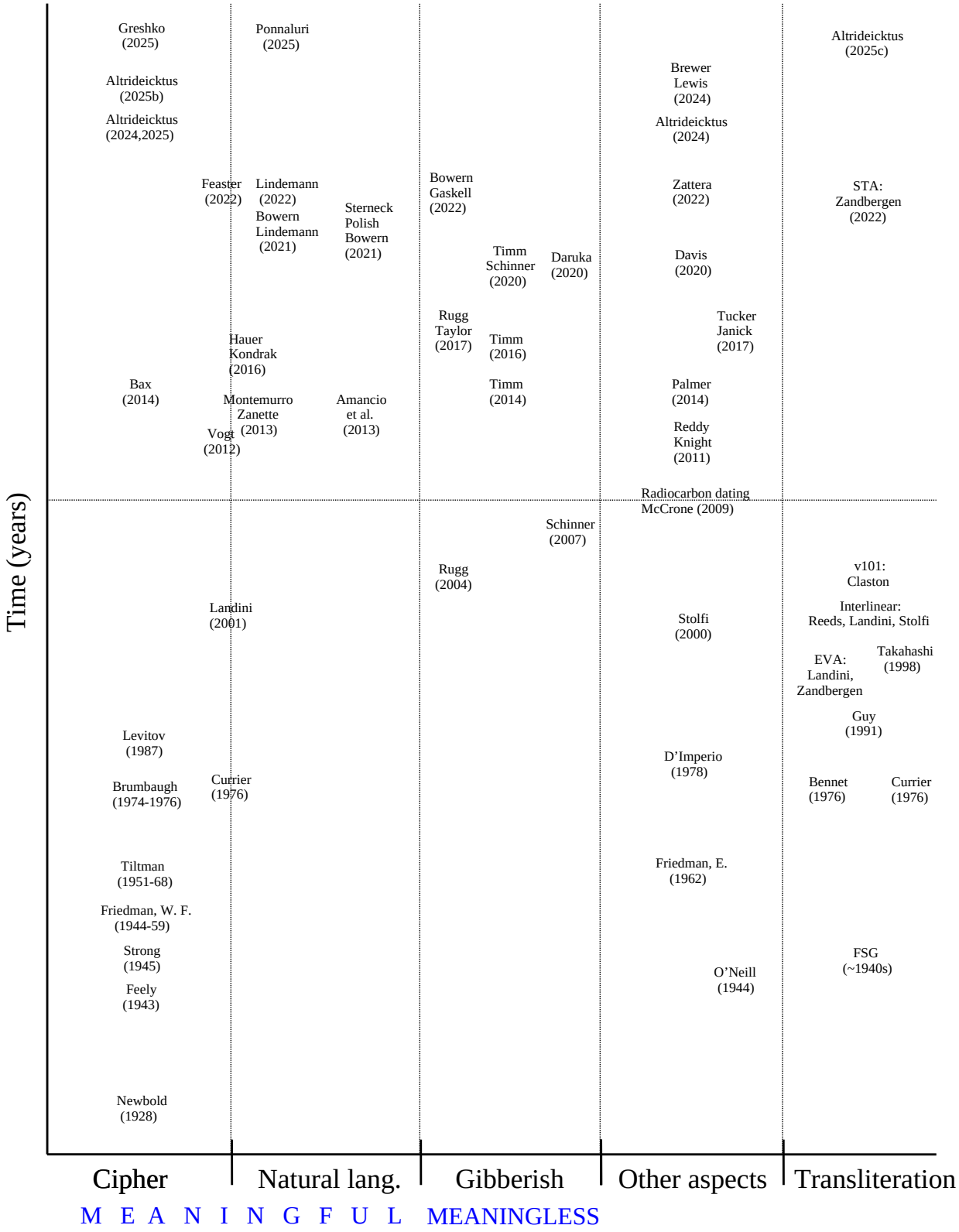

FIG. 1. TIMELINE CHART OF THE VOYNICH RESEARCH BASED ON SOME SALIENT WORKS.

Intriguingly, as demonstrated by all these diverse studies, the elusive, inherently complex *Voynich text exhibits statistical properties that are reminiscent of both a meaningless gibberish and a meaningful text.* This puzzling dichotomy fueled further research and rendered the semantic aspects inconclusive. Indeed, the vast corpus of Voynich studies established an elaborate, hierarchal web of statistical and linguistic features that adequate Voynich models should reproduce. In the following, I discuss these properties.

First, the Voynich text exhibits statistical features shared by regular texts written in natural languages. These include the Zipf's power-law scaling for the word-frequency-rank distribution [Landini01, Rugg17, Timm_Schinner20, Ponnaluri25, Altrideicktus25b], the related Heaps distribution [Ponnaluri25, Altrideicktus25b], and the decay traits of hapax legomena [Altrideicktus25b]. However, the works of Rugg (2017) and Timm and Schinner (2020) unequivocally demonstrated that these basic statistical properties can also be exhibited by meaningless texts. In addition, the word-length distribution of the Voynich words turned out a symmetric, quasi-binomial function [Reddy_Knight11]. This feature is not shared by European languages.

Concerning the next level of statistical-linguistic properties, Schinner (2007) and Daruka (2020) demonstrated the inherent presence of non-Brownian correlations in the Voynich text. This feature, signaling the presence of a self-citation mechanism in the Voynich text [Timm_Schinner20], turned out crucial, serving as an *aqua fortis* for efficiently sorting out inadequate Voynich models. Besides, positive autocorrelations in the consecutive word occurrences were demonstrated by Timm (2016), Timm and Schinner (2020), Daruka (2020), and Gaskell and Bowern (2022). These advanced statistical-linguistic properties are not shared by and prohibitive for regular texts written in natural languages.

In terms of textual inhomogeneities, other studies established the presence of line- and paragraph-position-dependent graphemic features [Vogt12, Zandbergen21, Feaster22]. Furthermore, the preliminary investigations of Rugg (2017) and the quantitative study of Altrideicktus (2025b) demonstrated the presence of remarkable discontinuities in the letter and syllable densities. This latter study also corroborated the earlier work of Davis (2020) indicating the presence of several writing styles (or the possible involvement of several scribes) in the Voynich manuscript. All these advanced textual features suggest that the Voynich text is not a meaningless gibberish. Furthermore, the textual inhomogeneities in the occurrences of the most informative Voynich words suggested the presence of thematic sections in the Voynich text [Montemurro_ Zanette13]. Besides, based on his investigations, Feaster (2022) raised the possibility that the Voynich text conveyed a polyphonic cipher.

Concerning the semantic aspects, the statistical and information-theory-based investigations of Montemurro and Zanette (2013) revealed the presence of semantic word-networks in the Voynich text. In addition, the elaborate interplay of the investigated syllable densities hinted at the presence of textual cohesion [Altrideicktus25b]. In terms of cryptological features, Altrideicktus (2025b) demonstrated the presence of strongly correlated and anti-correlated letter and syllable pairs in the Voynich text (in terms of their densities), as well as in the related Liber Loagaeth tables of John Dee [Dee_LL, Daruka20, Altrideicktus24-25]. This intriguing feature hinted at the presence of polyphonic encryption. Furthermore, based on a compact subset of his proposed polyphonic cipher key including medieval Latin abbreviations and word-ending truncations [Cappelli82], Altrideicktus (2025b-c) established a novel (full) Voynich transcription. Intriguingly, the resulting word-length distribution turned out asymmetric and consistent with those of regular Latin texts.

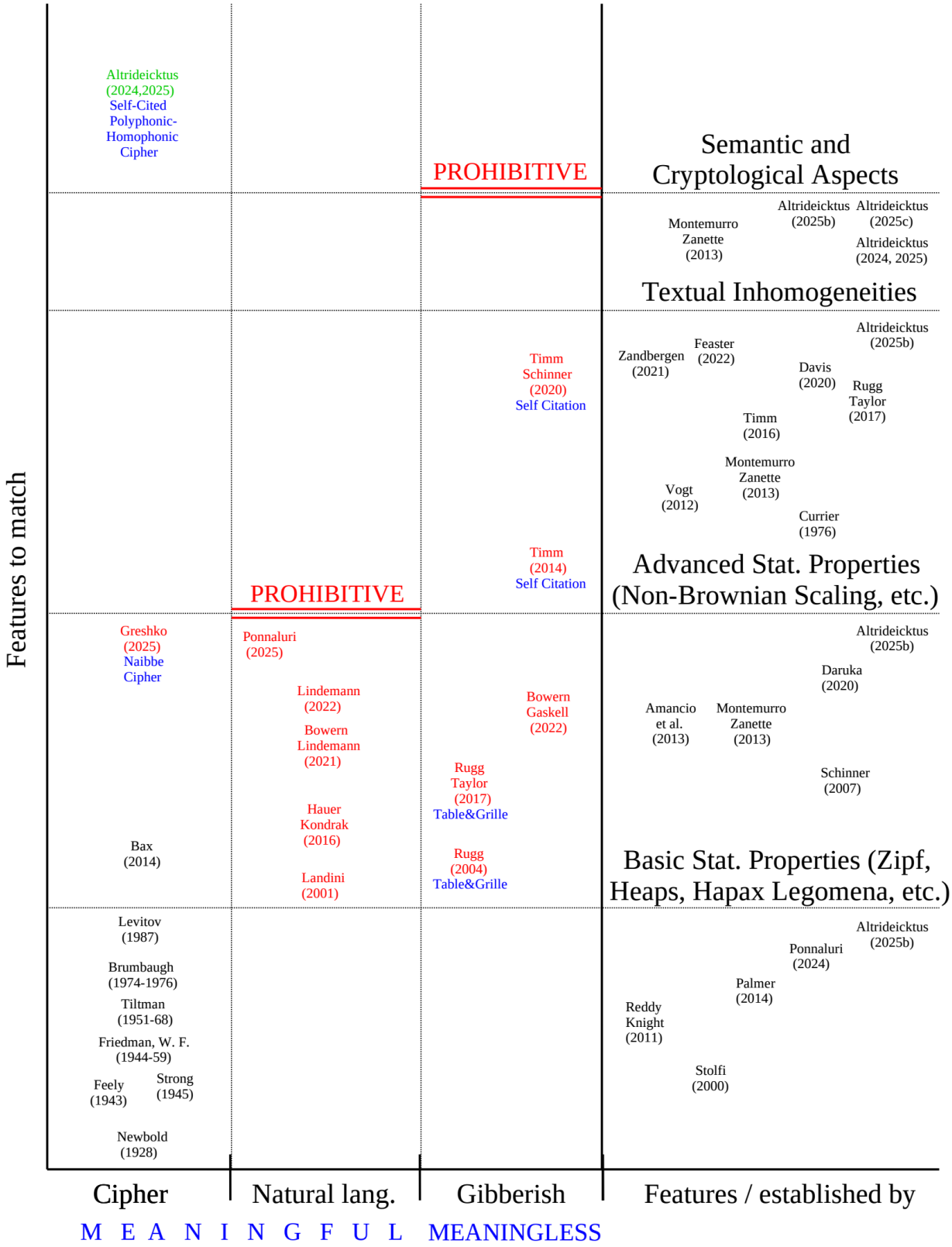

FIG. 2. FEATURE CHART AND MODELING PHASE SPACE OF THE VOYNICH RESEARCH BASED ON SOME SALIENT WORKS. RED COLOR INDICATES MODELS OR INFERENCES SORTED OUT BY SOME SELECTION FEATURES; GREEN COLOR INDICATES VIABLE VOYNICH MODELS; BLACK COLOR INDICATES INCONCLUSIVE OR INADEQUATE MODELS OR INFERENCES; AND BLUE COLOR HIGHLIGHTS THE NAMES OF PARTICULAR MODELS OR APPROACHES.

The above outlined features can be arranged into four hierarchal levels, as displayed in Fig. 2. These can be considered as constraints to be fulfilled (or filters to be passed) by the candidate Voynich models. The first level of filtering properties consists of some basic statistical features, including the Zipf and the related Heaps distributions, as well as specific traits of hapax legomena [Landini01, Rugg17, Timm_Schinner20, Ponnaluri25, Altrideicktus25b]. The next level comprises some advanced statistical features, including the non-Brownian scaling behavior [Schinner07, Daruka20, Timm_Schinner20], serving as an *aqua fortis* for sorting out inadequate Voynich models. As such, it turns out prohibitive for the "*regular text written in a natural language*" hypotheses, as these do not exhibit non-Brownian correlation traits. Furthermore, this non-Brownian correlation filter sorts out Rugg's table-and-grille hoaxing method [Rugg04, Rugg_Taylor17] and the Naibbe cipher proposition of Greshko (2025) as well.

The third level of filtering constraints comprises textual inhomogeneities, including line- and paragraph-position dependent features [Vogt12, Zandbergen21, Feaster22], inhomogeneities in the occurrences of the most informative Voynich words [Montemurro_Zanette13], as well as discontinuities in the letter and syllable densities [Altrideicktus25b]. Finally, the fourth level of features concerns the semantic and cryptological aspects, including strongly correlated and anti-correlated letter and syllable densities [Altrideicktus25b], the presence of semantic word-networks in the Voynich text [Montemurro_Zanette13], as well as the elaborate interplay of the letter and syllable densities hinting at textual cohesion [Altrideicktus25b]. Furthermore, the statistical and textual consistency of the novel Voynich transcription established by Altrideicktus (2025b-c) with regular Latin texts suggests the presence of polyphonic encryption. These semantic and cryptological aspects, indicating the presence of a meaningful content, sort out the meaningless gibberish scenario, including the self-citation mechanism proposed by Timm (2014) and Timm and Schinner (2020).

Interestingly, based on Fig. 2, the Voynich-model phase space appears filled and saturated already, and the proposed models more or less reached their (constraint-determined) limitations in the natural language (plaintext) and meaningless gibberish categories.

Based on all these constraints, we are left with the cipher scenario to account for the observed features of the Voynich text. However, some simple types of ciphers, for example, monoalphabetic substitution ciphers were ruled out a long time ago [D'Imperio78]. On the other hand, the inhomogeneous polyphonic-homophonic cipher scenario (including medieval Latin abbreviations and word-ending truncations [Cappelli82]), proposed by Altrideicktus (2024, 2025, 2025b) fulfills all the above discussed constraints and explains the puzzling, ambiguous statistical properties that are reminiscent of both a meaningless gibberish and a meaningful text.

In particular, the suggested presence of medieval Latin abbreviations and word-ending truncations substantially distorts the encrypted word-length distribution. However, the expansion of these linguistic features restores the usual word-length distribution characteristic of regular Latin texts [Altrideicktus25b-25c]. Furthermore, the line- and paragraph-position-dependent graphemic inhomogeneities can be interpreted as variations in the particular encrypting glyph implementations [Feaster22, Altrideicktus24-25-25b]. In addition, the observed discontinuities in the letter and syllable densities can be considered as encoding dialects in the Voynich text [Altrideicktus25b]. Last but not least, the polyphonic cipher scenario (together with the nature of the encrypted text) provides a simple, straightforward explanation for the inherent presence of non-Brownian correlations and the related self-citation mechanism in the Voynich text: "Re-using some of the already encrypted words, word segments, or the encrypting glyphs (within a visual reach) would make the process of encoding much more efficient [Feaster22]. This scheme would render the Voynich text a *meaningful* hoax" [Altrideicktus25b]. Finally, "the polyphonic cipher scenario would also explain the notorious word repetitions in the Voynich text as well, as each encrypted Voynich word may stand for several plaintext words" [Altrideicktus25b].

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