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EXAMINING THE USE OF LEXICAL DENSITY AND NOMINALIZATION IN ENGLISH ACADEMIC PAPERS ON ECONOMICS AND THE ENGINEERING SCIENCES

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Abstract: *The availability of structures from entirely finite to fully nominalized, which are used appropriately in syntactic and communicative settings, makes English a useful language for exploring the topic of nominalization. English also demonstrates that, within a single language and under identical grammatical conditions, one can choose a more nominalized or a more finite structure. In English for Economics or English for Civil and Mechanical Engineering, nominalizations are employed to enhance condensation, abstraction, lexical density, and accuracy. For learners of English for Specific Purposes, it's important to grasp how nominalizations influence lexical density. It aids them in developing writing skills suitable for professional or academic settings, enhancing their reading comprehension of complex materials, and recognizing and producing formal academic language. The paper discusses the analysis of lexical density and nominalization in English research articles in the fields of economics and engineering. It examines how complex language patterns, such as high lexical density and frequent use of nominalization, are present in these fields. The study aims to understand how these language features affect the clarity and readability of scholarly writing. It emphasizes the importance of examining these elements to improve communication within academic research. Moreover, the paper likely encourages ESP learners to consider their language choices to make their work more accessible to a broader audience. As a result, English instructors are encouraged to think about increasing students' understanding of nominalization in their academic writing courses to create lexically rich yet instructive papers.*

Keywords: *English for Specific Purposes (ESP), nominalization, lexical density*

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INTRODUCTION

Originally limited to the primary language of scholarly communication and instruction, English's function has slowly expanded to cover a broad spectrum of business environments, including digital communication, foreign travel, infotainment, diplomacy, politics, and business. The evolution of English as a language suited for professional needs has been much sped up by the rising demand for quick and general usage of English in international business. English for Specific Purposes (ESP) courses tailored for different objectives have directly resulted from the globalization of trade and economy, as well as the growing worldwide interaction across several disciplines. English has become a crucial language for communication both inside the region and with the wider global audience, thanks to its significant contributions to economic growth, growing global perspectives, and boosting competitiveness and operational success in international business (see Clayton, 2006). Consequently, Sarre and Whyte (2017, p. 150) characterized it as "the branch of English language studies which concerns the language, discourse, and culture of English-language professional communities and specialized groups, as well as the learning and teaching of this object from a didactic perspective."

Additionally, this study seeks to elucidate and focus on the distinctions between General English, English for Economics, and English for Civil and Mechanical Engineering in terms of specific linguistic features, such as the prevalence of nominalization and higher lexical density, which are more relevant to ESP than GE (Hyland, 2006, p.13).

Informational expository registers—like those used in scientific, financial, and medical writing—have evolved to embrace more sophisticated techniques over the past 200 years. This development involves a notable rise in the use of relative clause constructions, passive verbs, and more complex noun phrases (see Atkinson 1992, 2001; Biber 1995; Biber and Finegan 1997). The advancements in language correspond with the introduction of more specialized audiences, clearly defined objectives, and a complete use of the opportunities provided by written communication. This runs counter to the bigger society changes toward a wide general audience and the ensuing demand for easily available written materials. The increasing specialization of the audience's knowledge and education has propelled the transformation of scientific literature into more specialized linguistic formats. The writing style in English for Civil and Mechanical Engineering, as well as for Economics, is formal and aims for friendliness, directness, conciseness, brevity, and clarity. The English language used in the fields of economics, civil engineering, and mechanical engineering, which is acknowledged as a major variant of the language, has developed in tandem with progress in scientific technology. This genre includes a range of academic products, such as instructional presentations, thesis defenses, experimental reports, research papers, and scholarly articles. Among its other features are a high degree of accuracy, logical consistency, conciseness, and little change. Nominal structures illustrate many of these features. Because they contribute more content words (nouns) to a statement, nominalizations frequently raise lexical density. This is why texts that include a lot of nominalizations tend to be more formal and packed with information. Lexical density and nominalizations are closely related and significantly influence the style and complexity of English for Specific Purposes (ESP) writing, particularly in technical and academic settings. ESP writing often aims to convey and communicate intricate, complicated concepts effectively and clearly. Writers can condense several actions or ideas into fewer words using nominalizations, which helps create a denser and more abstract style. ESP texts, particularly in areas like science, law, or engineering, prefer a formal and impersonal attitude. By eliminating agents (who is performing the action), nominalizations aid in achieving this, which is in line with the objective attitude that is characteristic of academic writing. Nominalizations are a type of grammatical metaphor, according

to systemic functional linguistics, as they convert processes into things. This abstraction, which adds to both lexical density and conceptual complexity, is characteristic of academic and ESP genres.

LITERATURE REVIEW

The most powerful instrument for lexical packaging in academic writing, the grammatical metaphor known as nominalization, is utilized to capture the complexity of the semantic dimension of the academic genre (Ezefeika, 2015; Ryshina-Pankova, 2015). Nominalization is a sophisticated noun phrase that enhances sentence richness and increases lexical term density. Lexical density is considered a primary indication of complex academic writing linguistic features (Biber et al., 2013, as quoted in Lei and Yang, 2020; Nasseri and Thompson, 2021).

Scholars like Dudley-Evans and St. John (2009: 41) have observed that lexical density is a feature of language that is often used in ESP academic writing, clearly differentiating it from General English. Llyod (1980, p.6) provides evidence for the same theory: "Whether we like it or not, the language of science is English, and the English by which scientists communicate must be understood by people whose mother tongues range from Czech to Chinese. It has led to an extraordinarily brusque sort of language, with short sentences and a limited vocabulary".

Lexical density may be understood as including open-ended words like nouns, adjectives, verbs, and adverbs, which can provide specific information about a particular piece of writing. Nouns usually function as subjects, verbs convey actions or states of being, and adjectives often enhance the quality of scholarly writing (Didau, D. 2003; Johansson, V. 2008; Ure, J. 1971). Additionally, lexical density, which improves information clarity, is mainly a feature of academic writing. Higher lexical word density in texts typically indicates greater specialization and comprehension for people with higher academic backgrounds in a range of subjects. It is important to remember that when compared to general English, a text's meaning may become ambiguous due to a lower presence of lexical words (Didau, D. 2013). Unlike general English, academic writing places greater emphasis on lexical density for information dissemination. Even if it makes heavier lexical sentences more understandable (Thida, 2019; To et al., 2013), lexical density is essential for showing the higher quality of academic writing (Nasseri and Thompson, 2021). Crossley (2020) asserts, however, that as writers get better, their works seem to use more sophisticated language. This may be because of "the properties inherent to the words" (Crossley, 2020) or possibly because they are more often exposed to the terms.

Lexical density is essentially the statistic indicating the ratio of lexical components in a text—such as nouns and adjectives, classified as content words—relative to the overall word count (Laufer and Nation, 1995). Johansson (2008) claims there is a strong correlation between lexical density and the way information is presented. While function words—that is, prepositions, pronouns, and determiners—mostly serve syntactic goals inside a text, content words, especially nouns, adjectives, and adverbs, have more semantic meaning in this case. The idea gives an academic work's informational content priority over the functional vocabulary found in regular English writings. Several studies have focused on the concept of lexical density in writing, especially in the context of English for Specific Purposes (ESP). Chaudron (2003), as cited by Doughty and Long (2005, pp.762–858), posits that ESP students have a predisposition for lexically sparse writing since they tend to utilize a restricted number of content words per sentence in their written output. Furthermore, To et al. (2013) examined nominalization, lexical density, and readability in IELTS writing exams at the University of Tasmania, Australia, and discovered that ESP students had a very low lexical density in their work and employed very few nominalizations. This research underlines how important nominalization is in raising the lexical density of written language. Refnaldi (2015,

pp.27–33) supports this viewpoint by highlighting how the absence of grammatical metaphor—particularly nominalization—in students' writing produces works more akin to written discussion than polished written material. Students' writing is sometimes lexically scant, with a very complex architecture and few content words. Their work, therefore, still does not meet the criteria for competent academic writing. Excellent specialized academic writing (Soles, 2010, p.96; Swales and Feak, 2012, p.25) should, on the other hand, be defined by clarity, conciseness, and directness. Effective engineers or economists fluent in English will often favor using precise words to express the intended meaning over unnecessary speech. Using just the specified words, it is crucial to articulate the key ideas precisely. Students should therefore focus on selecting more precise language to better express their ideas, rather than relying on many words presented in a complex fashion. Effective writing, therefore, calls for students to be extremely careful about the words they use. Word choice employed in writing reveals a student's writing approach, which ought to be both brief and precise. This illustrates how lexical density—which examines the organization of words in writing to express meaning—reflects word selection and sentence structure. The degree of formality in a document determines its lexical density. Usually, the academic level of a work rises along with its lexical density. For this reason, readers typically need somewhat longer to understand scientific and technical papers. According to recommendations, students should focus more on the linguistic elements of their work, especially when writing academic papers in certain disciplines. In their technical writing, they should think about their word choice, expand their vocabulary, and deliberately aim to utilize their vocabulary in their writing.

Another significant distinction between English for Specific Purposes (ESP) and General English (GE) lies in the employment of nominalization. This linguistic feature, commonly found in scientific academic writing, entails the conversion of verbs into nouns, allowing them to signify concepts, objects, or individuals (Uni learning 2000). Moreover, an additional statement suggested that nominalization functions as a mechanism for developing grammatical metaphor within the context of academic writing (Galve, 1998). Furthermore, it is important to point out that academic texts, especially those related to the economic and engineering sciences, demonstrate a higher occurrence of grammatical metaphors (Halliday, 1988). Baratta, M.A. (2010) highlighted the significant function of nominalization in facilitating linguistic impersonalization in academic writing, especially in higher education. Nominalization can replace the presence of human agents, thus making the writing more formal and objective. The achievement of formality and objectivity is viewed as a fundamental goal in academic writing. In contrast, writings in General English typically display a high level of informality and a lack of objectivity. Moreover, nominalization is frequently utilized by numerous academic writers to analyze particular factual information or events in the form of assertions, as observed by Halliday and Martin (1993, p.15).

It is well acknowledged that articulating scientific discoveries in English presents considerable difficulties for numerous authors; even esteemed scientists may lack outstanding speaking or writing abilities, particularly if they are not native speakers. To create an engaging scientific manuscript, for example, one needs to follow the norms of the genre and meet the expectations of the pertinent discourse community. Clearly, academic writing plays an essential role in the distribution of scientific knowledge, which continues to be the main and most effective method of communication in different academic disciplines. Nominalizations are generated from verbs and adjectives through Romance affixation and are deemed prevalent in both academic and professional writing. Biber (1988, p.45) asserts that these structures are frequently employed to elaborate on an idea and concisely integrate information. Additionally, Bhatia (1993) contends that nominalizations generally relate to abstract ideas and generalizations, often being overused in formal settings,

especially when writers seek to enhance the sophistication of their texts. In contrast, Halliday (1998, p.195) argues that nominalization plays a crucial role in scientific dialogue by "creating technical taxonomies; it helps the writer to relate one process to another and thus create chains of reasoning". Consequently, it is imperative for students studying economics, civil, and mechanical engineering sciences, fields that comprise numerous aspects, to grasp and excel in the language, as this proficiency is critical for their career advancement and academic development. Hitchings (2013) notes that nominalizations prioritize actions over the individuals executing them. However, research shows that nominalizations can fulfill particular communicative goals and function as rhetorical instruments that enable scientific writers to express their findings with clarity and brevity. As illustrated by the excerpts highlighted in the Journal of Electrical and Electronic Engineering, 2025, Vol. 13, No. 2, pp. 108-115 and American Journal of Management Science and Engineering, 2025, Vol.10, No. 2, pp. 23-44, nominalization has converted verbs (which signify actions or occurrences) and adjectives into nouns (which indicate objects, ideas, or persons).

1. Heat exchangers maximize energy recovery during the condensation phase, reducing overall energy requirements.
2. Capture and recycle waste heat from the condensation process to reduce energy demands further.
3. Continued research in MOFs and solar optimization will further enhance the system's efficiency and affordability.
4. Despite their significance, SMEs face many challenges, including limited resources, intense competition, and the need for effective communication strategies to maintain their market position.
5. Thong and Yap indicated that competitiveness of the business environment means the competition faced by the business within its particular industry.

It is crucial to understand that when a verb or an adjective undergoes nominalization, it is changed into a concept rather than representing an action or a trait. This transformation yields a style of writing that is characterized by a more abstract and formal tone. Primarily originating from Romance languages, nominalizations are seen as contributing to the absence of expressive, emotional, and evaluative subtleties. It is commonly accepted that for native speakers of English, words derived from Romance languages often convey meanings that are rather general and abstract (Akhmanova & Idzelis 1987). It is widely accepted that nominalizations are often associated with academic writing, as they aid in creating an impersonal tone by frequently obscuring the human agent in sentences. Recognizing that nominalization enables the author to present a particular idea without personal involvement is crucial. This method aligns with the principle of objectivity, which is a key trait of scientific and technical writing. When verbs and adjectives are converted into noun forms, they come to be regarded as abstract concepts rather than dynamic actions. This alteration empowers the writer to increase the quantity and depth of information, facilitating additional commentary or analysis regarding the concept articulated within the clause. Jamshid (2005) articulates that nominalization exhibits what is termed "information density," a quality that is difficult to achieve through the simpler use of verbs. This indicates that nouns have the capacity to encompass a wider array of meanings than verbs, thus granting the nominalized process an increased expressive capability. This improvement stems from the broader set of operations — such as modification, subordination, and coordination — that can be performed on nouns, as opposed to verbs.

The establishment of deadjectival nominals is inherently constrained by the semantic properties of the base adjective, thus limiting their application solely to intersective adjectives. This

implies that these nominal forms are descriptively limited to adjectives that can also function in predicative roles. Fradin and Kerleroux (2003) offer a comparable hypothesis, claiming that the ability of an adjective to undergo nominalization is linked to its predicative characteristics. When examining a dual source for adjectives, those that can serve in a predicative capacity (hereafter referred to as predicative adjectives) emerge within a predicative framework (PredP), irrespective of their function as modifiers of nouns. In contrast, adjectives that cannot be used predicatively (henceforth known as attributive adjectives) are constructed within a fundamental adjectival phrase (AP). Predicational adjectives feature distinct attributes that set them apart from non-predicational adjectives, commonly identified as "relational" adjectives. This variety of characteristics encompasses their acceptability in standard predicate formations, such as serving as complements in copular clauses or functioning as secondary predicates. Furthermore, they have the capacity to accommodate degree modifiers and can be placed prenominally in languages that allow such adjectival arrangements, as observed by researchers such as Bally (1965), Schmidt (1972), Bache (1978), Bosque (1993), Fábregas (2007), and Marchis (2015). From a syntactic viewpoint concerning word formation, as described in the Distributed Morphology framework (Halle and Marantz 1993; Marantz 1997; and Borer 2003, 2005), nominalizing suffixes signify the expression of a predicative head in the nominal domain. This ultimately restricts the types of adjectives eligible to provide a basis for nominalization to those generated within a predicative framework.

It can be concluded that nominalization is a distinguishing feature of academic writing, as it greatly increases information density in a concise manner and promotes the text's objectivity. In other terms, nominalizations aid in achieving a more formal tone by enabling the writer to incorporate a larger amount of information, which leads to more complex sentence constructions. Acknowledged as a defining characteristic of scientific and technical writing, the prevalent use of nominalization of verbs and adjectives in English for Specific Purposes (ESP) is certainly warranted. Nominalizations empower authors to view events as abstract concepts and to make claims regarding them. This effective conceptualization and linguistic technique are widely employed in all scientific literature.

METHOD

The study utilizes a descriptive comparative approach, as it aims to objectively characterize and elucidate the linguistic behaviors linked to lexical density and nominalizations as a communication strategy in English research papers. Furthermore, quantitative methods were applied, specifically to ascertain their frequency and distribution across different disciplines and to generate findings that are applicable on a broader scale. To demonstrate the interdisciplinary aspects of our discourse analysis, which centers on English for Economics and English for Civil and Mechanical Engineering, we applied corpus linguistics methodologies to create and analyze a corpus. Due to the lack of a pre-existing corpus in these specific fields, we made use of BootCat, a corpus generation software developed by a team of linguists at the University of Bologna in Forli. BootCat operates as a type of "crawler," commonly known as a "spider," which is a software application designed to collect information from web pages via queries. We created a fundamental corpus utilizing the Google search engine, which produced tuples (data structures) for BootCat based on keywords such as "business economics/ financial economics/ urban, rural, and regional economics, civil engineering/ mechanical engineering/ engineering sciences." We carefully examined and compiled the hyperlinks to facilitate BootCat in constructing a relevant corpus. This collection grants researchers a wide range of linguistic tools to achieve their goals and address the questions raised. The examples are sourced from a compilation of 40 scientific articles within the domains of economics, civil

engineering, and mechanical engineering, published on https://www.sciencepublishinggroup.com/ between 2023 and 2025. The average article length is roughly 15 pages, which adds up to a total of about 600 pages of text. Science Publishing Group (SciencePG) functions as an Open Access publisher, offering more than 300 online, peer-reviewed journals that cover a wide range of academic disciplines. These areas encompass, but are not limited to, chemistry, education, medicine and health, architecture, civil engineering, as well as electrical, mechanical, and computer sciences, in addition to sociology, anthropology, psychology, political science, and management.

This study investigates the utilization of lexical density and nominalization as methods for articulating knowledge assertions in research articles related to economics, civil, and mechanical engineering. A thorough analysis of these nominalized structures within their contexts revealed 11 distinct patterns, with the preference for certain patterns differing between the introduction and methods sections of the articles. The findings indicated a greater prevalence of nominalization in the introductions. For this linguistic study, the Voyant-tool and Analyze My Writing were the instruments employed. The Voyant Tool was used to emphasize a few aspects, including the total word count, the diversity of word kinds, the vocabulary or lexical density, and data on the average number of words per sentence in economic and engineering research papers, while Analyze My Writing was used to confirm the results.

FINDINGS AND DISCUSSIONS

To assess the amount of information contained in our corpus, and utilizing the two linguistic tools previously referenced, we have calculated an average lexical density of 64.93%. The sentence with the highest lexical density averages 91.67%, whereas the sentence with the lowest lexical density stands at 39.13%.

"However, regions featuring expansive soil unfit for construction purposes necessitate stabilization i nterventions". (Adapted from Naimul Haque Nayem. (2023). Stabilization of Expansive Soil by Improving the Engineering Properties Using Lime and Fly Ash. International Journal of Engineering Management, 7(2), 27-34. https://doi.org/10.11648/j.ijem.20230702.12)

"The demand for goods in this model is built on the import of goods by each of the countries participating in the trade". (Adapted from 15. Gonchar, N. S., Dovzhyk, O. P., Zhokhin, A. S., Kozyrski, W. H., Makhort, A. P. (2024). China and G7 in the Current Context of the World Trading. American Journal of Management Science and Engineering, 9(6), 116-123. https://doi.org/10.11648/j.ajmse.20240906.11)

In the realm of economics and engineering sciences, there exists a substantial prevalence of abstract nouns that signify means, existence, and tools, which are derived from the base verbs or adjectives that form their origins. For example, the connection between "allocate" and "allocation", "leak" and "leakage", "insulate" and "insulation", "build" and "building", "implement" and "implementation", "expand" and "expansion", "consume" and "consumption", "assess" and "assessment", "stable" and "stability", "humid" and "humidity", and "convert" and "conversion" exemplifies this trend. Since written academic, technical, and scientific papers are lexically dense texts, conveying a huge amount of information, we have determined the lexical density of our corpus using Analyze My Writing:

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Part of Speech	Percentage
Nouns	39.01%
Adjectives	11.15%
Verbs	12.14%
Adverbs	2.64%
Prepositions	13.46%
Pronouns	0.42%
Auxiliary Verbs	2.21%

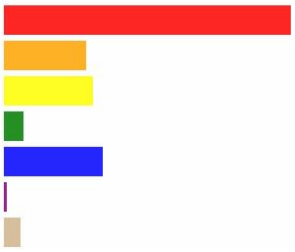

Figure 1. Percentage of lexical words (The author's own processing)

Moreover, a considerable array of descriptive adjectives is utilized to depict the state, characteristics, extent, dimensions, and form of natural phenomena and materials. Typically, these adjectives are produced from verbs and nouns via the application of various suffixes, including "–ac/iac," "-al," "-ar," "-ato," "-eal," "-ed," "-ic," "-ible/able," "-ing," "-ive," "-oid," "-ose," "-ous," and "-y.":

"–ac/iac":No such adjectives were found in our corpus since most of them belong to the medical field and sciences.

"-al": financial, fiscal, statistical, marginal, nominal, optimal, structural, global,

"-ar": regular, popular, circular, rectangular, modular, molecular, nuclear,

"-ato": sulfato, laminato.

"-eal": ideal (as in ideal voltage source), appeal (as in appeal value), real (as in real interest rate, real estate value),

"-ed": increased, developed, advanced, observed, estimated, welded, reinforced, cracked, isolated, embedded, integrated, simulated

"-ic": economic, dynamic, theoretic, strategic, specific, hydraulic, elastic, magnetic, electronic, polymeric, thermodynamic.

"-ible/able": reliable, comparable, feasible, sustainable, adjustable, flexible, detectable, recyclable, accessible, biodegradable, compressible.

"-ing": emerging, increasing, decreasing, booming, overlapping, vibrating, contracting, deforming, oscillating, charging, discharging, corroding.

"-ive": inclusive, competitive, productive, progressive, explosive, reactive, corrosive, adhesive, descriptive.

"-oid": spheroid, ellipsoid.

"-ose": grandiose, fibrose, porose, cellulose.

"-ous": continuous, hazardous, disastrous, spacious, spontaneous, vigorous.

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"-y": regulatory, inflationary, risky, pricey, grainy, bumpy, oily, powdery, leaky.

To identify the most frequently used words and word combinations in our corpus, we have used the Voyant tool:

Figure 2. Most frequent words in the corpus (The author's own processing)

Additionally, the integration of abstract nouns and descriptive adjectives is frequently employed to represent highly specialized concepts. Instances such as "earthquake engineering," "successful implementation", "engineering challenge," "crucial immunization programs", and "engineering major" demonstrate how the linguistic combination of abstract nouns and descriptive adjectives forms a significant feature of ESP vocabulary. The inclination towards using abstract nouns and descriptive adjectives in scientific and technical literature can be explained by their capacity to accurately and impersonally communicate the processes, outcomes, conditions, specialties, and attributes of natural phenomena.

Nominalization mainly entails the use of abstract nouns that represent actions or states, in addition to non-finite verb forms functioning as nouns, noun-noun combinations, and prepositions, among other components. This procedure preserves the original meaning linked to the agent within the structure, thus streamlining the narrative and improving clarity, which leads to a more concise and precise text. The use of abstract nouns that signify action or state is one of the most notable phenomena in English for Economics and English for Civil and Mechanical Engineering, and it plays a significant and essential role. This practice includes the nominalization of verbs, adjectives, and subordinate clauses. In the realm of grammatical metaphor, the ideational meaning remains unchanged, even as the word class used for its expression shifts (for example, both "expend/observe" and "expenditure/observation" express the same core concept related to a process) (Halliday, 1993; Halliday and Matthiessen, 1999). This phenomenon is known as transcategorisation. Within the framework of grammatical metaphor, it is suggested that every element in any language belongs to a specific category or word class, and furthermore, certain words can deviate from their original

classifications. As a result, semantic entities may also be expressed using a word class that differs from the one originally intended (Halliday and Matthiessen, 1999 and 2004). The functional systemic typology of processes, as described by Halliday and Matthiessen (2004), provided the basis for categorizing verb types and various forms of nominalizations. From the initial study, four main categories were identified concerning the roles that nominalizations fulfill: pre-verbal, post-verbal, object of a preposition, and as modifiers.

The occurrences of nominalized grammatical metaphors are closely aligned with the Latin text. Banks (2005) posits that the influence of Latin on the English language regarding nominalization, while rarely recognized, deserves comprehensive investigation. Nouns formed from verbs are widely employed. These nouns generally encompass verbs along with suffixes such as "-tion," "-sion," "-xion," "-ment," "-ance," and "-ence," among others. They stem from nouns whose etymology is linked to transitive verbs, particularly reflecting the illocutionary roles intrinsic to these verbs. Such nouns are frequently accompanied by a prepositional phrase, where the nouns serve as objects corresponding to transitive verbs. We have identified multiple deverbalized nouns for each of these suffixes within our corpus:

"-tion," – pollution, immunization, production, allocation, integration, contribution, simulation, application, transportation, reduction, education, institution, representation, actuation, centralization, operation, alleviation, optimization, recommendation, investigation, construction, addition, solution, correlation, communication, distribution, implementation, information, adoption;

"-sion," – expansion, inclusion, conversion, exclusion, collision, corrosion, explosion, erosion, fusion, conclusion, diffusion, decision;

"-ment," – development, government, improvement, management, equipment, engagement, reinforcement, advancement, requirement;

"-ance," – performance, allowance, appearance, importance, disturbance, admittance, maintenance, avoidance, significance, assistance, resistance, guidance, ignorance, disturbance;

"-ence" – obedience, interference, preference, existence, conference, difference, persistence, residence, emergence.

Norouzi et al. (2012) argued that academic writing demonstrates a notable prevalence of deverbalized nominalization. Consequently, it is clear that nominal forms are favored over verbal forms in academic discourse. This indicates that modern academic writing increasingly adopts a nominal style. A key feature of nominalizations is their capacity to present processes and events as abstractions, which reduces the emphasis on human agency and fosters a sense of detachment and objectivity within the text. Thus, the rhetorical techniques utilized by the authors obscure the subjective aspects of their contributions and explanations (I-Wen Su, 2011). There exists a broad agreement present in both academic literature and empirical research concerning nominalization, acknowledging it as the foremost linguistic mechanism that researchers employ to form grammatical metaphors. This process significantly enhances academic writing, distinguishing it from non-academic prose, which is frequently regarded as more simplistic in language. Furthermore, it is important to observe that there is a growing tendency, particularly in the realm of scientific English,

to avoid the creation of new terms in a way that echoes German practices, where nouns and adjectives are joined in succession prior to a major noun. In the absence of Germanic inflections, we are necessitated to use commas and hyphens with precision to ensure that these constructs are comprehensibly interpreted. The most extensive example documented includes a subsequent arrangement of nine words, as noted by Lloyd: "a progressive saturation selective population inversion nuclear magnetic resonance experiment" (Lloyd, 1980, p.8).

Nominalizations were categorized into nominal groups that include various components preceding and following a noun, each of which describes it from different perspectives (Halliday 2004). Halliday (2004) presented the experiential framework of nominal groups and detailed the specific importance of each component. For example, take the phrase "those two splendid old electric trains with pantographs", which is extracted from (Halliday 2004: 312), where the nominal group consists of deictic expressions, numeratives, epithets, classifiers, nouns, and qualifiers. In light of the previously mentioned definition and elements, we have recognized 11 common patterns. These patterns, along with relevant examples, are outlined below:

- **Noun+ Qualifier:**

"Future research could explore cross-cultural differences, longitudinal studies, and qualitative methods to gain deeper insights into customer satisfaction in Islamic banking, especially about technology and global crises like cybersecurity concerns, pandemics, and economic instability". (Adapted from Legass, H. A., Mekonnen, D. C., Yusuf, J. M. (2025). Islamic Banking Customers Satisfaction in the Digital Banking: Evidence from Ethiopia: A SEM Approach. International Journal of Finance and Banking Research, 11(2), 23-36. https://doi.org/10.11648/j.ijfbr.20251102.11)

"Environmental considerations unfold as a pivotal theme, examining practices such as green tunneling and the use of eco-friendly materials, with a focus on minimizing disruption and resource consumption". (Adapted from 24. Omar, E. A. (2024). Systematic Review of Innovative Approaches in Tunnel Construction and Design. American Journal of Construction and Building Materials, 8(2), 20-34. https://doi.org/10.11648/j.ajcbm.20240802.11)

- **Epithet…+ Noun:**

"When housing price can change value of the collateral and borrowing ability of the enterprises, monetary authority is motivated to stabilize the housing price".(Adapted from Guimin, H., Lili, M. (2025). Monetary Policy and Borrowing Constraint of Housing Market-a Comparative Research Between China and U.S.A.. International Journal of Finance and Banking Research, 11(2), 37-45. https://doi.org/10.11648/j.ijfbr.20251102.12)

"These pelletized additives were then blended with cement to produce cement beam test specimens, which were evaluated for their flexural properties". (Adapted from Garam Kim, Harry Lee, Guyuan Zhang, Caleb Mull, Kyubyung Kang. (2023). Investigation of Flexural Properties of Cement Reinforced with Recycled Carbon Fiber-Reinforced Polymer Composite Additives. American Journal of Construction and Building Materials, 7(2), 13-18. https://doi.org/10.11648/j.ajcbm.20230702.11)

- **Epithet…+ Noun…+ Qualifier:**

"As demand for efficient and eco-friendly rail solutions grows, the continued development and application of slab track systems stand as a pivotal contribution to the evolution of rail transportation". (Adapted from 23. Vashishtha, S. (2024). Plywood Proficiency: Navigating Quality Assurance in Manufacturing. American Journal of Construction and Building Materials, 8(2), 52-61. https://doi.org/10.11648/j.ajcbm.20240802.13)

"This research not only advances academic understanding of the intersection between culture and finance but also offers actionable insights for creating financial policies and services that resonate with the cultural realities of Ghanaian society". (Adapted from 3. Opoku-Okuampa, I. Y. (2024). The Influence of Cultural Factors on Financial Decision-Making in Ghana. International Journal of Finance and Banking Research, 10(6), 118-125. https://doi.org/10.11648/j.ijfbr.20241006.12)

- **Epithet…+ Classifier…+ Noun:**

"The study advocates for comprehensive employee training and cross-functional collaboration across production, quality assurance, and R&D teams to enhance overall product quality". (Adapted from Vashishtha, S. (2024). Plywood Proficiency: Navigating Quality Assurance in Manufacturing. American Journal of Construction and Building Materials, 8(2), 52-61. https://doi.org/10.11648/j.ajcbm.20240802.13)

"Questionnaires and interviews were used as data collection tools, and SPSS software analyzed the findings to uncover financial management practices and challenges". (Adapted from Mengesha, A. S., Kebede, M., Amentte, D. (2025). Assessment of Financial Management Practice of Small Businesses: A Case Study of Saja Administrative Town, Yem Zone, Central Ethiopia Regional State. International Journal of Engineering Management, 9(1), 1-10. https://doi.org/10.11648/j.ijem.20250901.11)

- **Epithet…+ Classifier…+ Noun+ Qualifier:**

"This paper presents new experimental and numerical methods for investigating the mechanical properties of pipe joints under different relative rotation angles". (Adapted from Tang, M., Hu, S., Xue, X. (2025). Mechanical Properties of Double-gasketed Steel Joints for Bar-wrapped Cylinder Concrete Pressure Pipe Using Experimental and Numerical Methods. American Journal of Civil Engineering, 13(3), 152-164. https://doi.org/10.11648/j.ajce.20251303.14)

"Climate change poses significant challenges in regions with inadequate institutional support for climate-sensitive activities". (Adapted from Traore, A. (2025). Comparative Economic Assessment of Self-protection Strategies and Climate Insurance in Developing Economies. Journal of Business and Economic Development, 10(1), 1-18. https://doi.org/10.11648/j.jbed.20251001.11)

- **Classifier…+ Noun:**

"High-speed trains are a useful friendly option for ground transportation. Railway-induced ground vibrations can have a severe impact on human health and the communities that surround rail lines". (Adapted from Sayeed, A., Saha, S. (2024). Investigating the Behaviour of Railway Track Ground Vibrations for Different Track Foundation Conditions Using FEM. Journal of Civil, Construction and Environmental Engineering, 9(4), 105-114. https://doi.org/10.11648/j.jccee.20240904.12)

"The analysis also found no significant differences in investment returns between men and women, suggesting that investment strategy plays a more crucial role." (Adapted from Massingarela, C., Cuna, R., Daniel, A., Mahaluca, F. (2025). Evaluation of Bitcoin Investment Viability in Mozambique: Opportunities and Risks in an Emerging Market. Economics, 14(1), 11-21. https://doi.org/10.11648/j.eco.20251401.12)

- **Classifier…+ Noun+ Qualifier:**

"With an emphasis on the moderating effect of institutional quality, this study examines the effect of private investment on the sustainable development of Sub-Saharan African (SSA) nations". (Adapted from Joefendeh, R., Mom, A. N., Nguena, C. L. (2024). The Impact of Private Investment on the Sustainable Development of Sub-Saharan African Countries: The Moderating Role of Institutional Quality. Journal of Business and Economic Development, 9(4), 254 - 267. https://doi.org/10.11648/j.ijebo.20241204.16)

"Establishing a benchmark reference for soil parameters is crucial for the accurate analysis and prediction of ground behavior. By creating a detailed and standardized set of soil data, engineers and planners can better understand the characteristics and capabilities of the ground on which they intend to build". (Adapted from Sayeed, A., Saha, S. (2024). Investigating the Behaviour of Railway Track Ground Vibrations for Different Track Foundation Conditions Using FEM. Journal of Civil, Construction and Environmental Engineering, 9(4), 105-114. https://doi.org/10.11648/j.jccee.20240904.12)

- **Numerative + Noun+ Qualifier:**

"The study utilizes secondary data from the statistical bulletin of the Central Bank of Nigeria (2018) covering the period from 1985 to 2018". (Adapted from Oriakpono, A. E., Habib, A., Ladan, B. (2024). Framework for Examining the Correlation Between Trade Liberalization and Employment in Nigeria. Economics, 13(2), 32-47. https://doi.org/10.11648/j.eco.20241302.11)

"The presented experience in dynamic 3D modelling of the problem allowed us to make design recommendations for the required length of the transition zone in different soil conditions and different types of structures". (Adapted from Koch, E. (2017). 3d Dynamic Modeling of Railway Transition Zones in Soft Soil, at: https://www.researchgate.net/publication/337155496)

- **Numerative + Noun:**

"Finally, it is seen as a result of this research that the type of soil has a great role to play as far as the interaction between two foundations is concerned."(Adapted from Kuma, M. M., Leonard, N., Bertrand, P. J., Arnaud, K. N., Elvis, A., et al. (2024). Numerical Approach to Appreciate the Interaction of Two Neighbouring Shallow Foundation on a Cohesive and Partially Cohesive Soil. Journal of Civil, Construction and Environmental Engineering, 9(3), 51-64. https://doi.org/10.11648/j.jccee.20240903.11)

"The current study summarized the mechanical performances of concrete and assessed the synergistic impacts of recycled aggregate, likely at 100% content, with silica fume (SF) partially substituting cement". (Adapted from Chowdhury, M. R., Hasan, M. M., Howladar, M. S., Billah, M., Shahin, M. S. H., et al. (2025). Effectiveness of Silica Fume as a Partial Cement Replacement in

Recycled Aggregate Concrete. Journal of Civil, Construction and Environmental Engineering, 10(3), 115-122. https://doi.org/10.11648/j.jccee.20251003.12)

- **Numerative + Classifier…+ Noun:**

"This study examines two key strategies that households adopt to manage climate risks: self-protection measures and climate insurance". (Adapted from Traore, A. (2025). Comparative Economic Assessment of Self-protection Strategies and Climate Insurance in Developing Economies. Journal of Business and Economic Development, 10(1), 1-18. https://doi.org/10.11648/j.jbed.20251001.11)

"The results were presented as part of this study. It has been found that two shallow closed foundations seriously affect the soil between them, regardless of the soil type." (Adapted from Kuma, M. M., Leonard, N., Bertrand, P. J., Arnaud, K. N., Elvis, A., et al. (2024). Numerical Approach to Appreciate the Interaction of Two Neighbouring Shallow Foundation on a Cohesive and Partially Cohesive Soil. Journal of Civil, Construction and Environmental Engineering, 9(3), 51-64. https://doi.org/10.11648/j.jccee.20240903.11)

- **Numerative + Classifier…+ Noun+ Qualifier:**

"social confirmation has the second strongest correlation with two types of mediated-interpersonal communication media, new mobile messaging media and old messaging media". (Adapted from Lo, O. (2025). Factors Influencing the Adoption of Interpersonal Communication Media among Small and Medium Enterprises in Hong Kong. American Journal of Management Science and Engineering, 10(2), 23-44. https://doi.org/10.11648/j.ajmse.20251002.12)

"Whereas local non-governmental organizations (LNGO) have been widely appraised as the third largest employment sector in most developing countries, there is a common concurrence among scholars that their strategic success depends on leadership traits". (Adapted from Okello, L. R. (2025). Local NGO Executive's Gender, Experience and Academic Qualification as a Predictor of Strategy Performance - Evidence from Uganda. American Journal of Management Science and Engineering, 10(2), 16-22. https://doi.org/10.11648/j.ajmse.20251002.11)

A primary pedagogical implication arising from this study is that it can provide academic writers and ESP students with essential knowledge regarding nominal structures and expressions. The application of these structures facilitates proficient writing, which encompasses the capability to condense numerous intricate abstract concepts into a single clause, thereby enhancing the text's density and formality. Certain patterns assist in eliminating human subjects from sentences, resulting in a more impersonal tone suitable for academic discourse. In his research, Wang (2012) concluded that an analytical exploration of the grammatical characteristic of nominalization is insufficient for enhancing students' awareness of employing this feature in their writing; thus, instructing on the nominalized structure and enhancing students' proficiency in utilizing this feature in their writing is crucial. Consequently, there are educational benefits in familiarizing students with the nominal structures that frequently appear in published academic writings. These advancements in language seem to arise from two major influences: the informational goals of expository and descriptive language registers, along with the effects of economic factors. In particular, the situation of 'informational explosion' has generated a need for conveying information in the most effective and

economical way possible. This necessity has resulted in the rise of succinct writing styles that heavily depend on cohesively designed noun phrase structures. Recognizing that nominalization serves as an essential mechanism for the advancement of scientific dialogue, our aim is to support ESP students in acquiring the language skills required to improve their academic writing skills.

CONCLUSION

This study, focusing on lexical density and nominalizations, has demonstrated that nominalization serves as the primary resource for generating high lexical density. It is characterized by properties such as condensed information, succinct expression, compact structure, and robust logic. Motivated by these significant features, we initiated an exploration of nominalizations within academic discourses to determine whether they are also commonly utilized in economic and engineering contexts. Based on the corpus-assisted methodology, the findings of this study show the evolution of two types of nominalizations in the reviewed research papers, whereby the main transformation is from process (verb) to thing (noun). In order to fully utilize the potential of employing nominalizations and creating texts that hold academic value, and motivated by the necessity to understand how nominalization can be used to structure texts, we investigated several nominal patterns and prevalent nominal expressions found in scholarly articles. Although this study looks at two forms of nominalization, it shows how the use of nominalization has enabled authors in the domains of engineering and economics to produce dense, rich, and economically extended papers without giving up the chance to articulate clear and instructive phrases. In economic discourses, the use of nominalization enables the conveyance of greater information with fewer words, thereby enhancing the conciseness and variety of expressions. Conversely, in the context of engineering discourses, the necessity for formal and objective language renders nominalization a tool that elevates the formality and objectivity of the expressions, resulting in more convincing and valid discourses. As a crucial and beneficial lexical grammatical resource, nominalization assists writers in developing a more cohesive, scientific, and coherent discourse. It is essential for researchers and ESP learners engaged in academic writing to understand how to utilize nominalizations appropriately and flexibly. Future research may consider interdisciplinary variances when analyzing the reasons behind differing distributions, thereby augmenting pedagogical significance and offering additional guidance for both learners and researchers.

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