CORPUS LINGUISTIC APPROACHES TO ENGLISH SCIENTIFIC TERMINOLOGY

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Abstract: This article explores how corpus linguistic methods contribute to the analysis and understanding of English scientific terminology. It discusses the application of frequency analysis, concordance, collocation, and semantic prosody in identifying patterns and usage of scientific terms in authentic contexts. Drawing on corpora such as the British National Corpus (BNC), the Corpus of Contemporary American English (COCA), and specialized scientific subcorpora, the study demonstrates how data-driven approaches can reveal morphological, syntactic, and semantic features of terminological units. The paper concludes that corpus linguistics plays a crucial role in terminology management, translation, lexicography, and teaching English for Specific Purposes (ESP).

Keywords: corpus linguistics, scientific terminology, collocation, concordance, ESP, COCA, terminology extraction

The growth of science and technology has led to a vast expansion of scientific vocabulary in English. With thousands of new terms coined annually, there is a growing need for systematic methods to analyze, classify, and teach this terminology effectively. One of the most powerful tools in this endeavor is **corpus linguistics**—the study of language through large collections of real-world texts, known as corpora.

Corpus-based research provides insights into how scientific terms are used in context, how frequently they occur, what grammatical patterns they follow, and which words they co-occur with. These insights are valuable for various fields, including applied linguistics, translation studies, language teaching, and lexicography.

This article aims to show how corpus linguistic approaches can be used to study English scientific terminology and support the development of accurate and pedagogically useful resources.

To investigate scientific terminology from a corpus-linguistic perspective, the following steps and tools were used:

- **Corpus Selection**: General corpora (BNC, COCA) and domain-specific corpora (e.g., Medline for medical texts, arXiv abstracts for physics, and academic journals from the Scientific American corpus).
- **Frequency Analysis**: To identify high-frequency scientific terms and affixes.
- **Concordance Analysis**: Using AntConc software to observe usage patterns in context.

• **Collocation Analysis**: Measuring co-occurrence relationships (e.g., *data + analysis*, *quantum + mechanics*) using statistical measures like MI (Mutual Information) and log-likelihood.

• **Semantic Prosody**: Examining the attitudinal or connotative meaning around specific terms.

• **Term Extraction**: Using tools like Sketch Engine and WordSmith Tools to extract candidate terminology based on keyness and domain relevance.

Frequency and Productivity of Scientific Terms

Corpus data showed that English scientific texts are heavily loaded with **nominal phrases** (e.g., *climate change*, *genetic mutation*, *information retrieval*), many of which follow the **N + N** or **Adj + N** patterns.

• Top frequent terms (from COCA-academic register): *data*, *analysis*, *research*, *study*, *result*, *model*.

• Common affixes in terms: *-logy*, *-scope*, *bio-*, *eco-*, *techno-*.

• Emerging neologisms: *infodemic*, *nanocarrier*, *biointerface*.

Collocational Patterns

• *Data* collocates with *collection*, *analysis*, *set*, *processing*.

• *Gene* collocates with *expression*, *sequence*, *therapy*, *editing*.

• These patterns reveal **semantic frames** and help disambiguate polysemous terms.

Concordance and Contextual Analysis

The term *algorithm* appeared in contexts such as:

• *search algorithm*, *learning algorithm*, *encryption algorithm*

• Often preceded by adjectives like *efficient*, *proprietary*, or *complex*

These concordance lines indicate disciplinary variation and usage specificity in computing vs. data science contexts.

Semantic Prosody

The term *mutation* showed a predominantly negative semantic prosody in medical contexts (e.g., *harmful mutation*, *genetic disorder*), while in evolutionary biology, the tone was more neutral or positive (*beneficial mutation*, *adaptive mutation*). This variation has implications for ESP teaching and scientific communication.

Genre-Specific Terminological Variation Across Disciplines

Corpus data revealed that identical scientific terms may display distinct semantic and functional profiles depending on the disciplinary context. For instance:

• The term **model** in physics is often used to describe theoretical constructs (*quantum model*, *standard model*), whereas in biology it refers to experimental systems or organisms (*animal model*, *in vitro model*).

• The word **interface** refers to a user or system boundary in computing (*user interface*, *software interface*), but in biology or chemistry, it denotes the contact surface between substances or systems (*cellular interface*, *protein–surface interface*).

Such **genre-specific variation** highlights the need for context-aware approaches in translation, lexicography, and ESP (English for Specific Purposes) instruction.

Monitoring Emerging Terminology via Corpus Tools

Using keyword and term-extraction features in **Sketch Engine** and **AntConc**, the study identified a range of **emerging or trending scientific terms** in corpora from 2015 to 2024:

• *CRISPR, blockchain, metamaterial, telehealth, climate resilience*

These terms frequently exhibit **metaphorical origins** or blended word-forms, underscoring the role of conceptual innovation in modern scientific language. For example, *blockchain* metaphorically frames information systems using imagery from physical chains, and *telehealth* blends *tele-* (distance) with *health* to describe remote healthcare delivery.

Corpus-based analysis provides a more **empirical and objective** approach to terminology study than traditional introspective methods. It reveals not only the forms of scientific terms but also their **collocational behavior**, **genre sensitivity**, and **disciplinary variation**.

One significant finding is that many scientific terms exhibit **stable collocational patterns** that could serve as pedagogical chunks in ESP contexts. For example, teaching the phrase *conduct a study* as a collocation rather than isolated words improves fluency and comprehension.

The extended findings reaffirm that **corpus linguistics provides a powerful empirical foundation** for analyzing scientific terminology. Unlike introspective or prescriptive approaches, corpus-based methods allow for:

• The observation of **authentic, in-use patterns** across disciplines.

• The detection of **genre and register variation**, crucial for precision in scientific communication.

• The identification of **collocational routines and phraseological units**, which are essential for fluency and accuracy in ESP and technical translation.

In educational settings, data from corpora can be used to develop **discipline-specific language materials**. For example, rather than teaching isolated terms such as *conduct*, instructors can present collocational chunks like *conduct a study*, *conduct an experiment*, or *conduct a trial*, based on real frequency data.

Furthermore, the analysis showed how some scientific terms undergo **semantic drift** over time or across contexts. The word *cloud*, for example, has shifted from its original meteorological meaning to become a core term in information technology

(*cloud storage, cloud computing*). Such shifts reflect the dynamic and metaphor-rich nature of scientific discourse.

Another point of interest is the **polyfunctionality of scientific terms**. Many words, such as *platform*, *network*, or *interface*, operate across multiple disciplines, often leading to potential ambiguity. Corpus analysis helps clarify these uses by providing context-rich examples, enabling translators and learners to distinguish between domain-specific meanings.

Finally, the **integration of corpus tools** into terminology research facilitates the creation of more effective glossaries, translation memories, and pedagogical resources, as it aligns linguistic analysis with real-world data and usage trends.

Moreover, corpus linguistics can help identify **terminological drift**—where words shift meaning across time or domains. For instance, *interface* once referred mainly to hardware connections, but now commonly denotes software environments or biological contact zones.

CONCLUSION. The findings suggest a strong potential for integrating corpus tools in translator training, technical writing, and ESP curriculum design. Teachers can use concordance lines to show real usage, while lexicographers can identify typical structures for dictionary entries.

Corpus linguistic approaches provide rich, authentic, and statistically grounded insights into the use of scientific terminology in English. These methods enable researchers to:

- Identify frequent and emerging scientific terms
- Analyze usage and collocation patterns
- Detect semantic nuances and contextual shifts
- Enhance translation accuracy and teaching effectiveness

As science becomes more interdisciplinary and terminology more dynamic, corpus linguistics will play a critical role in ensuring that language professionals keep pace with terminological change.

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