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THE PERSONIFIED SEMANTIC FUNCTIONS IN ENGLISH SCIENTIFIC DISCOURSE

BACHELOR THESIS

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CONTENTS

INTRODUCTION

Throughout the history, figurative language was used mainly in fiction, but nowadays this form of language can also be found in scientific discourse. The usage of figurative language in these texts has become more popular because it makes a text more emotional and colourful without losing its main purpose – to convey the scientific message to readers. Various stylistic devices can be found in figurative language. Personification is one of them. Dodson (2008: 30) defines personification as "the attribution of human characteristics to any inanimate object, abstract concept or impersonal being". To put it in other words, personification is one of the forms that gives human traits to lifeless objects or allows them to act like humans.

The simplest sentence structure involves a participant and a process. A participant usually has its own role (i.e. function) in the sentence and a process is performed by a participant. Semantic roles, which can be found in every sentence, form the semantic framework of the sentence. They represent things which take place in various events. To put in simpler terms, every sentence has its own situation and participants that are involved in it. Semantic roles can be easily personified providing new insights, decorating texts and making them more colourful.

The **relevance** of the work. The semantic framework of the sentence has been widely analysed by such linguists as Halliday & Matthiessen (1997; 2004), Eggins (1994; 2011), Downing & Locke (2006), Thompson (1996), Valeika (1998), Sušinskienė (2010; 2011), etc. Although a lot of researches have been done on the sematic functions and processes, very little attention has been paid to the personified semantic roles in popular science texts. As a result, the analysis in this field is necessary and useful.

The **novelty** of the work. Language involves many different text types such as literary, scientific, publicistic, poetic, etc. This research concentrates on popular science texts. The analysis of personified semantic functions in popular science discourse allows to view such texts within the framework of systemic-functional approach.

The **subject** of this research is the usage of personified semantic functions embedded in material, mental and verbal processes used in the articles of *National Geographic* magazine.

The **aim** of the present study is to analyse personified semantic functions embedded in material, mental and verbal processes in popular science texts.

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

1. To present theoretical material about systemic-functional approach and semantic framework of the sentence;
2. To provide theoretical background related to personification in popular science texts;
3. To classify the collected examples of personified semantic roles embedded in material, mental and verbal processes;
4. To show the relative frequency and present the statistical data of the collected examples.

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

1. Descriptive theoretical analysis method was used to provide the theoretical data concerning the systemic-functional approach, semantic framework of the sentence and a brief overview on personification in order to convey the main features of it.
2. Descriptive analytical method was useful while analysing the cases of personified semantic functions embedded in material, mental and verbal processes.
3. Statistical method was used to systematize the results of collected and analysed examples and to provide the relative frequency of their usage.

The **scope** of the research is 252 examples of material, mental and verbal processes with embedded personified semantic roles. Due to the space limitation, only 70 cases were provided. The source of the given examples is *National Geographic* magazine.

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 personification and semantic framework of the sentence. It also reveals the object, the aim, the objectives of the research and the main research methods used in the paper. Theoretical part of the research is divided into three main chapters of which the second one has three sub-chapters. The first section provides theoretical material related to systemic-functional approach. The second chapter gives an overview about the semantic framework of the sentence and has three sub-chapters. The first sub-chapter analyses material processes, the second – mental processes and the last one – verbal processes in a more detailed way. The third chapter deals with the concept of personification in popular science texts. The section of methodological considerations describes the methods of this paper and comments how they helped to conduct the research. Practical part analyses the collected examples of personified semantic functions in popular science texts. It is divided into three chapters: material processes with embedded personified

semantic roles, mental processes with embedded personified semantic roles and verbal processes with embedded personified semantic roles. The summary of the theoretical part and the results of the research are provided in conclusions. The list of references and sources lists the materials that were used while writing the present paper.

Practical value of the work. This research might be useful for students conducting research in systemic-functional approach of the English language.

I. THEORETICAL ASSUMPTIONS RELATED TO SYSTEMIC-FUNCTIONAL APPROACH

Language is a flexible unit. It can be used daily without general comprehension of its structure. Language is used in order to communicate with each other, to interpret the world for other people and to spread the information. According to Halliday & Matthiessen (2004: 19), it is possible to refer to language as "<(i)> as text and as system, <(ii)> as sound, as writing and as wording, <(iii)> as structure <(iv)> as resource <…>". As it can be seen, language can be referred to many things but the most important function of language is to create and express meaning. Language is a resource of the construction of the meaning. With the help of lexical and grammatical structures it is possible to express different meanings.

Grammar belongs to the systems of a language and forms a subsystem. More precisely, it is the system of words of a language (Halliday & Matthiessen, 1997). It means that grammar is responsible for the words of a language by which the meaning is created. Lock (1996: 1-2) notes that "The former approach to grammatical analysis is often called formal, while the latter approach is normally called functional." The point is that both approaches of grammatical analysis are not mutually exclusive and at some point formal analyses must take account of meaning and function and vice versa.

The systemic-functional approach is becoming widely analysed. It helps to analyse language as a strategic and meaning-making resource from the descriptive and interpretive points of view (Eggins, 1994: 1). The linguist provides two main reasons which show that the systemic-approach to language is functional (Ibid.):

1. It asks functional questions about language;
2. It interprets the linguistic system functionally.

These two reasons help to understand that language has its own functions by which the meaning is created. Language is used in everyday interaction and people make meaning by using it. A key characteristic of systemic-functional approach is its emphasis on language function. Halliday (1985; 1994; 2004), the founder of systemic-functional grammar, argued that language is structured to make three kinds of meanings at the same time, so he distinguished three metafunctions: **ideational, interpersonal** and **textual**.

Many linguists are interested in metafunctions proposed by Halliday (Halliday & Matthiessen 1997, 2004; Eggins 1994; Thompson 1996; Downing & Locke 2006; Morley 2000, etc.). Metafunctions are the broad functions that language performs in context to make a meaning. The meaning is created by grammar within interpersonal and ideational

metafunctions (Halliday & Matthiessen, 1997). Ideational metafunction is distinguished into two components: the experiential and the logical (Halliday & Matthiessen 2004: 29). The **ideational** metafunction is mainly concerned with human experience of the world. This metafunction is related with transitivity system of language which views language in terms of six processes (material, mental, verbal, happening, existential and relational). These processes are recognized by verbs. In addition, Downing & Locke (2006: XVII) imply that ideational metafunction sometimes can be called 'representational'. Another metafunction, called **interpersonal**, deals with how language reflects interpersonal relations between speaker and receiver of the message. Furthermore, Halliday & Hasan (1985: 20) also add that interpersonal meaning is "<…> a piece of interaction between speaker and listener". Its main grammatical system is mood, i.e. the grammaticalization of speech function (Ibid.). To see the main difference between ideational and interpersonal metafunctions, Halliday & Matthiessen (2004: 29-30) provide a simple explanation that "<…> if the ideational function of the grammar is 'language as reflection, this [interpersonal function] is 'language as action'". The third metafunction is **textual.** This function is responsible for the creation of clause and in general – the creation of text. It represents the information of ideational and interpersonal meanings that can be shared between speaker and the addressee. This metafunction is related with textual system of language that is theme. The theme of the sentence sets the context for the further development of the sentence. Also, Halliday & Matthiessen (1997) indicate that the textual function has an enabling role and say that "It serves to enable the presentation of ideational and interpersonal meaning as information that can be shared <…>". It means that speaker is able to provide for listener his own interpretation of ideational and interpersonal meaning in form of a text.

Thompson (1996: 28) summarizes the three kinds of meanings in an informal way:

1. We use language to talk about our experience of the world, including the worlds in our own minds, to describe events and states and the entities involved in them.
2. We also use language to interact with other people, to establish and maintain relations with them to influence their behaviour, to express our own viewpoint on things in the world, and to elicit or change theirs.
3. Finally, in using language, we organize our messages in ways which indicate how they fit in with the other messages around them and with the wider context in which we are talking or writing.

This short summary represents three metafunctions described above: ideational, interpersonal and textual. The conclusion can be drawn that each three metafunctions have

different purposes and meanings but in general are connected with each other and work systematically in the text.

In essence, a systemic-functional approach is still being analysed and has changed a lot since its beginning. It analyses both how people use language in various contexts and how language is structured for use. A key characteristic of systemic-functional approach is its emphasis on language function. There are three metafunctions which language performs in context: ideational, interpersonal and textual. The ideational metafunction is mainly concerned with human experience of the world; interpersonal metafunction deals with how language reflects interpersonal relations between speaker and receiver of the message and textual metafunction is responsible for the creation of clause and in general – the creation of text. Each of them has their own grammatical systems: transitivity (ideational), mood (interpersonal) and theme (textual). All three metafunctions have different aspects but act simultaneously.

II. THE SEMANTIC FRAMEWORK OF THE SENTENCE

The semantic analysis of the sentence related with communication has become an essential aspect in linguistics. Pick (2009: 10) defines the purpose of the sentence that "<…> it introduces new information for discussion, or refers to that information and conveys new information concerning it, or asks a question or makes a suggestion concerning it. In addition, it can deny the information or suggestion". It means that the sentence is responsible for creating new processes and involving various participants. In accordance with that, "<…> a sentence describes an action or state which someone or something is engaged in or undergoing" (Pick, 2009: 10). To put it in simper terms, a sentence contains an act and a participant which is involved in this act.

As Sušinskienė (2010: 293) quotes Van Valin and La Polla (2002: 82), "the communicative functions of language are central to the analysis of its structure, and one (but not the only) function of language is reference and predication, that is, representing things that happen in the world (or a possible fictional world) and the participants involved in those situations.", it can be noted that the main thing of the communicative act is situation and doers who are involved in those acts. To give another explanation, Valeika (1998: 7) states that a semantic point of view has the deep structure sense and the surface structure. The linguist provides a more metaphorical definition and 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. The individual or individuals responsible for carrying out the plot is called the *Agent*, the person or thing affected by the process the *Affected* or *Patient*, the thing (tool, device) used by the Agent, the Instrument. We can also distinguish other roles such as *Circumstances.*" (Ibid.) To put it in other words, each sentence has its own semantic functions or roles: processes, participants and circumstances. In addition, it should be noted that some linguists suggest different names for these semantic roles. For example, to define the participant of material processes, linguists Downing and Locke (2006: 128) name it as a *'doer'* or *Agent*, Valeika (1998: 18) calls it only *Agent* while Thompson (1996: 79) and Halliday & Matthiessen (2004: 179) define it as an *Actor*.

Of all the elements of the semantic structure of the sentence, the most important one is the verb or process. The semantic structure of the sentence must recognize the process and the participants that are associated with it (Valeika, 1998: 13). Eggins (1994: 229) implies that the system of the semantic framework of the sentence is called the system of transitivity or

process type. There are several types of processes: **material, mental, verbal, happening, existential** and **relational** (Halliday & Matthiessen 2004; Downing & Locke 2006; Eggins 1994, 2011; Thompson 1996; Valeika 1998; Sušinskienė 2006, 2010, 2011; Lock 1996; Pick 2009). These processes constitute the transitivity system of language. In transitivity analysis, the exploration of how language construes our experience of the world around us is made. Transitivity is the resource for interpreting our experience, and this is done in terms of processes. Halliday & Matthiessen (2004: 170) explain that "Each process type provides its own model or schema for construing a particular domain of experience as a figure of a particular kind <…>." It means that each process has a unique set of participants and processes which have different purposes. For instance, material processes are the ones of physical activities; mental processes deal with internal side of the mind and verbal processes are clauses of saying and communicating, etc. Every process has different purposes so the participants are called differently as well, e.g. material process involves a participant which is called an Agent; the basic participant in mental processes is called the Senser or Recipient Experiencer and another participant – the Phenomenon while verbal processes have three participants: Sayer, Receiver and Verbiage.

To conclude, the process is the main phenomenon of the sentence that is responsible for creating situation and is followed by participants and circumstances. There are several types of processes: material, mental, verbal, happening, existential and relational. Each of them has their own purposes, but their structure – the processes, the participants which take place in those processes and the circumstances related to the processes – they all form the semantic framework of the sentence.

2.1. Material Processes

Physical activities such as doing, running, cleaning, cutting, walking, reading etc., help us to define one of the most fundamental types of processes. Such kinds of words are called **material processes**. According to Halliday & Matthiessen (2004: 179), "<…> a 'material' clause construes a quantum of change in the flow of events as taking place through some input of energy". To put it in other words, it is a clause which contains some changes in the series of events which requires some source of energy.

Material processes are activities performed by a participant. The linguists use different word to define a participant. For instance, Valeika (1998: 18) calls it the *Agent* while Thompson (1996: 79) and Halliday & Matthiessen (2004: 179) define it as the *Actor*. The

Actor is the participant which brings the action. Another linguists Downing & Locke (2006: 128) name participant as the *Doer* or the *Agent*. They also add that "By 'Agent' we mean an entity having energy, volition and intention that is capable of initiating and controlling the action, usually to bring about some change of location or properties in itself or others" (Ibid.). It should be noted, that Agents are typically humans but not necessarily.

Moreover, Sušinskienė (2011: 433) states that "<…> material processes are causative processes and Agents could be referred as to Causers". Any material process has the Agent even though it might not be noticed in the sentence. According to Thompson (1996: 79), "In many cases, the action may be represented as affecting or 'being done to' a second participant: this participant is called the *Goal*, since the action is, in a sense, directed at this participant". In other words, the Goal is the one which is affected by the action. So basically, a material process involves the Agent, whether it is mentioned in the clause or not, and second participant – the Goal. By the way, some material processes can be followed by the *Circumstances*. The table to illustrate material processes is presented below:

Table 1. Material processes (Thompson, 1996: 80)

Her mother Coarse grass	smashed was growing	the glass.	 here and there.
Actor	**Process: Material**	**Goal**	**Circumstance**

Halliday & Matthiessen (2004: 180) claim that material processes can be either **intransitive** or **transitive**. Intransitive processes are the ones which contain only one participant – the Actor or the Agent whereas transitive processes have two or more participants. The linguists also add that intransitive processes represent a happening while transitive clauses represent a doing. It means that intransitive material processes have one participant the Agent and show the process of happening while transitive processes have two or more participants and show the process of doing. In addition, Eggins (1994: 230-231) proposes more definitions of intransitive and transitive material processes: intransitive processes are also called middle and transitive – effective material processes.

Agents can be distinguished into two groups: **animate** and **inanimate**. According to 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". To put it in other words, Agents, which are usually humans, have intentions

and are in control of the action they are performing. Inanimate participants have no intentions, but they might be in the control of the action. Because of this phenomenon, the term *Agent* is referred to the term *Animate Causer*, while the term *External Causer* is referred to the term *Inanimate Causer* (Sušinskienė, 2011: 434). Moreover, it is noted that the Agent can also be an inanimate or abstract thing while the Goal can be human (Thompson, 1996: 79).

Furthermore, Valeika (1998: 30-37) points out that material processes can contain other participants: the *Affected Patient*, the *Effected Patient*, the *Recipient* and the *Beneficiary*. The *Affected Patient* is the one which is affected by some certain action or is in the particular state. It is the synonym of the term *Goal*. In addition, the *Effected Patient* is simply a result of a certain action. The *Recipient* is the participant which receives something, while the *Beneficiary* – the one for whom something is done or given.

To sum up, material processes are the ones of physical activities. Each material process involves a participant which is called the Agent and might has a second participant called the Goal. Material processes can be intransitive which have only one participant or transitive which contain two or more participants. The Agents are divided into two groups: animate and inanimate. Also, it should be noted that material processes can involve other participants such as the Affected Patient, the Effected Patient, the Recipient and the Beneficiary.

2.2. Mental Processes

Mental processes are the ones which deal with internal side of the mind. In other words, according to Halliday & Matthiessen (2004: 197), "<…> 'mental' clauses are concerned with our experience of the world of our own consciousness". They are processes of sensing. Such verbs as *to think, to see, to imagine, to like, to feel,* etc. address to mental processes. Valeika (1998: 40) distinguishes three types of mental processes: **perception, cognition** and **affection**. The processes of perception perceive something through the senses such as sight, touch, smell, hearing and taste. The common verbs to represent the processes of perception are *to hear, to see, to feel, to smell,* etc. Moreover, the processes of cognition are about of knowing. These processes are conveyed by stative verbs such as *to believe, to trust, to fear, to feel, to imagine, to forget, to recollect,* etc. The third type of mental processes, which are called the processes of affection, is recognized by verbs: *like, love, hate, want, detest, delight,* etc. In contrast, Downing & Locke (2006: 139) also single out the fourth type of mental processes – **desideration** which is recognized by words such as *want, wish, like,* etc. The table to illustrate mental processes is given below:

Table 2. Mental processes. Senser and Phenomenon (Thompson, 1996: 82)

She	could hear	his voice.
Senser	**Process: Mental**	**Phenomenon**

The main participant in mental processes is the *Senser* which is always human. The Senser also can be called the *Experiencer* (Downing and Locke, 2006: 139). Halliday & Matthiessen (2004: 201) define it as "<…> the one that 'senses' – feels, thinks, wants or perceives <…>". In addition, there is also another participant in mental processes called the *Phenomenon*, that which is sensed, perceived, liked or etc. Halliday & Matthiessen (2004: 203) add that it may also be an act or a fact, not necessarily a thing.

In conclusion, mental processes deal with internal side of the mind. There are three types of this process: perception, cognition and affection. It is claimed that the basic participant in mental processes is called the Senser or the Experiencer and another participant – the Phenomenon.

2.3. Verbal Processes

Verbal processes are clauses of verbal action such as saying and communicating. Verbs such as *to tell, to ask, to say, to suggest, to indicate, to announce, to inform, to notify*, etc. help to identify verbal processes. Valeika (1998: 50) also pays attention to that some of the verbs indicates mental activities so they can be interpreted as a variety of mental verbs.

Eggins (2011: 235) proposes three participants of verbal processes: the *Sayer*, the *Receiver* and the *Verbiage* while Downing and Locke (2006: 151) define the Receiver as the *Recipient* and the Verbiage as the *Said*. The Sayer is in charge of the verbal process and usually is a conscious participant (but not necessarily). Sušinskienė (2011: 436) implies that "The Sayer is a kind of Agent who is responsible for putting out a signal". The Recipient or the Receiver is the one who receives the message while the Verbiage or the Said is the information which the Sayer conveys to the Receiver. Eggins (2011: 235) also adds that "the Verbiage is a nominalized statement of the verbal process: a noun expressing some kind of verbal behaviour (e.g. statement, questions, retort, answers, story…)". For example:

Table 3. Verbal processes (Thompson, 1996: 99)

I	explained	to her	what it meant.
Sayer	**Process: Verbal**	**Receiver**	**Verbiage**

To conclude, this part explores verbal processes. Such processes are clauses of saying and communicating. There are three participants of verbal processes: the Sayer, the Receiver or the Recipient and the Verbiage or the Said.

III. THE CONCEPT OF PERSONIFICATION IN POPULAR SCIENCE TEXTS

Scientific discourse can be distinguished into two types: professional and popular texts (Koskela, 1997: 343). Liao (2010: 44) points out the main difference between these two types: "The most significant difference between the genres of popular science and specialised science is their target audience. Popular science is written for lay people, and this difference tends to lead to the simple conclusion that popular science writing is a process of simplification from academic language to ordinary language, by, for example, avoiding technicalities and using everyday terms." In addition, Petrėnienė (2011: 5) adds that popular science texts are regarded as "<…> presentation of basic knowledge and facts about science and technology to the public in a popular and understandable way." To put it in other words, professional science texts are written for people who are experts in a specific academic field while popular science texts are written for a wider audience whereas readers have less scientific knowledge.

The authors of popular science texts try to use informal language by using various means of expressions. According to Petrėnienė (2011: 12), they "<…> are used to define information presented more accurately, making it easier to understand and persuading, which is very important whilst aiming at an undefined addresser". Personification is one of them. It is inseparably connected with popular science texts as objects, described in these texts, acquire human traits (Petrėnienė, 2011: 78) [translated by the author]. Many linguists define personification differently. Župerka (1997: 64) states that personification is the manner of expression which gives characteristics of living beings to lifeless objects. The author also adds that personification can also be regarded as a manner of expression while giving human traits to animals and birds [translated by the author]. In addition, Lakoff and Johnson (1980: 33-34) point out that personification is an extension of ontological metaphors' and explain that such metaphors "<…> are those where the physical object is further specified as being a person. This allows us to comprehend a wide variety of experiences with nonhuman entities in terms of human motivations, characteristics, and activities". Dodson (2008: 30) defines personification as "<…> the attribution of human characteristics to any inanimate object, abstract concept or impersonal being". In other words, it can be pointed out that the main feature of personification is that this stylistic device gives human traits and characteristics to lifeless objects making them alive.

Personification can be singled out into various stages. Župerka (1997: 64-65) distinguished three stages of personification:

1. Comparison;
2. Metaphorical personification;
3. Metonymical personification.

Comparison is the first stage in which the personified specific things or abstract phenomenon are compared with living being. The second stage – metaphorical personification – the main and the most popular type of personification while the metonymical personification is not so evident. Sometimes personification is based on the transfer of word meaning, i.e. metaphor or metonymy, but, especially in children literature and fairy tales, personification can form the whole artistic depiction where inanimate objects, animals or plants act as intelligent creatures (Župerka, 1997: 65) [translated by the author].

Moreover, Dodson (2008: 31) provides such a scale of personification which helps to understand and conceptualize it:

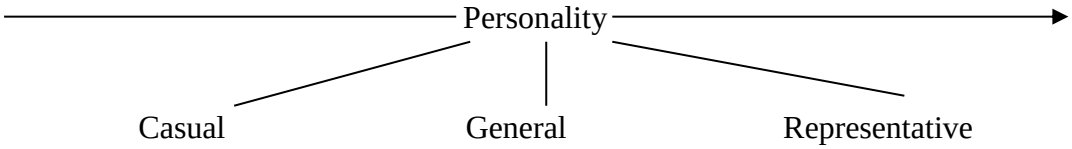

Figure 4. Prepared according to Dodson (2008: 31)

This scale shows that personification is distinguished into casual, general and representative. Casual personifications are the ones that have been commonly used and human characteristics attributed to it are not even conceived. The second type is general personification. Dodson (2008: 32) claims that "This personification speaks of an inanimate object, abstract concept, or impersonal being *in comparison* to a person". In other words, general personifications do not actually represent human traits given to a lifeless object, but that lifeless object is compared to a real person. The last one, representative personification, in contrast to general personification, actually represents someone else. It can stand for a human or certain power. Representative personification emphasizes an emotion, attribute or part of that personified being.

After discussing the definition of personification, it is important to distinguish the main purposes of this stylistic device. As it was already mentioned above, personification is a manner of expression which gives characteristics of living beings to lifeless objects. Dodson (2008: 41) distinguish such variations of primary purposes of personification and metaphor:

- To decorate or amplify;
- To educate or clarify;
- To motivate or manipulate;
- To expose the cause of something;
- To provide new insight;
- To deflect attention away from difficult topics.

As it can be seen, personification can have quite many purposes which can be understood from the context while analysing the personified object. Probably the most common purpose of personification is to decorate or amplify, because giving human traits to lifeless objects makes those objects strengthened and emphasized. In addition, the usage of personification in texts decorates them and makes them more colourful.

In conclusion, popular science texts are regarded as a type of scientific discourse. As they concentrate on wider public of readers, everyday language and stylistic devices are used. Personification is one of the stylistic devices. It is defined as a manner of expression in which human characteristics are given to lifeless objects. Personification can be singled out into various stages: comparison, metaphorical personification, metonymical personification, casual, general and representative. Each type of personification has its own features and can be noticed in the texts. Moreover, personification decorates, makes texts more colourful and easier to understand.

IV. METHODOLOGICAL CONSIDERATIONS OF THE RESEARCH

The total sum of 252 examples of material, mental and verbal processes with embedded personified semantic roles was accumulated from articles in *National Geographic* magazine's section *Animals* (available from http://www.nationalgeographic.com/animals). The articles vary from September 2014 up to December 2014. Due to the lack of space, 70 examples were provided in the empirical part of the research.

The research focuses on personified semantic roles embedded in material, mental and verbal processes. To conduct the research, several methods were set. First of all, descriptive theoretical analysis method was applied in order to provide the theoretical data concerning the systemic-functional approach, semantic framework of the sentence and a brief overview on personification in popular science texts in order to convey the main features of it. Exceptional attention was paid to the semantic framework of the sentence so theoretical assumptions on material, mental and verbal processes were provided.

Furthermore, descriptive analytical method was used to analyse the collected cases. The following steps were done in order to perform the analysis. Firstly, the examples were gathered from the source mentioned above. All the cases were written without chronological order of the articles' publishing date. Secondly, in order to classify the collected examples, they were arranged according to the types of processes that the semantic roles belong to, i.e. material, mental and verbal. The examples were analysed according to the classifications proposed by such linguists as Halliday & Matthiessen (2004), Eggins (1994, 2011), Thompson (1996), Valeika (1998), Sušinskienė (2011). Moreover, this method also supplemented the descriptive theoretical analysis method by combining theoretical knowledge with practice.

Lastly, statistical method was employed to systematize and count the collected and analysed examples of material, mental and verbal processes with embedded personified semantic roles. In addition, it was used in order to provide the exact scope of the cases and that was fundamental for providing the results and conclusions of the research. The statistical data was prepared using Microsoft Excel 2010 software.

In conclusion, all three applied methods were helpful while presenting theoretical background, conducting the empirical part and concluding the results of this bachelor thesis.

V. MATERIAL, MENTAL AND VERBAL PROCESSES WITH EMBEDDED PERSONIFIED SEMANTIC ROLES

5.3. Material Processes with Embedded Personified Semantic Roles

As has been mentioned, material processes involve physical activity. Verbs, which denote action, represent material processes. Each material process involves a participant which is called the *Agent*. The Agents are divided into two groups: animate, i.e. such participants are usually humans and have intention and control over the action they perform and inanimate, i.e. participants which have no intentions but can be in control of the action. However, as this thesis focuses on personified semantic roles, all the examples contain inanimate Agents. For example:

(1) ***Last winter*** *marked the lowest monarch count ever recorded at a time when other pollinators such as honeybees, native bees, birds, and bats—vital to U.S. agriculture and therefore the nation's economy—also are facing serious decline* (Conant, 2014).

(2) ***The report*** *pulls no punches in incriminating Tanzania—at the highest levels—in the illegal ivory trade* (Russo, 2014).

(3) ***The chemicals*** *in milkweed also protect the monarch* (Conant, 2014).

(4) ***Technology*** *now radically expands their options* (Kunzig, 2014).

(5) *Indeed,* ***a quick glance*** *at a set of instructions provides evidence of the value of artificially inseminating cattle* (Kunzig, 2014).

(6) ***The different segments of the beef industry*** *make money from each other and have little incentive to adopt new technologies to improve the whole process* (Kunzig, 2014).

(7) ***This new index*** *used a different methodology, taking vertebrate diversity into account* (Del'Amore, 2014).

(8) ***One picture after another*** *showed black bears* (Cornwall, 2014).

(9) ***The capsid*** *enables the virus to attach to proteins on a host's cell, Hewson said* (Lee, 2014).

(10) *In many deer species,* ***longer periods of sunlight*** *trigger a release of testosterone in the male deer's body, which in turn spurs antler growth* (Bittel, 2014).

The examples (1-10) provided above contain personified Agents. For instance, in the example (4), *technology* is the Agent, i.e. the one that does the deed. The verb that denotes

material process is *expands*. It means that the noun *technology*, which is a noun and a lifeless object, is involved in the process of expanding and is in charge of this action. *The Cambridge Online Dictionary* defines the noun *technology* as: "(the study and knowledge of) the practical, especially industrial, use of scientific discoveries"[1]. It is obvious that realistically *technology* cannot be in charge of any action as it is non-human entity. However, as this case is personified, the noun *technology* is treated and acts as a human. The same process of personification is applied in other cases presented above. All the Agents are lifeless objects but treated as humans and perform actions which can only be done by human entities.

In addition, material processes can be intransitive which have only one participant or transitive which contain two or more participants. Other participants involved in these processes are the *Affected Patient*, the *Effected Patient*, the *Recipient* and the *Beneficiary*. The *Affected Patient* is the one which is affected by some certain action or is in the particular state while the *Effected Patient* is simply a result of a certain action. The *Recipient* is the participant which receives something, while the *Beneficiary* – the one for whom something is done or given. In the collected examples, other participants help to reveal the personified Agents. However, not all of the second participants are personified themselves. See the examples with other participants:

(11) *If there's **one defining characteristic** that distinguishes **it** from the other big cats, it's that you never know what a jaguar is thinking* (Worrall, 2014).

(12) *This **hypersensitivity** even helps **the fish** hunt live prey at night* (Bittel, 2014).

(13) *Sometimes **the animal's arms** rip **themselves** off and walk away* (Lee, 2014).

(14) *Instead, **the farm** uses **artificial insemination** to impregnate its 4,000 cows with the semen of just a few elite bulls* (Kunzig, 2014).

(15) ***The experiments** tracked **energy budgets** for mountain lions in Santa Cruz, California, and cheetahs on two South African game reserves, measuring how many kilojoules of energy they use daily* (Del'Amore, 2014).

The most ubiquitous second participant is the Affected Patient (the examples (11-15)). For instance, in the example (12*) the fish* is the Affected Patient and is affected by the Agent which, in this case, is *hypersensitivity*. The case (13) is quite interesting one as it illustrates the Affected Patient *themselves*, which is treated as the Agent *the animal's arms,* and is being in particular state of the certain action, i.e. being ripped.

(16) *"**The image** created **an uproar**," Jay says* (Daugherty, 2014).

[1] Cambridge Online Dictionary. Available from: http://dictionary.cambridge.org/ [Accessed on 04 May, 2015]

(17) ***The death*** *of the rare creature, which had not fathered any offspring, leaves only* ***six northern white rhinos*** *left on Earth, including just one male of that subspecies* (Del'Amore, 2014).

The examples (16) and (17) contain the Effected Patient. In the (16) case, an uproar is the result of an action as it was created, while in the (17) example, *six northern white rhinos* stands for the Effected Patient.

(18) *Though* ***the new index*** *received* ***intense global media attention****, establishing a broad trend for all animals is difficult—and controversial—because of the limited data on global wildlife populations* (Del'Amore, 2014).

Moreover, the example (18) has the personified second participant *the new index* called the Recipient. The verb itself is *received* so it indicates the role of the Recipient.

(19) ***The new method*** *gives more weight to* ***reptiles, amphibians, and fish populations****, which are largely declining, resulting in an overall loss for the region.* (Del'Amore, 2014).

Here, the example (19) involves the personified Agent *the new method* and the second participants *reptiles, amphibians, and fish populations*. The Agent gives *more weight* to the second participants, so they are regarded to be Beneficiaries as something is given for them.

Nevertheless, in the obtained examples, the Agents are all personified and fall into inanimate group, while second participants can be both – human and lifeless objects. The examples (11-19) contain non-human entities as second participants while the below presented examples involve second participants who are humans:

(20) ***The chance of an education*** *led* ***local women*** *to say that they too wanted to join the lion conservation effort* (Daugherty, 2014).

(21) ***Another Ewaso program*** *enlists* ***women*** *to pick up litter, which endangers curious lions and other wildlife and livestock that can ingest plastic bags from local stores* (Daugherty, 2014).

(22) ***The Crittercams*** *have given* ***researchers*** *an unprecedented window into an urban coyote's lifestyle, with 91 video clips of the animals hunting, eating, and avoiding people* (Del'Amore, 2014).

(23) ***The tunnel*** *allows* ***researchers*** *to control all the variables except ones they wish to test, Hager says, "but you sacrifice the natural behavior of the bird because it's confined."* (Lee, 2014).

(24) ***Virginia retreat*** *offers* ***veterans*** *sanctuary from war's ravages (*DeLuca, 2014).

In contrast with the examples (11-19), the above mentioned cases (20-24) contain second participants which are humans. The (20) and (21) examples have the second participant called the Affected Patient while the (22-24) examples contain the Recipient, i.e. the participant which receives something. Nonetheless, the second participant of the (23) case can also be regarded as the Beneficiary, i.e. the one for whom something is done or given. The noun *researchers* stands for the second participant Recipient and Beneficiary as in this particular sentence the action verb *to give* is used in order to show the process of giving. All of the above listed examples (11-24) involve second participants. It means that these cases are transitive. However, it must be noted that these participants depend on the Agents which all are personified.

It is noticeable that the verb *to show*, which denotes action and represents material processes, is very frequently met in popular science texts. In general, 20 examples of material processes containing the verb *to show* have been collected while analysing 211 examples of material processes with embedded personified semantic roles. Consider:

(25) *In temperate regions, for example,* ***the index*** *now* <u>*shows*</u> ***a decline*** *in wildlife, whereas in 2012* ***the index*** <u>*showed*</u> ***an increase*** (Del'Amore, 2014).

(26) *(****One video sequence*** <u>*showed*</u> ***a coyote*** *burying a squirrel carcass for later use.)* (Del'Amore, 2014).

(27) ***None of the Crittercam clips*** <u>*showed*</u> ***evidence*** *that Chicago's downtown coyotes are regularly hunting dogs, cats, or other pets, a concern of many people* (Del'Amore, 2014).

(28) ***Genetic testing*** <u>*shows*</u> ***the fungus*** *has been lurking for some 30 million years in Asia, where local species evolved to resist it* (Watson, 2014).

In these cases with the verb *to show*, inanimate Agents are followed by second participants. This verb is usually used with the Effected Patient in order to show the result of the action. The example (28) has two Effected Patients: *a decline* and *an increase* which are considered to be the results. The above listed examples are transitive, i.e. involve two or more participants.

(29) ***The DNA fingerprinting*** <u>*showed*</u> *that the jaguar corridor was a reality* (Worrall, 2014).

(30) ***Jurassic skeletons*** <u>*show*</u> *that early mammals didn't just hide in the undergrowth* (Switek, 2014).

(31) ***A 1999 study*** *showed that 300 plants species rely on Old World fruit bats to spread, and these bats "have the potential to disperse seeds hundreds of kilometers."* (Langley, 2014).

Differently from the (25-28) cases, the examples (29-31) have the syntactic structure *to show that* and do not involve second participants. Such clauses are considered to be facts and cannot be in charge of any action or have anything done to them (Thompson, 1996: 83). They cannot be regarded as any semantic role in material processes. These examples are intransitive as they do not contain second participants.

Another frequently met verb is *to reveal*. Overall, 10 examples with this verb have been found. For instance:

(32) ***New DNA evidence****, published in July in the Biological Journal of the Linnean* Society, *revealed that Thelma is the sole parent, said Bill McMahan, the zoo's curator of ectotherms, or cold-blooded animals* (Qiu, 2014).

(33) *Overall,* ***the discovery*** *reveals that there's a lot left to be discovered about parthenogenesis* (Qiu, 2014).

(34) ***The GPS data*** *revealed that city coyotes have larger home ranges than suburban coyotes do—up to 3.4 square miles (8.9 square kilometers), compared with 0.4 square mile (1.2 square kilometers)—probably because sizable sections of their habitats are too hard to use or defend, such as popular shopping streets* (Del'Amore, 2014).

(35) ***Footage of the animals hunting****, for instance, reveals that they eat a surprisingly large amount of wildlife, such as songbirds and rabbits, instead of the suspected people food and garbage* (Del'Amore, 2014).

(36) ***The study*** *also revealed that a single gene plays a big role in monarchs' signature orange-and-black coloration, and a flip of this genetic switch is responsible for the unusual white monarch butterflies of Oahu* (Vergano, 2014).

(37) ***The new research****, published November 6 in* Science*, reveals that the Mexican free-tailed bat makes the interference call when another bat of the same species is closing in on dinner* (Arnold, 2014).

Similarly to the examples (29-31) with the verb *to show*, in the cases (32-37), the inanimate personified Agents are followed by the syntactic structure *to reveal that* and do not contain second participants. It means that the examples (32-37) are intransitive, i.e. have one participant.

Furthermore, some of the material processes with embedded personified semantic roles can be used more than once in the same sentence. The examples written below illustrate this phenomenon:

(38) *Speaking from his home in New York, he talks about how* ***a childhood speech impediment*** *made him bond with jaguars,* ***how a fur coat*** *worn by Jackie Kennedy triggered a catastrophic decline in jaguar populations, and how looking to jaguars could help us deal with problems we face, like climate change* (Worrall, 2014).

(39) ***The pee pheromone*** *not only draws in a female—it also actually primes her reproductive system, stimulating hormones that cause her eggs to ripen,* ***the study*** *discovered* (Sirucek, 2014).

(40) *As* ***the number*** *of fish traps in Kosi Bay increases and* ***commercial interests*** *intrude, fish populations are in jeopardy* (Warne, 2014).

(41) *As* ***daylight and testosterone levels*** *ebb in the fall,* ***antlers*** *mineralize and turn to bone* (Bittel, 2014).

(42) *As* ***U.S. laboratories*** *phase out the use of chimps,* ***former research subjects*** *fill* ***s****pecially designed facilities* (Morell, 2014).

In the case (38) two material processes with embedded personified semantic roles are used in one sentence as the homogeneous parts of the sentence. In addition, the examples (39) and (41) indicate three material processes. The inanimate Agent *the pee pheromone* is in charge of two material processes *to draw* and *to prime* while the second Agent *the study* goes together with the verb *to discover* and shows the reference. The examples (40), (41) and (42) are used with the subordinating conjunction *as* so they indicate two or more material processes happening one after another. Both of these processes are diverse and performed by the different personified Agents.

In conclusion, the total number of 211 cases of material processes with embedded personified semantic roles has been calculated while analysing 252 examples of personified semantic roles in popular science texts. However, due to the space limitation, only 42 examples of material processes with embedded personified semantic roles have been provided. This sub-chapter has proved that personified semantic roles of material processes contain Agents which are inanimate, i.e. they have no intentions, but can control the action. In addition, majority of the analysed examples involve second participants and the most ubiquitous one is the Affected Patient. However, a very small amount of second participants are personified. Also, this analysis of the collected examples has showed that material

processes with embedded personified semantic roles can be either transitive and contain two or more participants, or intransitive with one participant.

5.2. Mental Processes with Embedded Personified Semantic Roles

Mental processes are processes of perceiving, knowing, or liking. Such verbs as *to think, to see, to imagine, to like, to feel,* etc. address to mental processes. Mental processes have two semantic roles: the *Senser* – the one who feels, knows or perceives and *the Phenomenon* – the one who is perceived, felt, etc. Although it is said that the Senser is always human, the exceptions to this statement are personified sematic roles when lifeless participants act as humans. For example:

(43) *But **the very migration** that still puzzles **researchers** could soon become a thing of the past* (Conant, 2014).

(44) ***The tropics** have seen **a 56 percent reduction** in the index of more than 3,000 populations, which include 1,638 species, over the past 40 years* (Del'Amore, 2014).

These cases have both semantic functions of mental processes which are the Senser and the Phenomenon. The example (43) contains the Phenomenon *researchers* which is human and is being puzzled by the personified Senser *the very migration*. The example (44) has the Phenomenon as non-human entity – *a 56 percent reduction* which is seen by the personified Senser *the tropics*.

(45) *In 2007, **the U.S. Geological Survey** estimated **that the global polar bear population will shrink to a third of its current size by 2050, due to loss of habitat and less access to prey*** (Qiu, 2014).

(46) ***The committee's report**, issued by the prestigious Institute of Medicine, concluded **that while chimpanzee research has had medical value, most current projects are not necessary*** (Morell, 2014).

(47) ***These early cultures** believed, as I have firmly come to believe, **that there's something distinct about a jaguar*** (Worrall, 2014).

Thompson (1996: 83) states that "Phenomenon may be a 'fact': that is a clause treated as if it were almost a thing". The examples (45-47) involve Phenomenon as a fact which is an additional information.

Moreover, mental processes can be distinguished into three types: **perception, cognition** and **affection** (Valeika, 1998: 40). The processes of perception perceive something through the senses such as sight, touch, smell, etc. while the processes of cognition show the

process of knowing. The common verbs to represent the processes of perception are *to see, to feel, to smell,* etc. Cognition processes are conveyed by stative verbs such as *to believe, to trust, to fear,* etc. The third type of mental processes, which are called the processes of affection, is recognized by verbs: *like, love, hate, want, detest, delight,* etc. The examples (43) and (44) are of the perception type while the examples (45-47) fall into the group of mental processes of cognition. Consider more cases of mental processes of perception below:

(48) *In recent years, much of **Jay's best known work** has focused **on the illegal ivory trade*** (Daugherty, 2014).

(49) *Their **plight** reflects **that of lions in broader Africa,** where they have disappeared from more than 80 percent of their historical range, **declining from an estimated 450,000 animals in the 1940s to only about 20,000 today*** (Daugherty, 2014).

(50) ***Another study**—released in August by the Green 2.0 Working Group, with support from the National Fish and Wildlife Foundation, the Argus Foundation, the Sierra Club, and Earth Justice—looked at **191 conservation and preservation organizations, 74 government environmental agencies, and 28 environmental grant-making organizations** in the U.S., totaling 3.2 million people* (Morell, 2014).

(51) ***That geographic history** helps explain **Vintana's strange combination of characteristics**, Krause says* (Drake, 2014).

(52) *Underwater, **the world** looks **mostly blue to human eyes*** (Daugherty, 2014).

In general, 9 cases of mental processes of perception have been identified. The above listed some cases (48-52) contain verbs which represent the processes of perception. In addition, all sentences have the personified Senser and the Phenomenon, which is usually an act or a fact. For instance, in the case (49) the Phenomenon *"<…>that of lions in broader Africa <…> declining from an estimated 450,000 animals in the 1940s to only about 20,000 today"* is an embedded clause which is introduced by the word *that* and treated as it is a simple noun.

Similarly to the number of the processes of perception, 8 examples of the processes of cognition have been found. Consider the examples which have stative verbs to identify the mental processes of cognition:

(53) ***The appearance** of bony claspers in males and specialized genital plates in females means that Microbrachius is the earliest known example of sexual dimorphism—or differences in appearance between the sexes—in the fossil record* (Switek, 2014).

(54) ***Haida legend*** *holds that a raven found a clamshell filled with frightened little creatures—the first humans* (Langley, 2014).

These sentences also contain the Phenomenon as a fact which is identified by the word *that* and is regarded as a single noun.

(55) ***A craze*** *for natural fertilizer made from bird droppings spurred* ***the U.S.*** *to take possession of a group of remote Pacific islands in the 19th century, and now those islands are home to the world's largest marine reserve* (Morell, 2014).

(56) ***The study*** *acknowledges* ***these limitations****, he adds, but does a poor job of addressing them in the computer model* (Lee, 2014).

On the one hand, Eggins (1994: 243) states that "One test to determine an Act is that the word *that* cannot be inserted directly after the mental process". On the other hand, if the Phenomenon starts with the word *that* immediately after a verb which denotes mental process, it is a fact. Differently form the (53) and (54) examples, in the instances presented above, the Phenomenon is an act because *the U.S.* and *these limitations* do not have the word *that* in front of them.

However, no examples of mental processes of affection have been identified. The 17 cases of mental processes with embedded personified semantic roles have been collected while analysing 252 examples of personified semantic roles in popular science texts. Figure 5 shows the usage of mental processes of perception, cognition and affection:

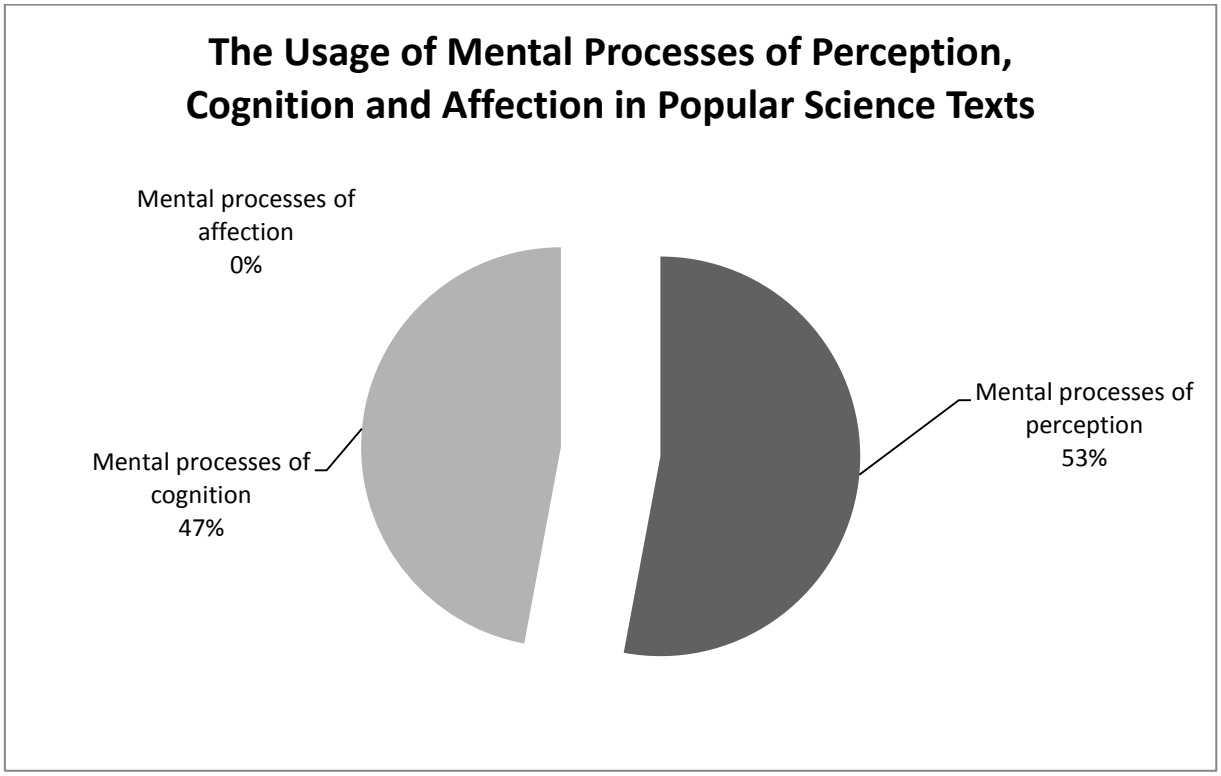

Figure 5. The Usage of Mental Processes of Perception, Cognition and Affection in Popular Science Texts

According to Figure 5 presented above, no cases (0%) of mental processes of affection have been found while analysing 17 examples of mental processes with embedded personified semantic roles. The conclusion can be drawn, that most commonly used types of mental processes in popular science texts are processes of perception and cognition. Mental processes of perception make 53% (9 cases out of 17 examples of mental processes) while mental processes of cognition make 47% (8 cases out of 17 examples of mental processes).

5.3. Verbal Processes with Embedded Personified Semantic Roles

As has been pointed out in the theoretical part, verbal processes are processes of saying and communicating. They represent verbal action by such words as *tell, ask, say, suggest, indicate, announce, inform, notify,* etc. Verbal processes usually contain three participants: the *Sayer,* the *Receiver* and the *Verbiage*. The Sayer is in charge of the verbal process and usually is a conscious participant. However, the Sayer in the following examples is not a human since all the collected examples contain personified semantic role of the Sayer. Consider the examples below:

(57) ***The organization's website*** *described* ***Laurita's roles*** *as elephant caregiver, enthusiastic educator, and energetic collaborator* (Del'Amore, 2014).

(58) *As enviable as that sense of connection to the sea may be,* ***the decline*** *of Kosi Bay's fish stocks tells* ***a different story****—or perhaps a variation on a worldwide story, one about failing to live within ecological limits* (Warne, 2014).

From these two instances it is clear that they contain personified semantic roles of the Sayer and the Verbiage, but no concrete Receiver. In the examples (57) and (58), the Verbiages *Laurita's roles* and *a different story* are nominalized statements involved in verbal processes.

(59) ***The report*** *notes that around the time of Xi Jinping's visit the market price of ivory in Tanzania doubled, to $700 a kilo* (Russo, 2014).

(60) ***Legend*** *says that salamanders can spit poison and extinguish flames, but even such pyrotechnic powers would not be enough to save them from a new scourge* (Watson, 2014).

(61) ***The memorandum*** *also* <u>says</u> *that the federal government, at the urging of scientists, farmers, and educators, is creating a multiagency Pollinator Health Task Force* (Conant 2014).

Similarly to the examples (57) and (58), the instances (59-61) also have personified semantic roles of the Sayer and the Verbiage, but no concrete Receiver. However, here the Verbiage is introduced with a *that* clause because the speech is reported.

Moreover, the verb *suggest* is quite ubiquitous in popular science texts. In total 16 examples with the verb *suggest* have been found. Some of the examples written below illustrate this phenomenon:

(62) ***The huge cheekbone attachments*** *for jaw muscles (called flanges)* <u>suggest</u> *that Vintana had powerful jaw muscles—the better to tear apart its vegetarian meals with* (Drake, 2014).

(63) *But* ***evidence*** *from the field* <u>suggests</u> *that the ferret has been pulled back from the brink of extinction* (Owen, 2014).

(64) ***The findings****, published October 29 in the journal Contributions to Zoology,* <u>suggest</u> *that golden-backed frogs, with a range that stretches from Africa to Australia, are much more diverse than had been thought* (Owen, 2014).

(65) ***The relationships*** *among these long-enigmatic creatures* <u>suggest</u> *that the very first mammals originated early* (Switek, 2014).

Similarly to the (57-61) examples, the (62-65) cases also have personified semantic role of the Sayer and the Verbiage, but no concrete Receiver. It must be noted that the speech in the instances (62-65) is reported so a *that* clause represents Verbiages.

Furthermore, the verbal verb *suggest* is mostly used with the Sayer *study* in popular science texts. 5 examples out of 16 examples with the verb *suggest* and the Sayer *study* have been identified. For instance:

(66) ***The study of monarch genes*** *also* <u>suggests</u> *that the butterflies began their evolutionary history as a migratory species that spread worldwide before a few groups settled down and eventually became separate homebody species* (Vergano, 2014).

(67) ***The study*** <u>suggests</u> *that migration was a founding condition for the species, which descended from a split with an ancestral African species more than a million years ago* (Vergano, 2014).

(68) ***A new study*** <u>suggests</u> *that blue whale populations are not as vulnerable to ship strikes as previously thought, but experts say, 'not so fast.'* (Lee, 2014).

Once again, together with the cases (59-65), the instances presented above also involve Verbiages which are reported by the personified Sayers and starts with a *that* clause.

Apparently, only two examples, which contain the Receiver, have been found while analysing 24 examples of verbal processes with embedded personified semantic roles. The Receiver is the one who receives the message or for whom the message is transferred. For example:

(69) ***South Africa*** *<u>requires</u>* ***cage divers*** *to obtain permits and follow strict safety guidelines, Skomal notes* (Howard, 2014).

(70) ***Getting an accurate population size*** *not only <u>tells</u>* ***park managers*** *how much food and habitat is needed for a certain species, but also how threatened that species might be* (Qiu, 2014).

As it can be seen, the personified Sayers in (69) and (70) examples listed above, address the Verbiage (i.e. the information which the Sayer conveys to the Receiver) to animate Receivers, i.e. humans. In the sentence, the Verbiage is usually presented after the Receiver is mentioned. In other cases, the Receivers are not mentioned and the prediction can be done that the Verbiage is sent to the readers or can be understood from the context.

To sum up, the total number of 24 cases of verbal processes with embedded personified semantic roles has been calculated while analysing 252 examples of personified semantic roles in popular science texts. This sub-chapter shows that all three participants, the *Sayer*, the *Receiver* and the *Verbiage*, can be found in verbal processes with embedded personified semantic roles, although, the Receiver is omitted in most of the cases (only two examples with particular animate Receivers were found out of 24). In addition, all the examples of verbal processes contain the Verbiage.

To conclude the results of each section of the empirical part and to calculate the frequency of the usage of material, mental and verbal processes with embedded personified semantic roles in popular science texts, consider the Figure:

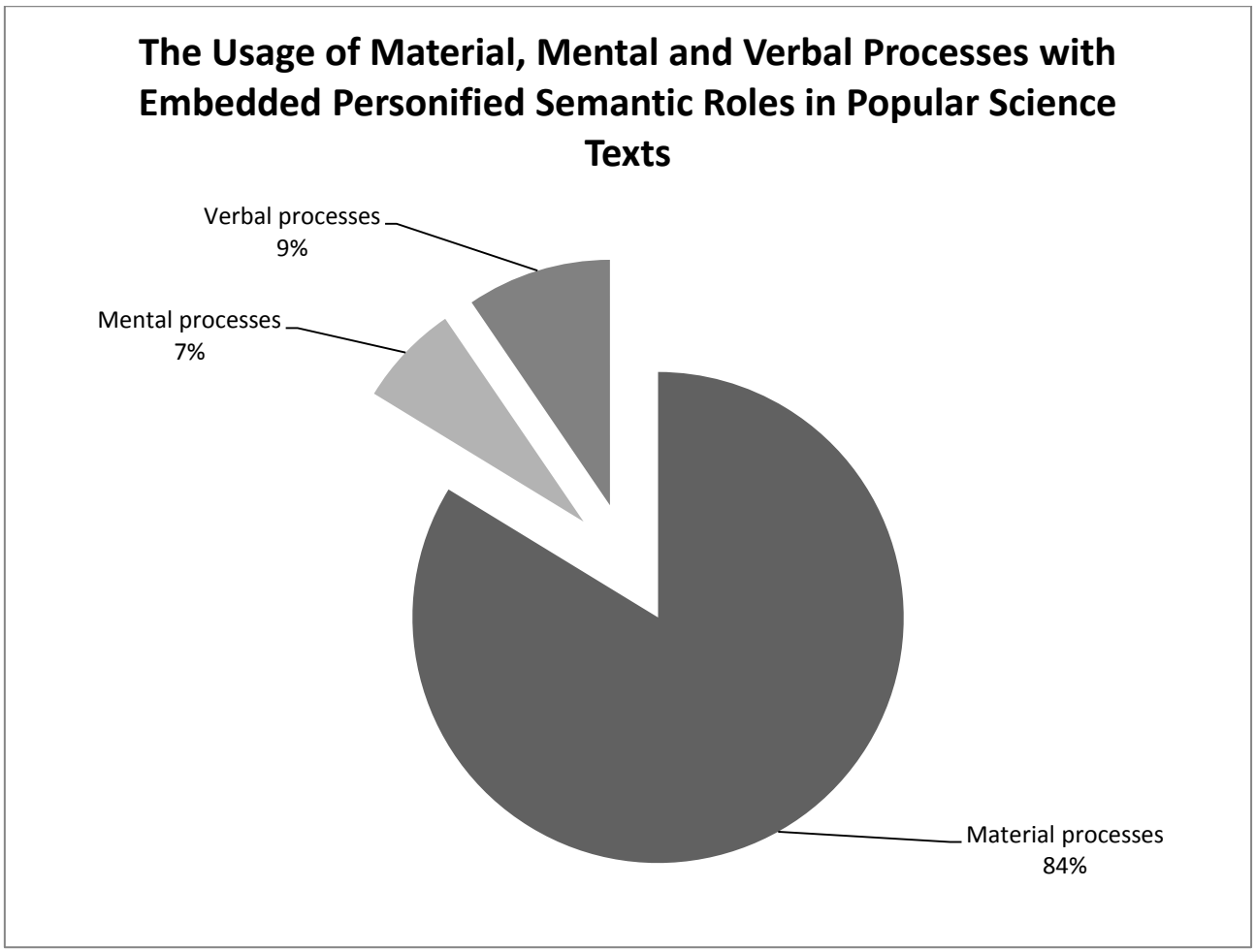

Figure 6. The Usage of Material, Mental and Verbal Processes with Embedded Personified Semantic Roles in Popular Science Texts

Figure 6 indicates the exact percentage of all the examples of material, mental and verbal processes with embedded personified semantic roles found in popular science texts. There have been found 252 examples of these processes in total. The material processes consist of 211 examples (84%) which is the largest number. Second largest group is of verbal processes as it has 24 examples (9%). Finally, mental processes contain only 17 examples (7%). The conclusion can be drawn, that material processes with embedded personified semantic roles are significantly more ubiquitous in popular science texts than mental and verbal processes.

CONCLUSIONS

The aim of the present study is to analyse personified semantic functions embedded in material, mental and verbal processes in scientific discourse. It has been accomplished together with the objectives pointed out in the Introduction of this thesis: 1) to present theoretical material about systemic-functional approach and semantic framework of the sentence; 2) to provide theoretical background related to personification in popular science texts; 3) to classify the collected examples of personified semantic roles embedded in material mental and verbal processes; 4) to show the relative frequency and present the statistical data of the collected examples. A thorough analysis of the usage of material, mental and verbal processes with embedded personified semantic roles allows to draw the following conclusions:

1) Systemic-functional approach analyses both how people use language in various contexts and how language is structured for use. A key characteristic of systemic-functional approach is its emphasis on language function. There are three metafunctions which language performs in context: ideational, interpersonal and textual. Each of them has their own grammatical systems: transitivity (ideational), mood (interpersonal) and theme (textual). The system of the semantic framework of the sentence is called the system of transitivity. Transitivity is the resource for interpreting our experience, and this is done in terms of processes: material, mental, verbal, etc. All types of processes form the semantic framework of the sentence.
2) Scientific discourse can be of two types: professional and popular texts. The main difference between them is the target audience. Professional science texts are written for people who are experts in a specific academic field while popular science texts focuses on a wider audience whereas readers have less scientific knowledge. The authors of popular science texts try to use informal language by using various means of expressions. Personification is one of them. This stylistic device gives human traits and characteristics to lifeless objects making them alive. Moreover, personification decorates, makes texts more colourful and easier to understand.
3) Material processes are the processes of physical activities. Each material process involves a participant, which is called the Agent, and might contain second participants such as the Affected Patient, the Effected Patient, the Recipient or the

Beneficiary. Another type of processes is mental. Such processes deal with internal side of the mind. There are three types of mental processes: perception, cognition and affection. Mental processes contain two participants – the Senser and the Phenomenon. Furthermore, verbal processes are clauses of saying and communicating. There are three participants of verbal processes: the Sayer, the Receiver and the Verbiage.

4) Overall, 252 examples of material, mental and verbal processes with embedded personified semantic roles have been collected. The significantly dominant type of processes is material as it consists of 211 examples (84%). Second largest group is of verbal processes. 24 examples of verbal processes with embedded personifications have been observed (9%). Finally, mental processes contain only 17 examples (7%). As can be seen, material processes with embedded personified semantic roles make up the majority of accumulated examples.

To sum up, personified semantic functions embedded in material, mental and verbal processes are commonly used in popular science texts. Personification illustrates such texts and makes them easier to understand. According to the analysis of the examples, material processes are the most ubiquitous in popular science texts.

The analysis has examined the usage of material, mental and verbal processes with embedded personified semantic roles in popular science texts. Further research could be done on the usage of other types of processes such as happening, existential and relational. Moreover, the research could also involve analysis of other means of expressions embedded in various types of processes.

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