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Disciplinary-specific grammatical patterns of nominal phrases with nominalisations

The study examines the relative frequency of complex nominal phrases with nominalisations in physics and humanities academic discourse subsets of the English language. Using corpus methodology, we demonstrate that, contrary to expectations, there is a 9% prevalence of NPs with nominalisations in the latter. The findings of the study allow to draw conclusions about the prevailing strategies for nominalisation usage in disciplinary academic discourse subsets (NPs as a means of technicality construing in physics discourse subset as opposed to NPs as a tool of rendering temporal, causal and instrumental relations in humanities discourse subset). The resulting functional model can be used as a framework of reference in EFL academic writing teaching and be of use to L2 scholars that would like to make their writing consistent with the tendencies of the particular academic discourse subset.

Key words: nominalisation, nominal phrase, disciplinary academic discourse, academic writing, corpus methodology

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Грамматические особенности включения номинализации в номинативные словосочетания в институциональном дискурсе

В исследовании приведены результаты сравнительного анализа употребления именных словосочетаний с номинализацией в институциональном академическом дискурсе (физическом и гуманитарном) на материале английского языка. Применение корпусной методологии позволило сделать вывод о 9-процентном преобладании номинализации в именных словосочетаниях в гуманитарном академическом дискурсе, а также выделить преобладающие дискурсивные тактики применения номинализации в институциональном академическом дискурсе (конструирование технического терминологического поля в физическом дискурсе и передача темпоральных, каузальных и инструментальных отношений в гуманитарном дискурсе). Сформированная в результате исследования функциональная модель будет актуальна в преподавании академического письма и может быть использована для проверки соответствия текста нормам конкретного институционального дискурса.

Ключевые слова: номинализация, именное словосочетание, институциональный академический дискурс, академическое письмо, корпусная методология

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1. Introduction

Over the last decades, genre analysis has been broadly implemented for studying academic writing conventions. There has been a wide range of research papers concerning certain linguistic features of different academic writing genres (abstracts, theses, textbooks, research articles, reviews) [Bhatia, 1997, 2002; Hyland, 2004; Marefat, 2013] and studies aimed at the cross-disciplinary analysis of particular genres [Samraj, 2005; Diani, 2007; Jalilifar et al., 2018; Kuhl et al., 2020].

A significant portion of the research in the field is devoted to the analysis of grammatical features of professional registers, including nominalisation [Baratta, 2010; Jalilifar et al., 2017; Kuhl et al., 2020]. The grammatical complexity, as part of the tripartite paradigm of language skills (complexity, accuracy, fluency), is understood as the ability of the author to utilise a wide diversity of sophisticated grammatical constructs in the written and oral speech. It is considered indispensable for retaining higher levels of academic writing proficiency [Jalilifar et al., 2017, p. 2; Lan et al., 2019]. While a substantial number of studies provide empirical evidence of nominalisations and nominal phrases being more widespread in academic writing than in conversation [Biber et al. 2011, p. 9–10] and playing the crucial role in syntactical complexity formation of various academic discourse genres [Biber et al., 2020], very few of them specifically focus on the disciplinary-determined grammatical patterns of nominal phrases with nominalisations. Meanwhile, mere quantitative analysis of nominalisations proves insufficient for specifying disciplinary features of nominalisation usage. Instead, what Liardet refers to as ‘nominal group elaboration’ [Liardet, 2016, c. 27], that is, patterns of integration of nominalisations into nominal phrases, is regarded as a major contributor to the formation of disciplinary discourse conventions. Thus, the *purpose* of this study is to provide a comparative analysis of nominalisation phrasal inclusion patterns in Applied Physical Sciences and Humanities academic discourse, with specific focus on the pragmatic nature of nominalisation.

The relevance of this study is determined by the recent investigations proving the currently increasing significance of nominalisation as a functional tool of institutionalised academic discourse [Bello, 2016]. However, there still remains a significant gap in the linguistic analysis of grammatical patterns of employing nominalisations in disciplinary-specific academic discourse and their functional interpretation. The institutionally bound discourse description with regards to nominal phrases with nominalisations would be of practical use for teaching academic writing that would conform to statistically significant tendencies characteristic of the sub-discourse

(technical and social). Additionally, the model of institutionalised sub-discourses might be used as a framework of reference by L2 scholars that would like to make their writing consistent with the norms and tendencies of the particular academic discourse subset.

2. Theoretical framework

2.1. Nominalisation definition and classification

All the pre-existing research on nominalisations may be roughly subdivided into formalist and functional approaches. The first group tends to focus solely on the structural (derivational) patterns of nominalisations and their immediate neighbours in utterances (e.g., gerundive nominalisations not allowing for pre-modifying adjectives [Chomsky, 1975, p. 58]; comparative valency of deverbal nominalisations and their verbal counterparts [Bloch-Trojnar, Malicka-Kleparska, 2017]). They do not aim to analyse the motivation behind the use of nominalisations in constructions. We might say that formalists answer the question of 'how' nominalisations are used. Though the said approach provides important insights into the use of nominalisations, the study of register- and genre-specific features of nominalisation usage would require deeper analysis of stimuli inducing speakers to adhere to nominalisations in the first place.

The functional approach includes the 'why'-question into the research. Maintaining an integral unified perception of lexicogrammar, the functional approach allocates generalised meanings to certain word-classes (e.g., the meaning of action for verbs), as opposed to formalist view on the distinct line dividing grammar from lexis. Such inclusion (to a certain extent) of semantic and contextual analysis enables researchers to make conclusions on the motivations for nominalising the verbal or adjectival component of the utterance. The cognitive linguistic analysis, for example, draws conclusions on nominalisations as components of conceptual metaphors that contribute to the way speakers perceive the world and help to understand the abstract phenomena better by means of comparing them to simpler notions from everyday life [Li, 2016]. However, the genre-specific cognitive analysis of nominalisations in academic writing does not appear to be extensive enough to draw conclusions on the contribution of nominalisations to cognitive rendering of science in general. The systemic functional linguistics framework, meanwhile, provides a clear-cut set of 'metafunctions' that can be used for the analysis of nominalisations as an academic writing tool [Halliday, Matthiessen, 2013] which explains the choice of systemic functional linguistics framework for the current research.

Nominalisation in systemic functional linguistics is understood as a representation of a broader concept of ‘grammatical metaphor’ developed by Halliday [Halliday, Matthiessen, 2013]. Although the definitions of grammatical metaphor may vary as per the focus of each particular study, the researchers appear to agree on the point that grammatical metaphor is characterised by the indirect link between the grammatical meaning and the grammatical form used to express it, or as Thompson broadly puts it – by the ‘re-setting the relationships between meanings and wordings’ [Thompson, 2014, p. 233] that causes ‘interstratal tension’ [Hao, 2020, p. 160] between the strata of semantics and lexicogrammar. Consider the following examples:

- (1) a. If we adopt the following principles, the company’s financial health will continue to improve.
- b. The adoption of the following principles will bring further improvement to the company’s financial health.

In (1a), the process, or ‘figure’ [Halliday, Matthiessen, 2013], is congruently rendered by a verb ‘adopt’, thus, there is no tension between the semantics of the concept and the lexicogrammatical form. However, in (1b), the process is incongruently (metaphorically) rephrased by means of a noun which is an accepted lexicogrammatical means of rendering things, or ‘entities’ [Ibid]. The prevalent significance of nominalisation as a vehicle of ideational (lexemic) grammatical metaphor is underlined by Halliday who claims that nominalisation is ‘the single most powerful resource for creating grammatical metaphor’ [Ibid, p. 729].

To restrict the scope of our attention to a particular type of nominalisations, we analysed the classifications that exist among scholars. First, the current study is specifically focused on deverbalised nominalisations (e.g., classification – to classify, digitalisation – to digitalise) as opposed to nominalisations formed on the basis of adjectives and other parts of speech (brief – brevity, bright – brightness). The reason for this consists in the fact that deverbal nominalisations prove to be more frequent in the English language than other types [Jalilifar et al., 2017, p. 7; Hayriyan, 2020].

Second, the present research paper, in line with other studies in the field [Baratta, 2010; Alexiadou et al., 2013], concerns itself with derivational nominalisations only, and excludes the instances of nominalisations formed through zero derivation or sound interchange (e.g., to walk – a walk, believe – belief). Such narrowing of the study scope can be justified, first of all, by the fact that derivational nominalisations constitute the most frequently occurring and productive word-building pattern. Nominalisations derived

by means of -tion suffix, in particular, prove to be especially frequent. A number of studies show quantitative evidence of its significantly higher rate of occurrence in academic writing [Biber, 1988; Mehrabi et al., 2018], even if compared to -ing nominalisation which intuitively might seem more widespread [Biber et al., 2011].

Third, nominalisations are subdivided into textual (or metalinguistic) and non-metalinguistic ones [Charles, 2003; Baratta, 2010]. Textual nominalisations are those that are used by the author to render concepts based on the opinions of other authors. In the current research, we study non-metalinguistic nominalisations only, as these nominalisations are the ones that ‘writers choose themselves’ [Baratta, 2010, p. 1021]. For the classification, we adhere to the criteria elaborated by Baratta, who lists as textual nominalisations direct links to other research papers, periphrasis of other people’s words as well as terms perceived as the professional jargon of a particular group of scholars [Baratta, 2010].

The fourth classification that proves significant for the scope of the present study is the division between the so-called ‘live’/‘instantial’ and ‘dead’/‘faded’ nominalisations [He, Yang, 2018; Hao, Humphrey, 2019; Hao, 2020]. Live grammatical metaphors (and nominalisations in particular) are understood as nominalisations that represent figures (processes), whereas dead nominalisations appear to have lost their processual meaning and tend to render the meaning of entities [Halliday, 1998; Hao, 2020], or, as Halliday and Matthiessen later called it, the meaning of a ‘reified process’ [Halliday, Matthiessen, 2013, p. 322]. The criteria of distinguishing between live and dead metaphors are not as obvious as those used for previous classifications; however, the method of ‘unpacking’, or congruent rendering of a nominalisation is widely recognised as a useful tool [Liardét, 2016; He, Yang 2018; Hao, 2020]. If a nominalisation does not yield to congruent unpacking, it can be classified as a dead grammatical metaphor. Consider the following examples:

- (2) a. Due to the introduction of the policy, the prospects for the future of the company seemed to improve.
- b. The novel was captivating from the start, even the introduction left the reader breathless.

In (2a), the nominalisation ‘introduction’ allows for congruent rendering (The prospects improved because we introduced the policy), thus, we may conclude that ‘introduction’ is an example of a live grammatical metaphor. In (2b), the word ‘introduction’ has long lost its processual meaning and cannot be unpacked in the same manner as in (2a). Consequently, ‘introduction’ in (2b) is a case of a dead grammatical metaphor.

However, the line between dead and live grammatical metaphors is not always clear, even after the attempt at congruent rendering of the message. Based on the principles developed by Halliday, Hao describes a tristratal approach that can be used to distinguish between the more ambiguous instances of dead/live grammatical metaphors [Hao, 2020]. The author has formulated a number of features characteristic of live and dead grammatical metaphors that can be used as markers for the differentiation: the semantic (whether the nominalisation comprises one figure or a sequence of figures), the contextual (with regard to cohesion) and the grammatical ones (with the focus on generalised elementary meanings, i.e., ‘Sayer’, ‘Value’, ‘Agent’). Whenever the item under classification appeared ambiguous, we adhered to this methodology. The application of the methodology in question can be illustrated with the following example:

- (3) a. The rate of the gas diffusion in the liquid seemed to be increasingly slow.
- b. Diffusion is an inevitable physical process, one can hardly avoid it even under controlled conditions of the laboratory.

According to Hao’s tristratal approach, the word ‘diffusion’ in both examples represents one figure. Thus, the semantic features do not seem to contribute to the differentiation. In (3a), however, the nominalisation is preceded by an agentive object (gas) and followed by an object describing the sphere of figure realisation (in the liquid) which is a contextual feature of a live grammatical metaphor [Ibid, p. 168], as opposed to ‘diffusion’ in (3b) that lacks such modifiers. These points allow us to classify ‘diffusion’ in (3b) as a case of a dead grammatical metaphor.

The current paper focuses on analysing live nominalisations, as they contribute to text cohesion [Hao, Humphrey, 2019] and reflect the active process of densely packing the idea into a more compact nominal form, in contrast to dead nominalisations that have (to a certain extent) lost their active processual meaning.

Thus, the current research focuses on the analysis of patterns of phrases with live non-metalinguistic deverbal nominalisations that present the characteristic differential features between Applied Physical Sciences and Humanities academic discourses.

2.2. Nominalisations as functional tools of academic discourse

Various studies regard nominalisation as an essential feature of academic discourse [Halliday, 1998; Biber, Gray, 2013; Xuan, Chen, 2019]. The opposing point of view that considers nominalisation a hindrance to comprehension that should be avoided in scientific papers [Arduengo, 2017]

tends to prescriptive character of analysis and seems to find less support among scholars. Alternatively, research that considers grammatical metaphor (and nominalisation in particular) an essential feature of academic discourse provides empirical evidence of this opinion resulting from synchronic studies [Norouzi et al., 2012; Staples et al., 2016; Biber et al., 2020]. Moreover, by conducting a diachronic corpus study, Bello [Bello, 2016] has concluded that the frequency of nominalisation usage in L1 scientific discourse has been steadily increasing over the last two centuries.

The reasons for nominalisations being a characteristic feature of academic discourse are obviously connected with the correspondence between the functions of nominalisations and the functions of academic discourse on the whole. The literature analysis allows to understand this correlation in more detail.

The main function of academic discourse is, beyond doubt, that of construing knowledge and transferring it logically and unambiguously [Popova, 2015, p. 87]. Likewise, the most widely recognised function of nominalisation is that of ‘construing disciplinary knowledge’ [Hao, 2020, p. 145]. Halliday further claims that nominalisation is a central tool of argument development [Halliday, 1998, p. 202]. There are several lines of research that eventually confirm this point of view.

First, according to [Norouzi, 2012] and [Ebrahimi, Nekooei, 2018], nominalisations contribute to syntactical complexity of academic discourse. Nominalisation has been shown to increase lexical density as it provides a more concise way of expressing ideas than the congruent rephrasing of a grammatical metaphor would allow [Norouzi et al., 2012; Pujol Dahme, Selfa, 2020]. In other words, nominalisations create a multi-layer structure that allows for the expression of multiple semantic levels [Halliday, Matthiessen, 2013, p. 711]. Additionally, nominalisation proves to be a major contributor to the ‘technicality’ of academic writing [He, Yang, 2018; Hao, 2020, p. 150] which makes nominalisations a lexical vehicle of construing academic knowledge. Moreover, several research papers illustrate the role of nominalisations in construing academic discourse on the pragmatic level. They analyse nominalisation as a tool of actual sentence division, maintaining coherence and enabling retrospective anaphorical sentence connection [Baratta, 2010; Liardét, 2016; Thomas, To, 2016].

The formal rhetorical effect of academic discourse can also be maintained by using nominalisations. By removing the need to mention a human agent behind the action or statement, nominalisations make the discourse more impersonal and generalised [Baratta, 2010; Thomas, To, 2016]. Another widely supported point is the formal and elevated rhetorical effect achieved by means of nominalisations [Baratta, 2010; He, Yang, 2018], or as Halliday

and Matthiessen put it, the effect of ‘prestige... power and authority’ [Halliday, Matthiessen, 2013, p. 713]. In this line of investigation Işik-Taş maintains that adding a complement to a nominalised stance expression helps to present a more convincing argument, thus retaining the level of objectivity [Işik-Taş, 2018, p. 3] by adding some additional information to the generalised abstract nominalisation. That makes the present research even more relevant, as it is aimed at understanding the conventional patterns of nominal phrases with nominalisations and their functional scope.

The correspondence between the functions of academic discourse and nominalisations provides the basis for the further comparison of the ways disciplinary-specific academic discourse subsets realise their functions via nominal phrases with nominalisations.

2.3. The relevant conclusions of the previous research on nominalisations

The widespread recognition of nominalisation as a significant tool for Academic Writing accounts for a constantly growing interest of scholars in the topic. All the studies in this field can be subdivided into those that dwell upon linguistic aspects of the phenomenon and those that focus upon the educational problems connected with nominalisations.

The papers concerning themselves with linguistic aspects of nominalisations are varied. As it has been mentioned, the theory of grammatical metaphor was formulated by Halliday [Halliday, 1985; Halliday, Matthiessen, 2013]. This milestone publication inspired a wide range of studies on nominalisation as an academic writing tool.

Namely, as nominalisations prove to be a characteristic feature of institutionalised academic discourse, there is a segment of research devoted to the way nominalisations are represented across registers and sub-discourses. One group of papers compares nominalisation usage in speech and writing [Biber, 1988; Norouzi et al., 2012], another one focuses on nominalisation representation across different soft and hard disciplines [Charles, 2003; Jalilifar et al., 2017, 2018].

In the latter group, the research by Jalilifar et al. is of particular interest to our investigation [Jalilifar et al., 2017, 2018; Heidari Kaidan et al., 2021]. The authors conducted a comprehensive analysis of patterns of including nominalisations into nominal phrases in expert academic writing across hard and soft disciplines. Data from these studies suggest that the most frequently encountered phrasal structures (with nominalisations) across hard and soft disciplines are prepositional phrases (e.g., reification of processes), nominal phrases with a classifier in pre-position (e.g., substantial contribution) and nominalisations that are not included into phrases. The last model, according

to Jalilifar et al., signifies that nominalisation is frequently used as a tool of semantic generalisation [Jalilifar et al., 2017, p. 11]. However, the study focuses predominantly on nominalisations as head nouns of nominal phrases (only one model of nominalisations as modifiers is discussed). Another possible limitation of the study is the fact that the authors make no distinction between metalinguistic and non-metalinguistic nominalisations, a limitation which we attempted to overcome in the current paper.

Another direction of nominalisation analysis is aimed at the more thorough understanding of the inner semantics of nominalisations and of the way it is reflected in the grammatical form and textual context. In this regard, Bello provides the cognitive interpretation of agent and circumstance inclusion in nominalisations [Bello, 2016]. Likewise, the analysis of verbal argument reproduction in nominalisations of different languages is the focus of a comparative study by Alexiadou et al. [Alexiadou et al., 2013].

The criteria for nominalisation classification comprise another fruitful field of research. Each study is concerned to a certain extent with the criteria for nominalisation choice and classification. However, there are papers that aim solely at elaborating the techniques to help tackling problematic issues of classification: dead – live opposition [Hao, Humphrey, 2019; Hao, 2020;]; eventive and referential nominalisations [Alexiadou et al., 2013; C. Park, B. Park, 2017; Fonteyn, 2019].

Though extensive research on nominalisations is devoted to the linguistic analysis of the phenomenon, a great number of publications in this field is focused on the educational aspect of the problem. A wide scope of problems connected with mastering nominalisation use in the process of language acquisition is covered: correspondence between nominalisation frequency and academic writing proficiency [Liardét, 2013; Thomas, To, 2016], retrospective labelling acquisition [Baratta, 2010], technicality construing skills development [He, Yang, 2018]. Of particular interest to the current study is the conclusion drawn by Hartig and Lu on high importance of teaching nominalisations in the scope of English for Specific Purposes instruction [Hartig, Lu, 2014], along with Liardet's observation that the most frequently occurring type of incorrect nominalisation usage is the so-called 'co-text intermediacy type' [Liardét, 2016, p. 23], i.e. the one containing mistakes in broader context of nominalisation embedding. These arguments overall argue for the importance of studying nominalisation phrasal usage patterns.

3. Methods

3.1. Corpora

For the purpose of this study the two subcorpora were used (Social Sciences and Physical Sciences subcorpora). Both of the subcorpora are subsets

of the British Academic Written English (BAWE) corpus¹. The corpus is a multi-million word collection of academic written papers in different genres and levels of the writer's linguistic and academic proficiency. Advanced level part of the corpus includes L1 Master's research proposals and critique essays. The corpus is widely recognised as a reliable source for academic reference [Işık-Taş, 2018, p. 10]. The BAWE corpus is relevant for the purpose of the current study because the annotation of each text provides information on the authors, including the information on the native language of the author.

The Humanities and the Physical Sciences subcorpora of this study include research proposals and critique essays of L1 Master's students in Social Sciences (2003–2007) and Engineering (2001–2007) with the respective total word count of 118,958 words (33 papers) and 101,729 words (24 papers). The corpora are comparable from the qualitative point of view: the linguistic characteristics (genre) and personal characteristics of the authors (native English speakers; proficiency level at academic writing) are the same. The slight quantitative difference between the corpora is neglectable and can be easily overcome by means of normalisation per 100 000 tokens.

3.2. Research design

The corpus was tagged by means of a corpus toolbox LancsBox 5.1². Initiated by the Lancaster University, this software package provides automatic parts of speech tagging along with more sophisticated tagging (such as automatic nominalisation tagging), a concordance tool and data visualisation tools.

At this stage, the question arises whether it is possible to rely on the accuracy of automatic parsing by automatic corpus tools. For obvious reasons, the manual checking of the whole corpus appears to be unattainable: it would require substantial amount of time and, thus, would make the use of automation tools pointless. It would constrain researchers to use smaller data sets and significantly lower the objectivity of study results, since the linguists would have to rely on extrapolations and approximations.

One of the approaches that is accepted in corpus linguistics consists in the manual check of the tagging accuracy of a relatively small part of the corpus. The prominent papers in the field suggest one tenth of a corpus

¹ Nesi H., Gardner S., Thompson P., Wickens P. The British academic written English (BAWE) corpus. URL: <https://warwick.ac.uk/fac/soc/al/research/collections/bawe/> (date of access: 20.04.2022).

² Brezina V., Weill-Tessier P., McEnery T. #LancsBox (5.1) [Computer software]. Lancaster University, 2020.

as a sufficient data set for that objective [Staples et al., 2016, p. 180; Lan et al., 2019, p. 5].

It should be mentioned that the automatic parsing is not perfect even in the most sophisticated corpus analysis tools. 100% accuracy is practically unattainable [Yumusak et al., 2014]. The comparative analysis of the existing corpora enables linguists to draw conclusions that 91% accuracy of the POS-tagging is a level sufficient for linguistic analysis, since the number of parsing inconsistencies would be negligible [Ibid].

Following the described methodology, we randomly selected 10% of the corpus data and checked it for tagging accuracy. The accuracy of part-of-speech tagging (POS-tagging) was over 95%. Incorrect tagging instances included only the types irrelevant for the scope of the current research (e.g., tagging a common noun as a proper noun) which allowed us to consider the tagging accuracy level for POS-tagging as appropriate for the study. Meanwhile, the automatic nominalisation tagging resulted in frequent erroneous parsing of nominalisations (about 40%) which resulted in the decision to avoid the use of automatic nominalisation tagging. Instead, the of **tion** and **_N** tags were applied.

The tagged corpus analysis consisted of three stages. The initial stage was to extract nominalisations that conformed with the criteria outlined for the study. The second stage consisted in listing all the patterns of nominalisation inclusion into nominal phrases, counting the frequencies for each type in the two subcorpora and normalising the data. The last step was to compare the frequencies of each type in the two subcorpora by means of statistical tools. Finally, the results were interpreted qualitatively.

Nominalisation extraction consisted of the three successive steps. Each of them applied one of the three relevant criteria (derivational, live, non-metalinguistic) and included two stages: automatic and manual. All the concordance lines with nominalisations were extracted with the context of thirteen words before and after the node. The extraction process is described in further detail below.

As Biber points, the majority of nominalisations are formed by means of the following productive suffixes: *-tion*, *-ity*, *-ment* and *-ness* [Biber, 1988]. For the scope of this analysis, we chose all the nominalisations ending in *-tion* suffix. The reasons for focusing on deverbal nominalisations were outlined in the theoretical chapter. Among the two derivational models for deverbal nominalisation formation (*-tion* and *-ment*) the one with *-tion* suffix proved more productive in the corpus under analysis (the comparative number of nominalisations in the two subcorpora are presented in Table 1), which outlined the object of the research.

**The comparative number of nominalisations
in the two subcorpora**

Variable	-tion Nominalisations	-ment Nominalisations
Humanities subcorpus	3085	966
Physical subcorpus	2285	1036

Note. Normalised per 100K tokens.

First, deverbal derivational nominalisations were extracted from the corpus by means of *tion* and *_N* tags. The application of automatic tags proved relevant at this point, with minor extent of manual correction that can be described with the following example:

- (4) <...> NGOs face, attention can now be turned to one of the most important **questions** of all; what is the true agenda of women's NGOs? The power that <...> (H2472)

The sentence contains the word 'questions' that conforms with the tags but obviously is not a derivational nominalisation. The manual correction allowed to exclude all similar elements from the sample: caution, condition, destination, fiction, function, portion, proportion, question. The correction was implemented by means of analysing the alphabetised list of nodes.

The resulting sample was used for the second step that consisted in extracting all the instances of non-metalinguistic nominalisations. The separation on the grounds of the textual – non-metalinguistic opposition was performed manually. The sentences below may serve as an example.

- (5) a. <...> 'Commercial infrastructure was improved by the **construction** of railways, roads, telegraph networks, harbours, and warehouses, the standardization of currency and <...> (H1363)
- b. <...> experience little 'autonomy to try and fail' as Leadbeater (1999: 83) suggests and the **exploitation** evidenced by the TUC report on call centres demonstrates that not all companies <...> (H0124)

In (5a), the nominalisation 'construction' is a component of a direct quote from an external source which undoubtedly provides us with a reason to exclude this sentence from the sample. In (5b), however, the grounds for the distinction are not that transparent. On the face of it,

the nominalisation ‘exploitation’ might seem as a word consciously utilised as a grammatical metaphor by the speaker. On closer inspection, it turns out that the nominalisation is part of a paraphrased statement made initially in ‘the TUC report’ which makes it a case of a textual nominalisation and effectively excludes the example from the study.

Step 3 included the extraction of live nominalisations. The extraction was manual, the automatic toolboxes do not appear to provide instruments for such a deep semantic and pragmatic analysis. The procedure of congruent unpacking was utilised in the majority of instances to observe whether the intrastratal tension is present in the nominalisation. Whenever the classification was ambiguous, we adhered to the tristratal approach to nominalisation classification mentioned in the theoretical part of the study. Consider the following examples:

- (6) a. <...> Upon their **election** victory in 1976, the Parti Québécois (francophone nationalist party) immediately set about replacing <...> (H2172)
- b. <...> their head office operations out of Quebec in the two years after the **election** of the Parti Quebecois. <...> (H2169)

In (6a), the word ‘election’ does not allow for congruent rendering without a nominalised expression. In (6b), on the contrary, instead of ‘after the election of the party’, we might say ‘after the party was elected’. Additionally, according to the tristratal classification mentioned on the theoretical part of the study, the presence of an agentive object ‘of the party Quebecois’ proves the fact that the nominalisation in (6b) is live.

As a result of this stage, we obtained a sample of live non-metalinguistic nominalisation uses in the two subcorpora. The respective numbers are provided in Table 2. Each nominalisation in the final sample was tagged with a ‘_1’ tag in order to exclude the duplication of results during the further automatic analysis.

Table 2

Live meta-linguistic nominalisation count in the two subcorpora

Variable	-tion Nominalisations	Live non-metalinguistic nominalisations
Humanities subcorpus	3085	1258
Physical subcorpus	2285	1187

Note. Normalised per 100K tokens.

In order to assess the relevance of the observations, we performed the same procedure with the corpus of newspaper articles from *The Guardian* devoted to the topics of physics and social studies. The results (see Table 3) conform with the statements from the theoretical part of the study: nominalisations tend to prevail in academic writing.

Table 3

**Live meta-linguistic nominalisation count
in newspaper articles**

Variable	-tion Nominalisations	Live non-metalinguistic nominalisations
Humanities subcorpus	1232	855
Physical subcorpus	978	554

Note. Normalised per 100K tokens.

The resulting academic discourse sample was analysed for patterns of nominalisation inclusion into nominal phrases. First, the 10% sample was analysed manually for pattern types. The expected patterns list was borrowed from Biber, Gray, and Poonpon [Biber et al., 2011, p. 20–21].

As a result, eight patterns were observed. Once the patterns were defined, we worked out the procedure for automatic extraction of those patterns that allowed it (e.g., ‘nominalisation + preposition’ pattern allowed for automatic extraction by means of right-context filters ‘Right: *_IN* (and)’, ‘Right: *to_TO* (and)’). The procedure simplified the extraction process but still required a certain level of manual correction (e.g., the exclusion of instances of ‘to’ used not as a preposition introducing a prepositional phrase). The patterns that did not allow for automatic analysis (such as relative clauses introduced asyndetically) were analysed manually. As a result of manual correction, ten pattern types were observed. The frequency for each pattern in each subcorpus was then counted and normalised per 100K tokens. The list of the observed patterns and the examples are provided in Table 4.

During the third stage, the frequencies were subjected to statistical analysis. For finding out whether the association exists between the two categorical variables (nominalisation phrasal pattern type and the disciplinary orientation of the text) and for assessing the effect size of association we used the Fisher exact test and the Yule’s Q coefficient respectively.

4. Results

The results of the statistical analysis of nominalisation patterns are provided in Table 4.

Table 4

**Comparative analysis of nominalisation patterns representation
in physical and humanities sub-corpora**

Pattern of nominal phrases with nominalisations (with examples)	Physical corpus count*	Humanities corpus count*	P-value**	Effect size
Total nominalisation count	1187	1258	$2.486 \cdot 10^{-4}$	0.086
Nominalisation + infinitive clause (recommendation to improve something)	7	10	0.631	0.148
Nominalisation + <i>-ing</i> clause (description explaining something)	16	31	0.055	0.293
Nominalisation as a premodifying noun + noun (promotion system)	220	79	$1.249 \cdot 10^{-16}$	-0.494
Premodifying noun + nominalisation (health promotion)	267	135	$2.648 \cdot 10^{-11}$	-0.354
Attributive participle + nominalisation (growing competition)	3 (1-2)	23 (3-20)	$1.037 \cdot 10^{-4}$	0.757
Prepositional phrase + nominalisation in post-position (proof of the intervention)	93	341	$4.824 \cdot 10^{-27}$	0.552
Nominalisation + relative clause*** (cooperation that includes the local communities)	23	58	$3.961 \cdot 10^{-4}$	0.408
Nominalisation + <i>-ed</i> clause ⁴ (exhaustion caused by something)	11	25	0.042	0.364
Nominalisation + prepositional phrase (recognition of the anomaly)	386	558	$6.402 \cdot 10^{-5}$	0.154
Attributive adjective + nominalisation (social isolation)	236	328	0.004	0.135

* Normalised per 100K tokens.

** $p < 0.05$.

*** Though relative clauses and *-ed* clauses might seem similar and interchangeable from the point of view of the grammatical meaning rendered with the structures, they are still perceived as structurally different patterns from the point of view of grammatical complexity and have to be analysed separately [Biber et al., 2011, p. 23].

As per the accepted *modus operandi* among linguists, the significance level for this study was 0.05. At this level the significant association between the two categorical variables was observed for the majority of nominalisation phrasal inclusion patterns. The only patterns that showed no association were ‘nominalisation with a post-modifying infinitive clause’ and ‘nominalisation with a post-modifying *-ing*-clause’. The prevailing number of patterns showed positive effect sizes of association. The negative association was observed in the pattern with nominalisations employed as preceding nouns and in the one with nominalisations modified by nouns in preposition. The highest strength of association between the variables was observed in pattern ‘attributive participle + nominalisation’ (76%), the lowest one occurred in pattern ‘pre-modifying attributive adjective + nominalisation’ (13%). The patterns ‘prepositional phrase + nominalisation in post-position’, ‘nominalisation + relative clause’, ‘nominalisation + *-ed*-clause’ and ‘nominalisation + prepositional phrase’ showed the significance level of 55%, 41%, 36% and 15% respectively. Nominalisation phrases with nouns in post- and preposition showed negative effect sizes (–35% and –49% respectively).

5. Discussion

The results of the study show that at the significance level of 0.05 there is an association between the number of nominalisations in the two subcorpora under analysis. The effect size is 0.086, which signifies that there is an approximately 9% prevalence of nominalisation use in the Humanities subcorpus over the Physical subcorpus. This outcome of the study is consistent with the results of Jalilifar’s et al. study [Jalilifar et al., 2017] and challenges MacDonald’s idea that soft sciences academic texts are characterised by lower frequency of nominalisation usage [MacDonald, 1994, p. 190]. The possible explanation for such a tendency might be that nowadays soft sciences tend to acquire the tools and approaches of technical sciences (e.g., statistical method, reliance on corpora and big data), which makes them harder [Yngve, Wasik, 2006, p. 3] and is naturally reflected by the discourse.

Among the patterns that demonstrate a significant association at the 5% significance level, the prevalent physical sciences subcorpus patterns are ‘nominalisation as a pre-modifying noun + noun’ (49% effect size) and ‘pre-modifying noun + nominalisation’ (35% effect size). Consider the following examples:

- (7) a. ...it was crucial that coordination and communication remained in place for the whole of the three-year construction project (P1204).

- (7) b. Furthermore there was very little uranium exploration between 1985 and 2005 (P1914).
- c. Marginal costing (in the form of contribution analysis) is extensively used in short term decision-making, which could be effectively illustrated by “Winning Margin™” (P0940).

Before we turn to the analysis of the examples, it should be noted that a number of nominal phrases on the sample consisted of more than two components, as illustrated with (7a). While this fact does not seem particularly remarkable or surprising, it poses a certain challenge at the analytical stage. Indeed, should such phrases as ‘three-year construction project’ be considered separate patterns of nominal phrases with nominalisations, consisting of three components or more, or should they be regarded as examples of simpler patterns? In the current research, we adhered to the theory of ‘immediate constituents’ [Schmid, 2012, p. 8] that analyses each structure as comprised of simpler immediate neighbours. From that viewpoint, the expression ‘three-year construction project’ consists of two nominal phrases: ‘construction project’ (head word ‘project’) and ‘three-year construction’ (head word ‘construction’) that should be analysed separately.

The first pattern is mainly used for terminology introduction (7b) or for rendering quantitative data (7a). The congruent unpacking shows that the nominalised expression enables the researchers to focus on the phenomena under study as opposed to those who studied or caused them (cf. ‘...remained in place for the whole three-year period while <something> was being constructed’ or ‘...<somebody> explored uranium’). The model employing pre-modifying nouns as a nominalisation modifier thus serves the objective of construing technicality of the Physical Sciences academic discourse and maintaining the level of objectivity. The second pattern (7c) adds to the level of abstraction and lexical density of the Physical Sciences academic texts since ‘nominalisation as a pre-modifying noun’ pattern provides a laconic form for message rendering (cf. ‘contribution analysed by experts’ or ‘contribution that was analysed by experts’).

The patterns prevailing in the Social Sciences subcorpus were ‘nominalisation + pre-modifying participle’ and ‘prepositional phrase + nominalisation in post-position’ with respective effect sizes of 76% and 55%. The more rarely occurring patterns were ‘nominalisation + relative clause’ (41% effect size), ‘nominalisation + *-ed*-clause’ (36% effect size), ‘nominalisation + prepositional phrase’ (15% effect size) and ‘nominalisation + pre-modifying adjective’ (13% effect size). The results can be illustrated by the following example of the most common phrasal pattern of ‘attributive participle + nominalisation’.

- (8) a. Numerous terms, definitions and phrases have been coined in an attempt to capture <...> the resulting reorganisation of world economies <...> (H0010).
- b. With growing competition, emotional labour has become extremely commonplace in the service sector (H0570).
- c. The EAEC emerged in distinct opposition to APEC as the anti-thesis of a perceived capitulation to Western economic dogma and globalisation (H1436).

The congruent unpacking of the grammatical metaphor in (8a) ('the fact that world economies were reorganised as a result') might serve as a ground for functional interpretation of the pattern. It illustrates how introducing non-finite verbal forms adds the dynamic character to the utterance, supplies the component meaning of simultaneously occurring action. This fact is further supported by the comparative normalised frequencies of *-ed* and *-ing* participles as nominalisation pre-modifiers: the *-ing* participle prevails. In some contexts, the componential meaning of a dynamic action contributes to the implicit modal assessment of the utterance rheme as important (8b) by introducing the increasingly influential factor that accounts for the significance of the concept rendered by the rheme. Indeed, if the attributive *-ing* participle is omitted in such examples, the logic behind the sentence would be affected, as the 'competition' has always been a factor influencing business and, consequently, it cannot be used as an explanation of recent changes. Only if the factor of increasing ('growing') competition is highlighted, it can be employed to justify the rhematised structure and to prove its significance.

Meanwhile, the attributive *-ed* participle appears to serve the function of increasing the level of abstraction and generalisation by deleting the figure of the author from the statement and thus extrapolating the idea to the general public on the whole. This can be illustrated by the fact that to rephrase the nominalised phrase from (8c), we would require some sort of deictic, or indefinite agentive pronouns, e.g., 'as the anti-thesis of what is perceived by some people as the fact that some states capitulated to Western economic dogma'. By avoiding the mentioning of the people responsible for the claim, the author extrapolates the idea to all the participants of the system, inducing the recipient to share the view as if it were a common knowledge. However, without further proof of the reliability of the statement in the broader textual context (Who perceives APEC as surrendering to Western economic dogma?), the use of pre-modifying *-ed* participles may have the opposite effect of making the text sound void of content.

Table 5

**The comparative models of technical and humanitarian academic discourse subsets
with regards to nominalisation phrasal inclusion**

Function	Humanities sub-discourse patterns	Physics sub-discourse patterns
The function of construing academic knowledge	<ol style="list-style-type: none"> 1. Nominalisations as components of prepositional phrases with co-occurring secondary textual prepositional nominalisation (lexical density) 2. Nominalisations as components of prepositional phrases employed as a coherence marker (textual coherence maintenance) 3. Nominalisations modified by relative clauses for the sake of the actual sentence division (rhematisation of a certain utterance element) 	<ol style="list-style-type: none"> 1. Cardinal numbers as pre-modifiers of nominalisations (technicality construing) 2. Terms (nouns) as pre-modifiers of nominalisations (technicality construing)
The function of maintaining the rhetorical effect of impersonal, generalised, objective character	<ol style="list-style-type: none"> 1. Nominalisations modified by non-restrictive relative clauses (adding supplementary details for increasing the level of objectivity) 2. Nominalisations with pre-modifying <i>-ed</i>-participles (abstraction) 3. Nominalisations with attributive adjectives of positive connotation (increasing the recipient trust to the message) 4. Nominalisations with relative clauses containing positive connotation (increasing the recipient trust to the message) 5. Nominalisations modified by attributive <i>-ing</i>-participles representing increasingly significant dynamic factors (increasing the recipient trust to the message) 	<ol style="list-style-type: none"> 1. Cardinal numbers as pre-modifiers of nominalisations (objectivity) 2. Terms (nouns) as pre-modifiers of nominalisations (objectivity) 3. Nouns as post-modifiers of nominalisations (omitting the process agent)

The functional interpretation of the patterns performed in such a manner allowed us to model a paradigm of institutionally bound academic discourse with regard to nominal phrases with nominalisations in its scope. The model (presented in Table 5) might be employed as a framework of reference for the appropriate use of nominalisation ‘elaboration’ [Liardét, 2016].

In conclusion, the physical subset of the academic discourse appears to be more laconic in the use of complex nominal phrases with nominalisations and in the range of functional patterns of such phrases employed for the achievement of discourse pragmatic objectives. The patterns found in the physical sciences subcorpus are oriented towards the maintaining of objectivity level and construing the technicality of the academic knowledge. Contrariwise, nominalisations of the humanities subset of the discourse tend to focus on broader range of targets, namely ensuring coherence, actual sentence division, objectivity and abstraction realisation, increasing the recipients’ trust to the message and invocation of their cognitive reaction, providing lexical density.

6. Conclusion

The current study was aimed at the analysis of the disciplinary-specific grammatical patterns of nominalisation inclusion into nominal phrases. The research paper lies in the scope of genre studies. It continues the analysis of genre-specific structural conventions of expressing grammatical meaning according to the principles outlined in previous works in the field [Samraj, 2005; Diani, 2007; Jalilifar et al., 2018; Kuhl et al., 2020].

The existing research analysis provided a model for nominalisation classification and interpretation. The results of the study suggest that there is a 9% association between the disciplinary discourse features and the frequency of nominalisation use with the prevalence in Humanities sub-discourse. This finding challenges the previously held view that hard sciences discourse uses nominalisations more frequently than soft sciences. This outcome is in accord with the growing tendency to apply the tools of exact sciences in social sciences. Another possible explanation is that the Humanities sub-corpus under analysis included the texts in applied sciences that tend to use more practically oriented and more specific data. However, the technical sub-corpus also contained the texts in an applied branch of studies, thus, the character of texts was uniform enough to justify the comparison.

The uniformity of the texts constituting the corpora under study is an essential condition that makes the study results reliable: the texts in the corpora belong to the same genre of academic writing (research proposals), the authors are native English speakers who demonstrated

the same proficiency level of their academic writing skills. Obviously, it would hardly have been possible to compare the data if one of the criteria were not observed. Consequently, the methodology suggested in the research cannot be used to compare, for example, film reviews with software documentation.

The findings concerning the most common grammatical patterns of nominalisations were different for the two subcorpora under study. The physical sciences discourse applies the pattern of 'pre-modifying noun + nominalisation' as the most frequent model of nominalisation grammatical embedding in order to retain higher levels of technicality and objectivity, whereas the prevalent models for the humanities subcorpus were 'nominalisation + pre-modifying participle' applied for rendering the component meaning of dynamic action, 'noun + prepositional phrase with nominalisation' used to ensure a high level of lexical density in rendering temporal, causal and instrumental relations and 'nominalisation + relative clause' employed for inducing the recipient to share the positive assessment of the message, for the sake of textual coherence maintenance and for the sake of increasing the objectivity of the text.

The findings of the study have been summarised with the objective of creating a model of the conventions of complex phrases with nominalisations representation in hard sciences and soft sciences sub-discourses. While the prevalence of nominal phrases with nominalisations is observed with regards to the humanities sub-discourse, the technical sub-corpus tends to higher levels of objectivity and technicality of such phrases, which seems consistent with the exact and technicalised character of the discourse. At the same time, the Humanities subset of the sample shows a broader variety of functional patterns of nominalisations employment (in the scope of complex nominal phrases).

The outcomes of the research can be of theoretical and practical significance to those studying institutionalised discourse and the general conventions of academic writing. Additionally, the results of the study will be relevant to researchers in the field of pragmalinguistics, discourse analysis and actual sentence division. The model of institutionalised discourse subsets can be applied as a framework of reference for academic writing in the scope of a particular branch of studies. The results of the study may receive practical application in the sphere of effective communication strategy development within the framework of English institutionalised academic discourse.

One of the possible limitations of the study might lie in the extrapolation of the results to the whole technical and humanitarian subsets of academic discourse. Though researchers tend to regard the analysis of two disciplinary discourse subsets as sufficient for the study [Diani, 2007; Jalilifar et al.,

2018; Kuhi et al., 2020], other genres of texts, additional branches of study might be considered to prove the correctness of the extrapolated conclusions of the current paper. This limitation, thus, may provide a fruitful basis for further study.

The strategy for analysing utterances with nominal phrases with nominalisations developed within the framework of this study, as well as the metalinguistic, pragmatic paradigm of interpreting the research results, can be extended to the analysis of other segments of discourse. This research can be continued by expanding the analysed empirical data, as well as by conducting a comparative analysis among other institutional discourse segments. Another relevant area of further research consists in comparing common patterns of nominal phrases with nominalisations usage within the scope of institutional discourse subsets of different languages.

Overall, the findings of the study confirm the high and ever-increasing role of nominalisations in institutionalised discourse formation and demonstrate the need to use nominal elaboration patterns in accord with the conventions and functional features of disciplinary-specific discourse types and, consequently, to create detailed corpus-based frameworks of reference that could be applied as academic writing disciplinary-specific guides.

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