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**THE STYLISTIC FEATURES OF NOMINALIZATIONS
IN SCIENCE POPULAR TEXTS**

BACHELOR THESIS

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INTRODUCTION

Language is a unique and continuously changing phenomenon. Its importance is unquestionable. The purpose of it is to convey the message to readers or listeners in oral or written form. Spoken language tends to be spontaneous and not so well structured as written texts. While writing the author of written work has more time and is non-committed to answer or say something immediately. Nowadays many different genres of texts exist, however, this research focuses on science popular texts. Perrault (2013) claims that science popular texts can be found in many places, even in books. Usually this type of writings is published in magazines, newspapers, online magazines or blogs, for instance *Popular Science*, *The Guardian*, etc. Such texts are available worldwide, everyone interested can access them. As every type of written form of language, it has some interesting features. Therefore, this research focuses on nominalizations in science popular texts.

The **subject** of this research is the stylistic features of nominalizations which are one of predominant features in English science popular texts.

The **aim** of the present study is to analyse nominalizations and its stylistic features of it in English science popular texts.

To achieve this aim, the following **objectives** have been set:

1. to present theoretical framework of nominalization;
2. to discuss the genre of science popular texts;
3. to reveal the stylistic features of nominalizations and provide the classification of nominalizations according to their function in science popular texts.

The below presented research **methods** have been applied:

1. Descriptive theoretical analysis method was used to provide the theoretical data concerning nominalization.
2. Descriptive analytical method was useful while analysing the cases of nominalizations.
3. Statistical method was used to systematize the results of collected and analysed examples.

The research material and the scope:

Popular science texts concerning the topic of science were taken from the online English magazine *Popular science* (see the website <http://www.popsci.com/>). For investigation 259 examples nominalizations were drawn and examined from 40 articles covering the period from January 8, 2018 to March 27, 2018.

The relevance and novelty of the research:

Nowadays more linguists analyse the phenomenon of nominalization. The importance of nominalization has been studied by Halliday (2004), Downing and Locke (1992), Sušinskienė (2010, 2012, 2013), Heyvaert (2003), Baratta (2009) in different point of views. Nominalizations are essential in scientific discourse; however, writers tend to use them in popular science texts as well. Different approaches to it were discussed in the research. As this investigation focuses attention on science popular texts, investigation implies theoretical framework of it. The phenomena of science popular texts have been analysed by such linguists as Sušinskienė (2012), Koskela (1997), Hyland (2009; 2018), Petrėnienė (2011) to mention a few. Main features of science popularization texts and its importance in global world were discussed in research. Despite the fact, quite significant number of linguists have already done many researches on nominalizations and its functions, but there are not so many works done about nominalizations in science popular texts. Therefore, there is a need for more investigation to reveal how grammatical metaphors function in science popular texts. Hence, the research in this field is necessary and useful to everyone interested in nominalizations and its functions.

The structure of the research includes the following parts: introduction, theoretical part, methodological considerations of the research, empirical part concerning the analysis of examples taken from the source mentioned above, conclusions, the list of references and sources.

The introduction shortly presents the concept of nominalizations. It also reveals the object, the aim, the objectives of the research and the main research methods used in the paper. The theoretical part of this thesis observes nominalizations and its use in science popular texts. Practical part investigates the collected examples of nominalizations and their use in popular science texts. The summary of the theoretical part and the results of the research are provided in conclusions. The list of references and sources lists that were used while writing the present paper.

I. THE CONCEPT OF NOMINALIZATION

Language is one of the means humans communicate with each other. Most of the languages existing in the world have changed significantly. Languages had evolved and adapted to people's needs as many different things appeared. Systems of words for communication are continuously changing, evolving, adapting to the people's needs as life itself is changing due to many technological things being produced. As a result, new words enter the language. One of the way new words are built is nominalization.

Several linguists have analysed the concept of nominalization: Halliday (2004; 2014), Foley (2005), Sušinskienė (2013, 2014), Lieber (2016), Barrata (2009), Heyvaert (2003), to mention the most prominent ones. Trask (2005:204) claims that "any grammatical unit which behaves like a noun or a noun phrase, but which is built from something very different" is known as the nominalization. It means that noun or noun phrase derived from any other part of speech (verb, adjective, etc) is considered as nominalization. According to Lieber (2016) nominalizations are not simple nouns because they are made from verbs, adjectives or other part of speech. In English they are derived by adding affix. It is crucial to note that both morphologists and syntacticians were investigating nominalizations, yet they were focused on different issues. Morphologists were focused on forms: affixes and how they are added to the word, their productivity. As noted by the author, syntacticians have been more interested in the connection between sentences and phrases in which such action take place than in its arrangement. It is claimed by Chamoreau and Estrada-Fernandez (2016:6) that nominalization is such method when a word of different category is changed into a noun as a result its lexical category is not the same anymore. To put it in other words, nouns are derived from other parts of speech. According to Sušinskienė (2014) nominalizations are created from already existing words. It is believed that by using this resource many new words are created by changing it ranges. It is claimed that nominalizations can be studied on two levels: by analysing only the word or analysing the whole sentence.

We can also find definitions of nominalization in dictionaries, as in the *Routledge Dictionary of Language and Linguistics*, which provides a definition of nominalization which is defined as, "productive process of word formation through which words of all word classes can be used as nouns." (Bussman, 2001: 327). In other words, verb, noun can be derived from verb, adjective, article or other part of speech. To create a noun some morphological changes can be done.

Nouns are derived from verbs or adjectives by adding different affixes. Jackson & Zé Amvela (2004) present common “derivational affixes” or “nominalizers” allowing the transformation from one part of speech to another. Linguists claim that “English class-changing derivations are mainly suffixes. Examples:

Table 1. Derivational affixes. Jackson & Zé Amvela (2004)

Verb	Affix	Noun	Adjective	Affix	Noun
Leak	-age	Leakage	Accurat(e)	-y	Accuracy
Argu(e)	-ment	Argument	Social	-ist	Socialist
Betray	-al	Betrayal	Electric	-ity	Electricity
Resign	-ation	Resignation	Free	-dom	Freedom
Defen(d)	-ce	Defence	Good	-ness	Goodness
Disturb	-ance	Disturbance	Tru(e)	-th	Truth
Refer	-ee	Referee	Social	-ite	Socialite
Depart	-ure	Departure			
Consult	-ant	Consultant			
Farm	-er	Farmer			
Enquir(e)	-y	Enquiry			
Brag	-art	Braggart			
Conclude	-ion	Conclusion			
Im'port	(stress)	ˈImport			

Table 1 presented shows the variety of suffixes used to derive nouns form verbs or adjectives. Examples of nouns derived from verbs and adjectives represent the feature of English language allowing to form nouns from other parts of speech. After analysing the table, it is clear, that mostly verbs are being converted into nouns.

In addition, Banks (2003) presents three types of possibilities of transforming the verb into a noun:

1. Nominalization and verb are identical. It means that no morphological changes are necessary to use the word as a noun (e.g. act, damage, flow)
2. Nominalizations which have no agnate¹ verb, however, they represent a process. Author provides examples of *trend* and *occasion*.

¹ Halliday and Matthiessen (2014) explain *agnateness* as relation with other things, “its pattern of systemic relationship”.

3. Nominalizations which have an agnate verb, however structurally they differ. Such nominalizations are derived from a verb by adding different derivational affixes provided in the Table 1 above.

Nominalization can be analysed from different perspectives. According to Heyvaert (2003:52), nominalization is formed on the theory that constructions should be analysed on different levels. She distinguishes three types of nominalizations (ibid, 49):

1. Nominalizing only the word (e.g. participate→ participation)
2. Nominalizing more than one word, however, it is not a full clause.
3. Nominalizations as a full clause.

This shows that nominalization functions not only on word level, it can nominalize the full phrase. For instance, word singer is derived from verb sing by adding suffix *-er*. Participation is made from verb participate by adding suffix *-ation*. Other types mentioned above are more complex as they consist of more than one word. However, their semantic significance cannot be lessened to the situation produced by the verbal constituent.

Nominalization phenomenon prevails almost in every sentence in scientific texts as it makes its style more academic and intricate. Sušinskienė (2013) states that nominalization allows the author of the text to make technical terms, to explain the relation between various phenomena, and to generalize already presented facts. Nominalizations are not so common in literature or other non-specialized popular genre texts. In addition, Foley (2005) claims that nominalization is not very typical in regular speech, however it prevails in texts, especially in scientific writings. The author stated that conversational affairs are different from issues in texts. It is noted that discussions take place face-to face and people do not have time to think about difficult phrases or speech systems where nominalizations tend to prevail. People in everyday life choose to use simple words and phrases to convey the message. It was noted that re-categorization technique fulfils the most important nominal function.

Academical discourse differs from other types of texts i.e. fiction or non-fiction as authors' role in these texts is not the same. Baratta (2009) notes that nominalizations are usually related with scientific texts as they help to apply neutral tone, by deleting an agent in the text. It is that nominalizations also assist in creating textual cohesion which ensures the quality of scientific written works. Although nominalized phrases mostly are used in science texts, such phenomenon is essential in science popular texts as well. In addition, Weiss (2005: 33) states that nominalizations appear in many genres of written language: legal documents, political discourse, social discourses and all other where higher level of technicality and abstraction is needed. It allows authors make texts more complex. As a result, sentences are shorter as nominal phrases are used instead of long, incoherent verbal constructions. It is pointed out by

Sušinskienė (2012) that nominalization is nominal structures permitting greatness of complexity as these constructions serve as references to processes. Moreover, Eggins (2004) believes that nominalization allows us to recede from the way people speak on daily basis. Although nominalized texts can sound “pretentious”, it provides writers with options that do not have texts depending on verbal constructions. According to Eggins (2004) nominalizations have two functions: economy of the text and rhetorical organization. It means that nominalizations let authors organize the text as if the research or activity is rendered not by the person but the research, ideas. Moreover, Sušinskienė (2009: 84) stated “nominalization generally invokes an impression of abstraction in texts: they help us to create more distance between the event and the participants by removing the agents of actions”. Speaking about density, in the nominal group nouns can be followed by other parts of speech. English language allows to classify, specify, describe nouns. However, the same is not applicable to verbal group as it can only be expanded in terms of tense, voice. It does not contain the meaning that expanded nominal group has.

To conclude, nominalizations have been analyzed by many linguists from different points of view. In general, nominalization is word or phrase functioning as noun but created from other part of speech. Having in mind stylistic features of nominalizations it enables the author of the text downgrade his presence in the text which makes it more objective, dense. The next paragraph will provide the theoretical framework on nominalization analyzed as grammatical metaphor.

1.1. Nominalization as grammatical metaphor

The essence of nominalization has been already presented, however nominalization can be analysed from different approach. Many linguists have analysed the phenomena of nominalizations, however Halliday ‘s researches began different approach to this process as he defined nominalization as “grammatical metaphor”. To cite Halliday (1989) grammatical metaphor “is a substitution of one grammatical class, or one grammatical structure, by another; for example, *his departure* instead of *he departed*”. In this example noun departure is derived from verb depart by adding affixes, to be more specific suffix *-ure* has been added. As a result, the phrase *his departure* functions as a Subject in the sentence. Moreover, Halliday (2004) defined nominalization as “the single most powerful resource for creating grammatical metaphor”. It symbolizes the fact that grammatical metaphor relies on the process of nominalization. Moreover, Downing and Locke (2009) claim that nominalization is the main

feature of grammatical metaphor and any situation can be presented in more than one way. It is claimed that the normal or typical way of expressing the situation may be called “iconic” or “congruent”, in which structure reflects the meaning. Any other methods of expressing a situation are called “metaphorical”. It is illustrated by two sentences provided.

Table 2. Grammatical metaphor. (Downing and Locke, 2009, 161)

Agent	Material process	Time circ.	Place circ.	Goal circ.
<i>We</i>	<i>walked</i>	<i>in the evening</i>	<i>along the river</i>	<i>to Henley</i>

Presented Table 2 provides an example of “iconic”, common way of expressing thoughts. Agent of the sentence provided is personal pronoun *we* and the main process of it is expressed by material verb *walked*. Such semantic construction is widely used in everyday speech. However, there is another way of conveying this message.

Table 3 Grammatical metaphor. (Downing and Locke, 2009, 161)

Agent	Material process	Affected	Goal
Our evening walk along the river	took	us	to Henley

The Table 3 shows the different manner of expressing the same idea. In this case, the agent of sentence is material process of the first example. To be more specific, verb *walk* has become Agent of the sentence. Circumstances of time and place now are moved from their place in the sentence and belong to nominal phrase where nominalization functions as head word. In both tables, only *Goal circumstances* have not changed their place and are interpreted in the same way. In other words, second sample is a primitive example of “grammatical metaphor” when human agent is changed by an inanimate agent. In this sentence, personal pronoun is changed into an abstract nominal phrase which is related to original agent. In the present table, nominal phrase with nominalized verb is the Agent of the sentence.

In this research paper, nominalization is considered as grammatical metaphor, thus is crucial to point out the difference between traditional understanding of metaphor and grammatical metaphor. Online *Longman Dictionary of Contemporary English (2008)*² explains metaphor as “a way of describing something by referring to it as something different and suggesting that it has similar qualities to that thing”. To be more specific, metaphor is a figure of speech, while grammatical metaphor belongs to lexical morphology.

² Online Longman Dictionary of Contemporary English available from: <http://www.ldoceonline.com/>. Accessed on 4 April 2018.

The idea of grammatical metaphor as a tool to achieve abstraction is also mentioned in Norgaard et al. (2010) work as “it enables interlocutors to talk and write about scientific phenomena as “things”. It means that abstract words are chosen to express the idea in more abstract, generalizes terms, avoiding complex, ambiguous verbal constructions. To quote Sušinskienė (2013) “nominalisation is a linguistic mechanism whereby the process or property realised as the entities.” Similarly, Fairclough (2003:12-13), “instead of representing processes which are taking place in the world as processes (grammatically, in clause or sentences with verbs), they are represented as entities (grammatically, through nominalization i.e. transforming a clause into a nominal or noun-like entity)”.

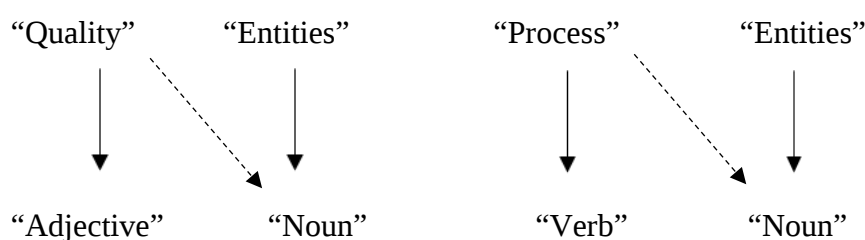


Figure 1. Nominalization and entities. Halliday (2006).

The figure 1 visualizes the function of nominalization when processes or property (quality of event) are transformed into nouns. Entities are generalized things which are comprehensible to reader. They be animate, inanimate, concrete or inconcrete (Downing & Locke, 2006:401) Moreover, Halliday (2006) claims that processes and properties due to nominalization are presented as metaphorical nouns leading to density of information and objectivity common in science discourse and science popularised texts. In the article *Nominalization as a Cohesive Device in British Newspaper Editorials (2010)*, Sušinskienė states that nominalizations appear in texts where density of information and short clauses are necessary. Thus, nominalization is a tool to pack needed message into fewest possible amount of words. In other articles linguist adds that grammatical metaphor represents processes and actor of it at the same time (Sušinskienė, 2013).

As pointed out by Downing and Locke (2009:162), grammatical metaphor “distances us from the event, raising the representation of a situation to a higher level of abstraction”. Sušinskienė (2004) states that sentence is a device to express ideas and it consists of three parts: process, participant and circumstances. According to syntactic role played by parts of semantic functions, two types of sentences are distinguished. Sentences are either congruent or non-congruent. This change is defined as “grammatical metaphor”. The heart of grammatical metaphor is nominalization when verbal group is changed into nominal group. Linguist Halliday (2004) distinguishes two types of “grammatical metaphor”: ideational and

interpersonal. Ideational metaphor as commented by Halliday (2004) is related with scientific and more formal speech in comparison with interpersonal. The essence of ideational metaphor is expressing processes or qualities as things or “entities” as the author names them.

According to Norgaard et al. (2010) ideational grammatical metaphors are grammatical constructions where parts of speech have different function than assigned one originally. For example, process is expressed not via verb but noun or nominalized structure. In the sentences provided earlier, this change is shown by word *walk*. Its original function is to express an action being done, however in second sentence the function changes into noun by zero derivation.

In Halliday’s words grammatical metaphor “opens up a new dimension of semantic space” (Halliday 2003). Stålhammar (2006) states that grammatical metaphor is a way to condense the information and it is commonly found in scientific and technical written works. To quote, “the “real” actors are often absent from the scene, replaced by the (nominalized) processes they have set in motion”. Halliday and Webster (2009) adds that according to Systemic Functional Linguistics, grammatical metaphor is understood as two wording that are grammatical classes and/or ranks. They provide two phrases to visualize the idea. Congruent clause is *farms produce(d) wheat* and metaphorical one is *farm wheat production*. According to Halliday (2004:32), “metaphor in the grammatical sense, the replacement of one grammatical class by another, of which the prototypical example is nominalization”

Halliday (2004:104) states that at the beginning grammatical metaphor was the feature of scientific discourse, however with the time it evolved and occurred in genres for wider audience.

To conclude, nominalization as grammatical metaphor was analysed by linguists Halliday (2004; 2014), Downing & Locke (2006). According to them nominalization is the main feature of grammatical metaphor. As mentioned in this chapter, it provides with an option to rise the level of objectiveness and distance the author from the text. It is important in science popular texts, as well as in more professional discourse.

II. SCIENCE POPULAR TEXTS

The aim of language is to convey the message. There are two ways to do that: spoken and written. People use spoken language, spontaneous construction in their everyday life. Written language tends to be well organized, explicitly explained. Over the last few decades the number of different text genres has increased significantly. Nowadays variety of texts for all people can be found: essays, poems, research papers, reports, articles. Having in mind scientific discourse, it suffered some changes as more and more scientific texts were classified as “science popular texts”. Professional scientific texts are written in complex and ambiguous style therefore it is orientated to expertise in a field covered. The main difference between “science popular texts” and “scientific texts” lies on the target people. In this thesis the emphasis is put on science popular texts.

The phenomenon of popularization was studied by many scholars from ancient times. It did not lose its attractiveness till nowadays as a result, many of theoretical material was carried out on science popular texts. This genre was analysed by such linguists as Sušinskienė (2012), Koskela (1997), Hyland (2009; 2018), Petrėninė (2011) to mention a few.

Calsamiglia (2003) believes the scientific discourse was predominant in the world. However, in the mid-20th century, scientific texts were not accessible to general public, moreover, its register was barely understandable to non-professionals. Author adds that with the help of evolving technologies and globalization, scientific articles got attainable by other people. However, the peculiarities of science language were not understandable for humans without any knowledge in that field. According to Calsamiglia and Lopez Ferrero (2003), better life conditions and means of communication made people more attentive to science. Moreover, Myers (2003) points out the importance of science popularization. The author believes that it is useful in various situations. For scientist is it crucial to have the ability of give a clear description of research or discovery to make people comprehend the significance of it. The competence of conveying the message in simpler terms ensures the support of other people. As claimed by the author, scientists believe that people being more aware of science would broaden their knowledge of world problems which could be controlled by people being more aware about it.

It is noted by Koskela (1997) that science popular texts are subdivision of scientific discourse divided into professional science texts and science popular texts. Works of highly terminological scientific discourse are created for other researchers interested in same study field. Having in mind the language of science popular texts and academic discourse, some distinctness can be noticed as well. Different strategies are applied as in academic discourse

ambiguities, author's opinion is rarely found. Scientific texts focus on providing accurate information about science. For instance, Myers (1989) believes that more general language is used in academic discourse than in science popular writings. It was pointed out that more opinion can be noticed in popularisations. On the other hand, fully specialized texts are full of technicalities which are complex, incomprehensible to audience of science popular texts. Thus, different ways of ensuring understanding of scientific topic are implied. Hyland (2018) believes that popularisations "can't assume this degree of shared knowledge and have to make connections to what readers are likely to already know". It means that language is adapted to public without specific knowledge by making links to everyday events, sometimes using such literary devices as simile.

According to Koskela (1997) academic discourse and science popular texts are related yet they have differences. Author claims that readers of professional texts have more knowledge than readers of science popular texts. It is pointed out that scientific writings are read by people who can see implied textual relations which are incomprehensive to people reading science popular texts. This situation occurs because of lack of background knowledge. In other words, audience of science popular writings need clearly shown, unambiguous textual links to be able to understand the text. Similarly, it is observed by Perrault (2013) that science popular texts provide information about science in a way which is understandable to everyone and the author believes that such type of texts should "promote civil engagement". To put in simpler terms, science popular texts provide people with possibility to build some skills which could be beneficial to their social life. Perrault (2013:17) claimed that "popular science writings can help readers – scientists, non-scientists, and scientists working outside their areas of expertise – understand how a given area of research affects and is affected by social institutions". To put in other words, this type of texts is designed for people without any understanding of a subject presented. Adaptations to social realities, links to everyday life make it comprehensible to everyone. In addition, Sušinskienė (2012) claimed that the genre of popular science differs in its main aspects of relation between author and target audience. The aim of science popular texts is to present generalized information to reader. Texts are simplified by avoiding specific terms. As a result, texts become understandable to ordinary reader and do not require any proficiency in covered field. Moreover, Hyland (2009) in his work *Academic Discourse—English In A Global Context* claims that popular science texts are not only transmitting science facts but also making it original, intrigue and interesting for readers. In addition, the focus in science popular discourse lies on importance of data and results, which could be applied in everyday life and benefit the reader. The validity of results and presented information is usually assumed without question as the target audience is non-professional in covered scientific field.

To sum up, science popular texts are more interesting for people from different social classes as they do not have background knowledge in presented topic. Such texts do not contain large amounts of impenetrable terminology, implicit devices and explain how the life of ordinary person could be improved by applying this advancement or development.

Hyland (2018) states that popular science “is produced for audiences without a professional need for information about science but who want to keep abreast of developments” and “complex processes are related to more familiar everyday events through simile”. Online *Longman Dictionary of Contemporary English* (2008) ³provides a definition of a simile which is defined as, an expression that describes something by comparing it with something else, using the words ‘as’ or ‘like’, for example ‘as white as snow’. As pointed out by Petrénienė (2011) “contrary to texts of the scientific style, where subjects of cognition are merely mentioned, speaking of science popular texts we can identify unique usage of science popular texts subjects: mentions are accompanied by additional information, the so-called attributes”. Moreover, Petrénienė (2011) mentions that science popular texts are adapted to the life of reader by using colloquial vocabulary which help to create a lively, emotional contact between reader and author. Semantic figures such as comparison, metaphor, metonymy, etc. are highly used in science popular texts.

In conclusion, science popular texts can be considered as a type of scientific discourse as many linguists believe these genres do not differ significantly. Although they are related with one another, some differences can be noticed. The main point in which they are dissimilar is target audience and relation between author and reader. The goal of such texts is to convey the message to ordinary person and make it comprehensible without knowledge required. Texts consist of sentences, thus, the next chapter will briefly overview the main constituent parts of the sentence.

³ Online Longman Dictionary of Contemporary English available from: <http://www.ldoceonline.com/>. Accessed on 15 February 2018.

III. SEMANTIC FRAMEWORK OF SENTENCE

While examining nominalization it is necessary to present the sentence. Sentence is the main mean of expressing ideas. In terms of communication separate words cannot express the idea clearly thus to say something a sentence is the best option, especially in written form. Sentence⁴ is defined as a set of words, typically containing subject and predicate.

Analysing the sentence on semantic level, Valeika (1998: 7) explains that each sentence “<...> expresses a certain situation, as a miniature drama where the plot is given by the verb and where the actors in their various roles are the nominal expressions that interact with each other.” Agent and process are the most important parts of the sentence.

In science popular texts, nominalization take place of Agent is common phenomenon. Agents can be divided into two groups: animate and inanimate. To cite Sušinskienė (2011: 434), “Agents are prototypically animates, especially humans, and are characterized by control and intentionality over the action that they perform. Some inanimate entities can also have control over the action, but obviously they cannot have any intentionality”. It means that animate agents have full control of process and are doing it consciously, on the other hand inanimate agents have no intentions of performing the action, though they can control performed action. In science popular texts inanimate agents prevail an impression of objectivity and attention is focused on the process, but not on the doer of the action. It means that in the sentence is focusing on the action, but not on the person performing that action. To be more specific, abstraction is achieved by changing the agent of congruent sentence into nominal phrase related to original agent.

Sušinskienė (2013) noted that nominalization appears in the texts in relation with other parts of speech: proposition which is related with the verb. Proposition⁵ is defined as constant part of the sentence despite any changes done to express the message using different construction. As defined by Sušinskienė (2004) “grammatical metaphors expressed by verbal nouns are referred to as nominalized propositions”. Nominalization depends on proposition as it arises in relation with processes and circumstances. To put in simpler terms, sentence is not a sentence without participant and processes. There are several types of processes: material, mental, verbal, happening, existential and relational (Halliday & Matthiessen 2004; Downing & Locke 2006; Eggins 1994, 2011; Valeika 1998; Sušinskienė 2010, 2011). However, this research paper will focus on four main types of processes: material, mental, happening and

⁴ Online Oxford Dictionaries available from: <https://en.oxforddictionaries.com/> Accessed on 4 April 2018.

⁵ Glossary of Linguistic Terms available from <https://glossary.sil.org/term/proposition>. Accessed on 4 April, 2018.

verbal. These processes are part of transitivity. It explains how reality is expressed through language.

3.1. Material processes

Halliday (2004) describes the material processes as processes of “doing & happening”. It means that semantic meaning of these verbs is of movement and actions. To cite Sušinskienė (2013:164), “material processes are processes of “doing” and involve some physical action and show that something is going on in the external world”. In other words, material processes involve energy in the process of producing the action.

According to Eggins (2004) material process clauses consist of Actor and the Goal. Actor does the action, which in this case is material process. The Goal is understood as the participant of the clause to whom the action is directed. These are the most common participants of the material process clause. Usually, the Actor in this type of clauses is expressed by a nominalized abstract noun.

Halliday and Matthiessen (2004) state that material processes are divided into transitive and intransitive. Processes with only one participant are called intransitive. Oppositely, transitive have not only one participant, it has two or more. Intransitive material processes are described as processes of happening as there is no *Goal*. (Halliday and Matthiessen, 2004). Moreover, Valeika (1998) presents other participants: the *Affected Patient*, the *Effected patient*, the *Recipient*, the *Beneficiary*. By Eggins (2004) the *Affected Patient* is called the *Goal*. The *Effected Patient* is the outcome of the process. The *Recipient* is considered as the receiver and the *Beneficiary* is someone who got the benefit from the action produced.

All in all, material processes are processes physical activity. They can be transitive and intransitive depending on participant involved.

3.2. Mental processes

Material processes are not only type of processes, human not only perform physical actions, but they are also capable to feel and think. Mental processes are opposite processes in comparison with material processes as they occur in internal world. Halliday and Matthiessen (2004) describes them as processes of feeling, thinking, seeing. Linguists add that they cannot be replaced by the verb “do”.

The Subject of the clause is called *Senser* as it deals with processes taking place in mind. Halliday (2004) states that second participant of such clauses is called *Phenomenon*. It could

be explained like something that *Senser* feels, thinks, wants. To cite Downing & Locke (2006) “the Experiencer (or *Senser*) is the participant who sees, feels, thinks, likes, etc., and is typically human, but may also be an animal or even a personified inanimate object (*The rider heard a noise, the horse sensed danger, your car knows what it needs*)”. Halliday and Matthiesen (2004) also adds that “any entity, animate or not, can be treated as conscious; and since mental process clauses have this property, that only something that is being credited with consciousness can function in them as the one who feels, thinks, wants or perceives, one only has to put something into that role in order to turn it into a conscious being”. The texts give the impression of abstract nouns being conscious.

To sum up, mental processes are actions happening in internal world and the producer of this action is usually animate creature. However, mental processes have the ability to make entities conscious.

3.3. Behavioural processes

Egins (2004) explains that behavioural processes have features from both previously described types of processes. Similarly, Halliday and Matthiesen (2004) add that “behavioural’ process clauses are not so much a distinct type of process, but rather a cluster of small subtypes blending the material and the mental into a continuum”. Such verbs like *breathe, smile, laugh, watch, listen, stare* are considered to be behavioural processes. Halliday and Matthiesen (2004) describe them as “processes of (typically human) physiological and psychological behavior.”

Moreover, Egins claims that usually behavioural processes have only one participant, which is called the *Behaver*. Similarly as in mental processes, this necessary participant is understood to be “conscious creature”.

3.1. Verbal processes

Verbal processes are verbs denoting speaking and communications. To cite Halliday and Matthiesen (2004:305) “the Process of a ‘verbal’ clause is realized by a verbal group where the lexical verb is one of saying”. Linguists identify them as verbs *say, tell, repeat, explain, suggest*. According to Egins (2004) the clause usually contains of three participant *Sayer, Receiver* and *Verbiage*. *Sayer* is producing the action, *Receiver* is someone to whom something said is directed to. *Verbiage* is the information produced.

Moreover, Halliday and Matthiesen (2004) add that verbal clauses are important in scientific discourse as they help to present the ideas of other scientists.

IV. METHODOLOGICAL CONSIDERATIONS

The analysis is based on nominalizations functioning as inanimate agents in science popular texts. The total sum of 259 examples of nominalizations has been collected from the online English magazine *Popular science* (see the website <http://www.popsci.com/>). Popular science is widely known American magazine is being released monthly. Founded in 1872, today it is the world's largest magazine about science dedicated to general audience. It covers a huge variety of topics which led to the fact that magazine has been translated into 30 languages and could be found in 45 countries. Examples of nominalizations were taken and analysed from 40 articles. Texts are vivid, interesting, covering the topic of science and related topics. The articles vary from February 2017 up to April 2018. Due to the lack of space, 54 examples were provided in the empirical part of the research.

The research focuses on stylistic features of nominalizations, its functioning as inanimate agents. To conduct the research, several methods were set. First of all, descriptive theoretical analysis was employed in order provide theoretical data about science popular texts, concept of nominalisation. Moreover, descriptive analytical method was useful while analysing the cases from source mentioned above. All examples were presented in no chronological order of date it was published. In order to classify the examples collected, they were classified according to classification provided by linguists Halliday (2004), Eggins (2004), Downing & Locke (2006). This method was useful in presenting theoretical framework and applying it to the practical part of this thesis.

Analysing stylistics of nominalization, attention was payed also to semantics of the sentence. Transformational method was applied to provide the relationship between proposition and nominalization.

Lastly, statistical method was applied to present statistical data collected from selected articles. The statistical method by applying a spreadsheet program Microsoft Excel 2010 was used to count all the examples and to draw figures which visually disclose the research results.

In conclusion, all the methods were useful while writing this paper. Having observed the methodology of the study, the following section will investigate the nominalizations found in the science popular articles.

V. NOMINALIZATIONS IN SCIENCE POPULAR TEXTS

5.1. Extended noun phrases functioning as head words

As already mentioned, nominalizations function as a tool to achieve economy of the text. To cite Sušinskienė (2013) nominalizations help “to pack complex information into a concise unit”. By nominalizations the author of the text is allowed to put his ideas and information into a concise unit. It is attained converting a long and intricate phrase into a noun phrases with the nominalizations operating as main words in the phrase. In the sentence, nominal phrases function as agents. Consider examples provided below:

(1) ***The rise of Bitcoin*** and its ilk have seriously shifted some collectible prices. (Eleanor Cummins, Cryptocurrency millionaires are pushing up prices on some art and collectibles 6 March, 2018)

(2) Of course, ***the individual fluctuations in collectibles markets*** will always remain most important to the collectors themselves and of little notice to those outside these bubbles. (Eleanor Cummins, Cryptocurrency millionaires are pushing up prices on some art and collectibles 6 March, 2018)

(3) “***The arrival of this unique and interesting species and eventually a novel*** (at least in the U.S.) rabies virus variant is not a catastrophic event or cause for significant alarm,” Chipman says. (Kate Baggaley, Vampire bats could soon swarm to the United States, 27 October, 2017)

(4) ***Other potential explanations for the rise in allergies in wealthy nations*** include too much folate in childhood and too little vitamin D throughout life. (Eleanor Cummins, Why I can never eat onions or garlic again, 6 March, 2018).

(5) ***The proposition of changing the way you sleep*** seems preposterous. (Eleanor Cummins, You can (and should) train yourself to sleep on your back, 19 February, 2018)

(6) ***Another non-tech solution to food waste*** is the ugly food movement. (Eleanor Cummins, 7 ingenious ways to deal with food waste, 1 May, 2017)

Sentences provided above, prove the fact that density of information is achieved by expressing the same information in noun phrase. Noun phrases such as *The rise of Bitcoin*, *the individual fluctuations in collectibles markets*, *The arrival of this unique and interesting species and eventually a novel*, *other potential explanations for the rise in allergies in wealthy nations*, *Another non-tech solution to food waste* enable the writer use shorter and more complex sentences. All these phrases are Agents of the sentence. Head words in the phrases are *rise*, *fluctuations*, *arrival*, *explanations*, *solutions*. These nouns are derived from verbs adding

different affixes, for example fluctuations are derived from fluctuate by adding the suffix *-ion*, arrival → arrive by adding *-al*, explanations → explain by adding *-ation*, proposition → propose by adding *-ition*, solution → solve by adding *-ution*. Extended noun phrases with its premodifiers and postmodifiers replace long verbal constructions. Nominal phrases are more economical as the same information can be condensed in fewer amount of words and clauses. While analyzing the articles, 21 sentences with extended nominal phrases where nominalization functions as head word, were found. Due to the lack of space only 6 are provided in the text.

All in all, nominalization is a useful method to achieve the economy of the text. Sentences are shorter and give the impression of being neutral without being in favor of one thing or another. The same information is expresses in nominal phrase rather than verbal construction. The next chapter of this research will focus on analyzing nominalizations as grammatical metaphor distinguishing various types of it.

5.2. Nominalization as metonymy

Metonymy is widely analysed on lexical level. It is understood as figure of speech. *Routledge Dictionary of Language and Linguistics* provides the definition as "the replacement of an expression by a factually related term". As a part of grammatical metaphor, to quote Stålhammar (2006), "metonymy is based on close association, for example designation of x by some element associated with x, for example agent for action (pen for writing), producer for product (Dickens for Dickens's works), instrument for user (cello for cellist), container for contents (the House of Parliament for the Members of Parliament, or parliamentary work)." It means that metonymies allow the authors of the texts replace one thing by another, without losing the meaning of phrase. It provides the author with ability to express more complex entity by another one making it even more understandable. To cite Langacker (2002), "by virtue our reference-point ability, a well-chosen metonymic expression lets us mention one entity that is salient and easily coded, and thereby evoke -- essentially automatically -- a target that is either of lesser interest or harder to name." To put in simpler forms, it allows to express related things interchangeably. In science popular texts, it makes the text more formal and objective.

According to Stålhammar (2006:102), nominalization implies many approaches where the idea is explained in an uncomplicated way with help of abstract phenomena like studies, research, paper. It is evident metonymic words replacing the author of the work.

Consider some metonymic constructions found in science popular articles under investigation:

- (7) **Some studies** have shown that eliminating this stimulant can reduce the severity and frequency of debilitating headaches, and I wanted to give it a shot. (Claire Maldarelli, The easiest way to kick your caffeine habit, 24 March, 2017)
- (8) **One recent study** recommended consumers substitute beans for beef, while another proposed doing the same with edible insects or imitation meat. (Marlene Cimon, Keep your love of chocolate from destroying the planet with this one easy fix, 17 April, 2018)
- (9) **New recommendations** suggest vitamin supplements probably won't help stave off falls and breaks. (Sara Chodosh, Worried about breaking a hip? There might be something better than calcium, 17 April, 2018)
- (10) **Productivity studies** suggest you can boost your output with the right music. (Sara Chodosh, You should be listening to video game soundtracks at work, 26 January, 2018)
- (11) **New research** indicates that the bats' population is on the rise at the northern edge of their range, and they may even return to the United States as climate change renders parts

of Texas and Florida hospitable once more. (Kate Baggaley, Vampire bats could soon swarm to the United States, 27 October, 2017)

(12) **Another paper in Nature** suggests that this might be due to the presence of dark matter, a fascinating possibility that other researchers are eager to investigate. (Mary Beth Griggs, This is what some of the earliest stars in the universe might have looked like, 3 March, 2018)

(13) In fact, **a study on open offices** found that broadcasting speech was the least conducive to productivity, while continuous background noise actually boosted performance. (Sara Chodosh, You should be listening to video game soundtracks at work, 26 January, 2018)

In the examples provided, inanimate subjects (*Studies, Research, Recent study, New recommendations, another paper*) are placed as agents and followed by verbs, such as *have shown, recommended, suggest, found, indicates*, functioning as predicates. In the examples provided, one type of metonymies is clear. In these sentences producer is replaced by product. Sentences do not contain words meaning person. Words *studies, research, recommendations, another paper in Nature, a study on open offices* are in the position of agents to imply higher level of abstractness and objectivity. The absence of producer of the process delivers the impression of fairness. Sušinskienė (2013) claims that nominalizations provide the author with a possibility to distance himself from the text and it makes the work sound more objective. Author's presence is unseen although it is understandable that processes of recommending, suggesting are carried out by a researcher. Metonymies has the impersonal quality as producer is changed by the work.

Also, the authors imply the rhetorical impact in the text by using abstract nouns include the reader into the process of reaching the outcomes. Same conclusions are attained as the author is focusing on the process, not on the doer of that process. Such type of grammatical metaphor is common in science popular texts as well as scientific discourse. Examples of it were found in almost every article analysed under this research.

Under the investigation, 46 examples of nominalization as metonymy were found. The most frequent cognitive verb was *suggest* (14 examples out of 46). This phenomenon is common in science popular texts, as examples were found in almost all articles investigated.

To finalize this chapter, nominalization implies the function of metonymy when the producer of the action is replaced by the result. In science popular texts the usage of metonymies is common and ensures the certain needed level of objectiveness while presenting the result or product of the research or experiment produced. Depersonalized sentences show the attention

lying on the desire to present objective information without involving any personal influence or presenting personal opinion.

5.3. Types of Grammatical metaphor

As indicated earlier in this research paper, nominalization is considered as grammatical metaphor: a tool to express the same idea in a different way using nominalized words. It is achieved whether by adding different affixes. Adjectives, verbs are converted into nouns to achieve objectiveness and abstractedness. Linguists Halliday (2004) believes that something is considered as metaphor it has two meaning, every word we say has two meanings: literal and metaphorical. It means there is no one way of expressing the idea. As discussed earlier in this paper, grammatical metaphor has the ability to express the actor and process of the situation by using nominalization. Nominalized verb or a clause with a nominalization in it

In order to distinguish different types of grammatical metaphors and provide examples, this research paper focuses on classification provided by Downing & Locke (2006:163-164). Research focused on two main types of grammatical metaphor classified by linguists:

1. Process expressed as “entity”.
2. Attribute as “entity”;

All these types of grammatical metaphor show the power of versatility that has nominalization, to be more specific, its type grammatical metaphor. In all types the process of nominalization is realised by converting one part of speech into a noun. It can be executed by adding different affixes. Although, English language provides the possibility to transform the verb into a noun without any morphological changes. It means without adding any suffixes. Following chapters will provide the examples of each type.

5.3.1. Process as “entity”

Downing & Locke (2006:163) claim process expressed as Thing is the most common type of grammatical metaphor. In the process of nominalization, verbs denoting the process of doing something are derived into abstract nouns. Abstract nouns are formed by adding affixes to the root of the word. Consider examples found in science popular articles:

- (14) *Each new **revelation** sent me spiraling.* (Eleanor Cummins, Cryptocurrency millionaires are pushing up prices on some art and collectibles, 6 March, 2018).

(15) *With a true allergy, you're vulnerable to an anaphylactic response, like you see with peanut allergies or shellfish allergies, where a small **miscalculation** can result in your throat closing up.* (Eleanor Cummins, Cryptocurrency millionaires are pushing up prices on some art and collectibles, 6 March, 2018)

(16) ***The collision** produced a mountain range in northern Australia, although a relatively small one.* (Amal Ahmed, There's still a piece of Canada stuck to Australia, 24 January, 2018)

(17) ***The arrival of this unique and interesting species and eventually a novel** (at least in the U.S.) rabies virus variant is not a catastrophic event or cause for significant alarm,"* Chipman says. (Kate Baggaley, Vampire bats could soon swarm to the United States, 27 October, 2017)

Sentences provided show the power of grammatical metaphor when process of activity can be realized in a different way. Process is expressed as a *Thing*. Nouns seen in the examples above (*Revelation, Miscalculation, Collision, Arrival*) originally are verbs. However, in terms of derivation, they were transformed into abstract nouns. Revelation is derived from reveal, Miscalculation → miscalculate, collision → collide, arrival → arrive. Thus, nominalizations have their agnate verbs. Nouns in the examples have the function of Agent. In other words, the process of reveal, miscalculate, collide, arrive become an entity. As a result, the focus in the phrase lies on the process itself, not on the outcome. To put it into simpler terms, the result is not so important. In the examples, nominalized verbs are functioning as Subject in the sentence.

Although, Downing & Locke (2006: 163) state that nominalized verbs of processes can perform functions of Subject or Direct Object in the sentence. For example:

(18) *A normal part of the body's immune system response, IgEs plug offending allergens into an immune system receptor site that triggers **the rapid production of histamines**, which fight off attacks.* (Eleanor Cummins, Cryptocurrency millionaires are pushing up prices on some art and collectibles, 6 March, 2018)

(19) *But the effects were strongest for false political news, with the total number of false rumors peaking at the end of both 2013 and 2015 and again at the end of 2016, corresponding to the last U.S. presidential **election**.* (Eleanor Cummins, 7 ingenious ways to deal with food waste, 1 May, 2017)

(20) *You can quickly add **premade adjustments** and filters to your images, and slap fun effects such as stickers and borders on top.* (David Niel, Why pay for Office and Photoshop when you can get these alternatives for free?, 30 January, 2018)

In the examples above, verbs were derived into nouns. After morphological changes, production came from product, election → elect, adjustments → adjust. Analyzing these

sentences from the perspective of syntax, the function of these nominals in the sentence is different. In this case, they operate as Direct Objects. The process of produce, elect, adjust became entity. It proves the theory of versatility nominals possess, in comparison with verbs.

Having in mind the density of language, nominalization of verbs allows to avoid the repetition of the same verbal construction. Sentences provided illustrate this:

(21) *The fire **has damaged** more than a dozen wineries, but this area is home to over 1900. <...> head of the University of California Agricultural Issues Center estimates that **the damage** accounts for “less than one percent of the total Napa and Sonoma processing capacity.”* (Claire Maldarelli, California's wildfires could make 2017 a very unusual wine vintage, 18 October, 2017)

(22) *Unlike a balloon, the increase in pressure from food or liquid doesn't cause the stomach to relax and **expand**. <...> **This expansion** isn't really at all like a balloon filling with air; it's more like an unfolding.* (McNamara & Lederman, Is it possible to eat so much that your stomach explodes?, 27 November, 2017)

The examples (21-22) provide the example of rationality and logic which can be achieved by using nominalizations. Authors explain the situation by using verbal constructions, although in the following sentences nominalizations appear. Nevertheless, the change in grammar does not influence the comprehension of the text. It is understandable and more economical as nominalization transmits the same message in fewer words. Examples also proves the fact that nominalizations enable the economy of the texts. In the first sentence of this case word is used as a verb to explain the situation, however, in the following clauses there is no necessity to use the same verbal construction as nominalization serves to generalize already mentioned situation. Examples prove the fact that nominalizations provide the option to dense the text by packing the meaning in fewer words. In these phrases, authors are not obliged to repeat already mentioned facts. Nominalizations convey the same information and the reader can understand the text clearly.

Although, English language has nominalizations with no agnate word still representing the processes. Some examples were collected from the articles analyzed:

(23) ***The impact** sent material flying into space, which eventually coalesced into our Moon.* (Mary Beth Griggs, This is what some of the earliest stars in the universe might have looked like, 3 March, 2018)

(24) ***The ban** also reminds customers that they have a choice in consuming things so mundane we don't even think about them.* (Amal Ahmed, We suck at recycling straws—so maybe we should ban them, 8 February, 2018).

(25) **Dubai's population boom** long ago outgrew its groundwater supply. (Kelsey D. Atherton, In photos: Dubai's massive desalination plant, 18 February, 2017)

(26) *But be aware of the weather—**water vapor in the air** can spell disaster for these delicate decorations, as sugar can absorb moisture, a problem that is particularly bad on high-humidity days.* (Mary Beth Griggs, How to make caramel at home without losing your mind, 9 March, 2018)

It was noticed while collecting the examples that the place of an Agent in the sentence was occupied by the nominal phrase where the material verb is nominalized by adding the suffix *-ing*. Consider.

(27) **Flipping between the two** is an easy way to change the whole tone. (Sara Chodosh, You should be listening to video game soundtracks at work, 26 January, 2018)

(28) **Mimicking the feathery shape of the dandelion parachute** could enable micro air vehicles to fly without consuming any power. (Kate Baggaley, Dandelion fluff makes a surprisingly effective parachute, 20 November, 2017)

(29) **Adding something truly useful and enjoyable to your life** isn't shallow consumerism. (Sara Chodosh, Why you're never really happy with the things you buy anymore, 27 November, 2017).

The examples show that realizing the process as entity provides the option to shorten the text as grammatical metaphor implies the meaning of Actor and Process. With all postmodifiers phrases function as Actor of the process. Having this in mind, scientists or journalist while writing science popular texts can express more information with less words and complex clauses.

To conclude, 66 sentences where the verb denoting process was transformed into entity expressed by a noun. It is considered as a common feature of science popular texts.

5.3.2. Attribute as “entity”

Another type of grammatical metaphor widely analysed by linguistics is attribute realised as entity or thing. Attribute is realized as a noun by expressing it by abstract noun. Derivation of abstract noun from attribute can be processed by adding different affix to adjective: for example: *difficult – difficulty, different – difference*. It is necessary to mention, that the structure of the sentence changes as the relation between other parts of the sentence and nominalized version of the attribute. In the nominalized version abstract noun functions as the Agent or Doer of the sentence. For example:

(30) **Familiarity** with scientific laws not only helped performers come up with daring new stunts, but it eased their anxiety over how things could go wrong. (Denise Ngo, Archive Gallery: Classic Thrill Rides and Carnival Attractions, 2 October 2017)

(31) The soundtrack to *The Sims* is incredibly conducive to efficiency, probably because you're supposed to play the game for hours doing tasks that are arguably kind of boring. (Sara Chodosh, You should be listening to video game soundtracks at work, 26 January, 2018)

(32) It usually takes a couple of days for a storm to **slowly build up its strength**, but Maria is a reminder that this isn't always the case—rapid intensification can occur in developing hurricanes with little or no warning. (Dennis Mersereau, Hurricane Maria proves how difficult it is to predict a storm's devastation, 19 September, 2017)

(33) By their very design, these falsehoods prey upon some of humanity's greatest cognitive **weaknesses**. (Rachel Feltman, Our brains love spreading lies all over the internet, 9 March, 2018)

Sentences demonstrate how the attribute can be nominalized and function as a noun. In the example (30) adjective *familiar* is transformed into a noun *familiarity* and occupies the place of the Agent in the sentence. According to the sentence, congruent, not nominalized phrase would be: performers familiar with scientific laws could not come up with daring new stunts, <...>. The phrase conducive to efficiency could be replaced by very efficient. In the example (23) the congruent form of realising the phrase *slowly build up its strength* is *slowly getting stronger*. The next sentence provides another example of attribute converted into a noun. Weak is transformed into weakness by adding suffix *-ness*. Another way of expressing the same phrase is by using simple and more common construction with attribute: *these falsehoods are focused on weak people*. As mentioned before, in the example (21) nominal phrase functions as the Agent of the sentence, although other examples show that nominalized nouns can perform the role of Object. However, the author of these sentence chose to use this type of grammatical metaphor to make the sentences sound more abstract and formal.

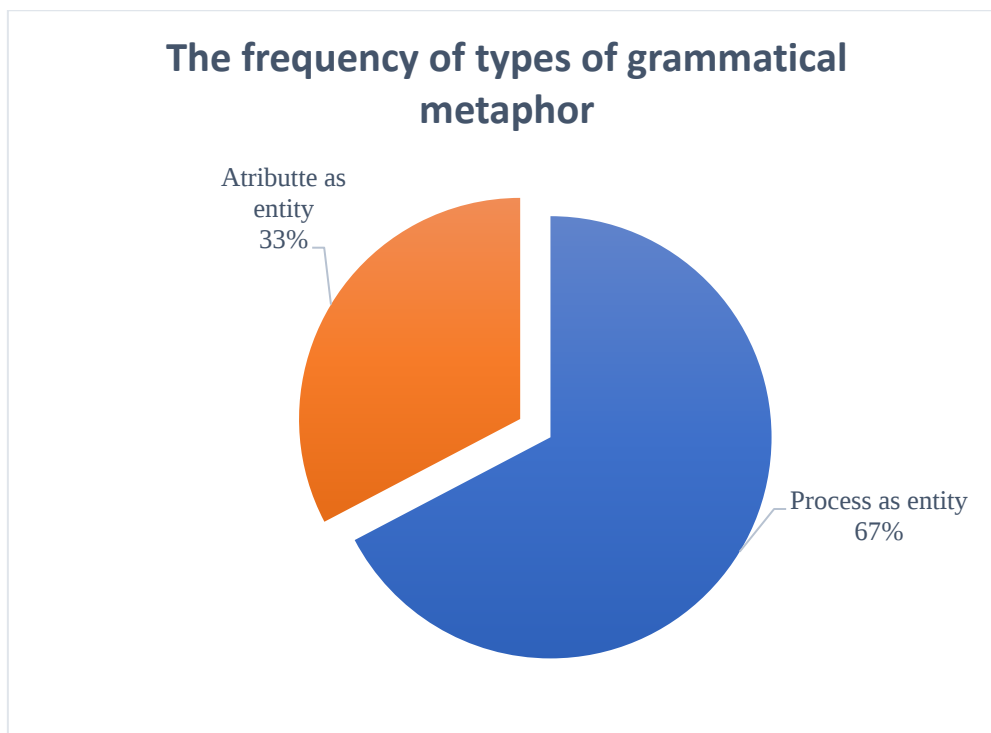


Figure 2. The relative frequency of types of grammatical metaphor

The figure presents the frequency of categorization of grammatical metaphor according to Downing & Locke (2006). It provides the visual picture of usage of four types of grammatical metaphor. It proves the statement of linguists Downing & Locke (2006:163) that process converted into a noun is „the most common type of grammatical metaphor”.

To generalize this chapter, grammatical metaphor is a way to convey the message of the phrase using nominalizations. Converting different parts of speech into nouns helps to achieve the density and objectivity in the science popular texts. Research focus on three types of grammatical metaphor according to the part of speech being converted into a noun. The types are: process as a noun, attribute as a noun, circumstance as a noun, dependent situation as a thing. These different types of grammatical metaphor implement the objectivity and abstractness of the text as the conversion of other part of speech makes the genre of science popular texts denser. Nominal phrases convey more information in shorter phrases as verbal constructions tend to be heavier and longer, requiring more words or clauses to convey the same message. The next chapter will present examples of different types of proposition and functions of nominalization in it.

VI. NOMINALIZATIONS IN PHRASES WITH PROPOSITIONS

6.1. Nominalizations and material processes

Under investigation it was noticed that embedded nominalizations play a role in material propositions. As explained, physical action is the main feature of material processes. They are represented by verbs and contain a participant called Agent. They are divided into two classes: animate and inanimate. Although, the focus of this thesis lies on inanimate Agents. To add, it shows that inanimate agents are personalized because of the inability to perform that action which is usually performed by an animate creature. Consider:

(34) ***The impact sent material flying into space, which eventually coalesced into our Moon.***

(Mary Beth Griggs, This is what some of the earliest stars in the universe might have looked like, 3 March, 2018).

(35) ***The same troubling sensation also came with every slice of pizza (turns out, there's garlic in most sauces), bite of steak (most is seasoned with mixed spices, including garlic) or lick of roast chicken over potatoes and onions (you see the problem here already, I presume).*** (Eleanor Cummins, Why I can never eat onions or garlic again, 6 March, 2018).

(36) ***Chocolate production generates a lot of pollution.*** (Marlene Cimon, Keep your love of chocolate from destroying the planet with this one easy fix, 17 April, 2018).

Examples provided show the personified inanimate Agents functioning as humans, as processes expressed by verbs *sent*, *came*, *generates* can only be done by animate creatures. Examples of *Affected Patients*:

(37) ***Rising global temperatures and extended drought due to climate change will likely increase the risk of wildfires like these.*** (Claire Maldarelli, California's wildfires could make 2017 a very unusual wine vintage, 18 October, 2017).

(38) ***Natural weather fluctuations may keep 2017 from breaking yet another heat record, but as our hottest years get hotter, so do the ones that don't manage to hit a new benchmark.*** (Rachel Feltman, Octopuses can basically edit their own genes on the fly, 6 April, 2017).

(39) ***Calcium supplements did seem to increase the likelihood of kidney stones, especially at high doses, so it's possible taking more would be harmful.*** (Sara Chodosh, Worried about breaking a hip? There might be something better than calcium, 17 April, 2018)

Affected Patients are things or persons which are influenced by the action produced. In the examples, *the risk of wildfires of like these, 2017* and *the likelihood of kidney stones* are affected by the processes produced.

Under the research examples of presence of other participant like *Effected Patient* were found. For example:

(40) ***The collision produced a mountain range in northern Australia, although a relatively small one.*** (Amal Ahmed, There's still a piece of Canada stuck to Australia, 24 January, 2018).

(41) ***The same type of landmass collisions created the Himalayas in India, but with much greater force, creating a larger range that's still growing taller today.*** (Amal Ahmed, There's still a piece of Canada stuck to Australia, 24 January, 2018).

Instances show transitive mental processes where nominalized Agents produce the action and its result is called the *Effected Patient*. In the examples provided phrases *a mountain range in northern Australia* and *the Himalayas in India* are *Effected Participant* as they are the consequences of the processes done.

Examples provided show the participation of nominalization in material propositions. Material processes are realized by such verbs as *produce, create, increase, come, spell*. All these words involve some action in the external world. In terms of sentence, they function as predicates. Agents of the sentences provides are inanimate nominalized nouns or extended nominal phrases.

In terms of stylistics, extended nominal phrases with nominalization allow encoding the same information in fewer number of words. Moreover, it makes the text sound more technical, however, it is still understandable to ordinary audience without a high level of knowledge in the field.

6.2. Nominalizations and mental processes

Another type of processes where nominalizations appear is mental processes. According to Sušinskienė (2013), „mental processes form a conceptual semantic category: there is a clear boundary between something that goes on in the external world and something that goes on in the internal world of mind.“ It means that mental and material processes are opposite poles as mental processes occur in the inside of someone. Mental processes are characterized as verb of feeling, thinking. Abstract nouns are personified as they produce the action which happens in mind of animate *Agents*. They are called the *Senser*. Consider:

(42) *A new study published in Nature Geoscience found that the water might be even more widespread than we thought, spread out across geographical regions, but also concluded that the water might be pretty immobile.* (Mary Beth Griggs, This is what some of the earliest stars in the universe might have looked like, 3 March, 2018).

(43) *Whether industry heavies will admit they envision a future when humans drive vehicles more often for leisure than for commuting, innovation is an excellent proxy for R&D dollars.* (Joe Brown, Where we're going, we won't need roads, 18 October, 2017).

(44) *UC Davis' report, authored by James Lapsley, an adjunct professor in Davis' viticulture department and Daniel Sumner, head of the University of California Agricultural Issues Center, estimates that the damage accounts for "less than one percent of the total Napa and Sonoma processing capacity."* (Claire Maldarelli, California's wildfires could make 2017 a very unusual wine vintage, 18 October, 2017).

Sentences found under the investigation, show the mental processes clauses. Mental processes happen in mind of someone. However, in the instances provided inanimate nominalized nouns are personified, they are given the functions of human. This fact makes the text objective as authors presence is replaced by inanimate things.

6.3. Nominalizations and behavioural processes

Behavioural processes are believed to have characteristics of both material and mental processes. For example:

(45) <...> *where a small **miscalculation** can result in your throat closing up.* (Eleanor Cummins, Cryptocurrency millionaires are pushing up prices on some art and collectibles, 6 March, 2018)

(46) <...> ***rapid intensification** can occur in developing hurricanes with little or no warning.* (Dennis Mersereau, Hurricane Maria proves how difficult it is to predict a storm's devastation, 19 September, 2017).

As seen in the sentences, nominalized nouns *miscalculation* and *rapid intensification* are Agents of the clauses called *Behavers*. Predicates are expressed by the verbs *can result* and *can occur* are categorized as behavioural processes.

6.4. Nominalization and verbal processes

Another type of processes distinguished by Halliday (2004) is verbal processes. As mentioned in theoretical part, verbal processes are verbs which denote the action of telling

something. Some examples of verbs denoting ways of communication were found under the investigation:

(47) **An unprecedented panache for RNA editing may explain why cephalopods are so bright and adaptable.** (Rachel Feltman, Octopuses can basically edit their own genes on the fly, 6 April, 2017)

(48) **Crazy levels of RNA tinkering could explain how cephalopods got so smart.** (Rachel Feltman, Octopuses can basically edit their own genes on the fly, 6 April, 2017)

(49) **New research indicates that the bats' population is on the rise at the northern edge of their range, and they may even return to the United States as climate change renders.** (Kate Baggaley, Vampire bats could soon swarm to the United States, 27 October, 2017)

In the sentences above, personalized thing performs the action which in everyday speech would be performed by a human. Thus, inanimate agents become the performers of the action, in other words, become the *Sayer*. In examples (47-49) verbs are used with modal words *may* and *could*. In sentences (48-50) the *Receiver* in these sentences is unknown, however, reader can understand that it is intended to people reading. Verbiage is information explained to the *Receiver*. Instances with clearly expressed *Receiver*:

(50) **If you don't recognize any of the applications, a quick web search should tell you what they are and why they want to launch with macOS.** (David Niel, 4 hidden Mac tweaks to speed up your computer, 22 August, 2017).

Example (50) consist clearly expressed *Receiver*. It is a personal pronoun *you*. Moreover, science popular texts tend to present information of other scientists and researchers, so the *Verbiages* are subordinate clauses with conjunction *that*. Consider the sentences:

(51) **New research indicates that the bats' population is on the rise at the northern edge of their range, and they may even return to the United States as climate change renders.** (Kate Baggaley, Vampire bats could soon swarm to the United States, 27 October, 2017)

(52) **The results of the study, Calo notes, suggest that people value the idea of human judgement.** (Nicole Wetsman, Before trying robot judges, let's learn from robot referees, 7 September, 2017)

(53) **A new study published this week in Science suggests that hoaxes, whether they be unintentional nuggets of misinformation or malicious pieces of propaganda, actually disseminate more quickly than pieces of true news.** (Rachel Feltman, Our brains love spreading lies all over the internet, 9 March, 2018)

To sum up, the total number of 17 verbal processes with nominalizations were found. In most of the instances the *Receiver* of the information is absent, as a result, sentences consist of only two participants: the *Sayer* and the *Participant*.

To conclude the results of material, mental, behavioral and verbal processes, consider presented figure:

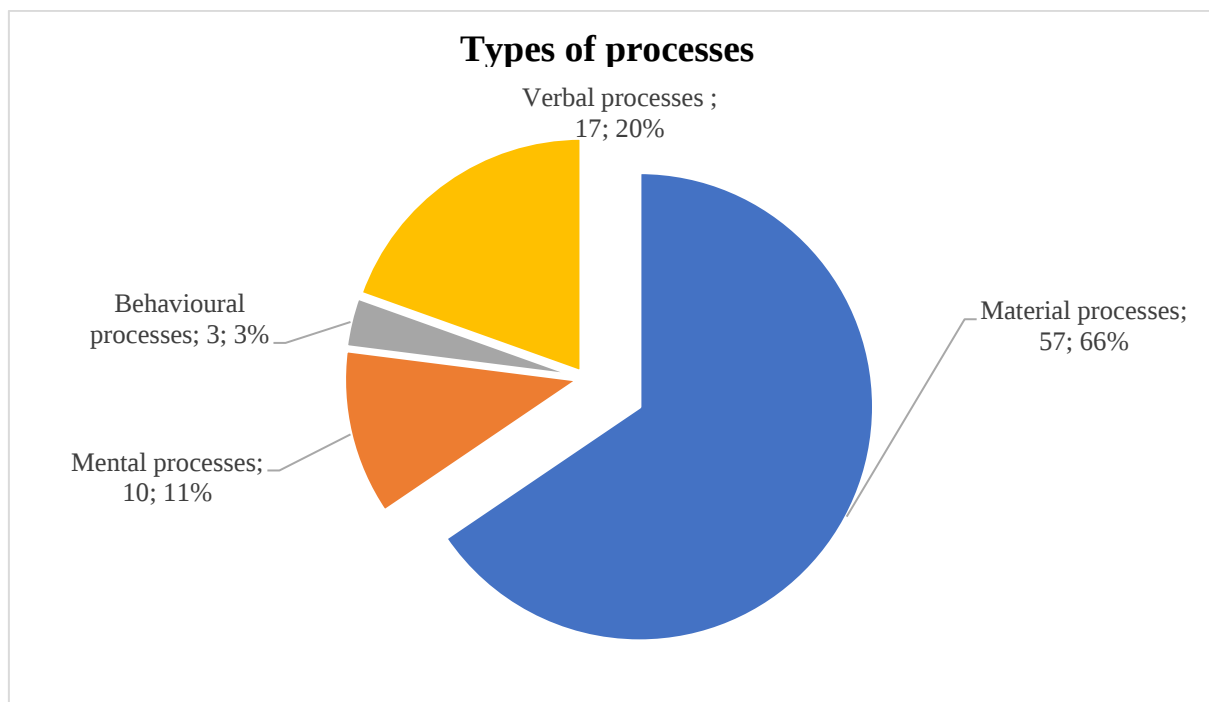


Figure 3. Types of processes

The figure 3 above visually presents the frequency of different types of processes in science popular texts. As reflected in the diagram, nominalizations usually occur in material propositions. Embedded nominalizations operate like Agents of the action. Figure shows that verbal and mental proposition were second and third the most common types in analyzed science popular texts. The total sum of 87 examples leads to conclusions that embedding nominalizations in material, mental, behavioral or verbal proposition is one of the characteristics of science popular texts.

To conclude, the use of inanimate agents with verbs of processes, allows the author of the texts make his presence in the writing almost invisible. Also, different processes allow the metaphorical transformation of the situations. Consequently, the level of objectivity rises. Texts sound more rational and objective.

VII. CONCLUSIONS

Science popular texts is an important genre. The aim of science popular texts is to provide the general public with information about scientific discoveries, researches which could improve their life conditions. The way of transmitting the information is important as people are unable to comprehend complex terminology or phrases. Considering that, texts have their stylistic features which helps to express the message of it. Moreover, texts should be objective, dense, rationally organized. The important feature of science popular texts is nominalization.

In conclusions, objectives set in the introduction of this thesis (3 page) were confirmed: 1) to present theoretical framework of nominalization; 2) to discuss the genre of science popular texts; 3) to reveal the stylistic features of nominalizations and provide the classification of nominalizations according to their function in science popular texts.

- 1) Generally speaking nominalizations is transforming one part of speech into another. It can be done by adding derivational affixes or without any morphological changes. Nevertheless, nominalizations are also described as the main feature of grammatical metaphor, which allows the metaphorical presentation of information. As a result, processes or properties are metaphorically transformed into entities, which become Agents of the sentence. Also, nominalizations occur in material, mental, behavioural or verbal propositions, which metaphorically express the events.
- 2) Science popular texts is the genre of scientific discourse which evolved directed at non-professionals. They present information about science, however, texts are simplified: sentences are less complex and technical, stylistically sentences are objective and short. Nowadays they are easily accessible, as science popular texts can be found in online magazines or books.
- 3) There are two ways to express the same idea: congruent and non-congruent. The metaphorical way with nominalizations let the author of the text to dense the text, make it more objective, abstract, downgrade his presence in the written text. Main uses of nominalizations in science popular texts were distinguished under the investigation: head words of nominal phrases, metonymies, nominalizations and its denoting processes.

A conclusion can be drawn that a typical characteristic of science popular texts is nominalizations. Abstract nominalized nouns are one of the stylistic features of science popular texts. To achieve abstractness and objectivity of the writings, authors preferably express processes or properties as nouns. Due to this transformation, sentences become shorter, packing the same information in fewer number of words. With the help of metonymies, results of

researches are given the importance in the sentence. Metonymies present scientists' researches as individual entities. The usage of metonymies makes the writings objective, as the presence of author is unseen. As a result, the focus lies on the research and its results, how discoveries can change ordinary people's life.

All in all, nowadays science popular texts is a popular phenomenon and one of the main tools to maintain its writing style is nominalization. Embedded nominalizations in various propositions allow the authors express the events metaphorically.

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