

Vilnius University  
Faculty of Philology  
Department of English Philology

Dovilė Urbanavičiūtė

Metaphorical language in popular science literature: A case study of Richard Dawkins

Thesis submitted in partial fulfilment of requirements for the degree of BA in English  
Philology

Supervisor: Dr. Davide Castiglione

2017

## Contents

|                                                       |    |
|-------------------------------------------------------|----|
| Abstract .....                                        | 3  |
| 1. Introduction .....                                 | 4  |
| 2. Data and Methods .....                             | 11 |
| 3. Analysis of extended/novel metaphors .....         | 13 |
| 3.1. Survival machine/vehicle .....                   | 13 |
| 3.2. Translation/communication of the gene code ..... | 15 |
| 3.3. Personification of genes .....                   | 25 |
| 4. Conclusions .....                                  | 31 |
| 5. References .....                                   | 33 |
| Summary in Lithuanian.....                            | 35 |
| Appendix 1.....                                       | 36 |

## **Abstract**

The following paper discusses metaphor usage in the genre of popular science. The object of this analysis is a chapter called ‘Immortal coils’ taken from Richard Dawkins’ book *The Selfish Gene*. The study discusses the impact of creative conceptual metaphors on the construction of the overall meaning of the text, as well as the significance of their linguistic manifestations and context. In focusing on the genre of popular science, it also makes an attempt at defining potential difficulties of metaphorical language usage from the perspective of lay readers. The trade-off between the simplification and clarity introduced by the metaphors is explored through the means of the metalanguage provided by the author and the reader responses provided as reviews of the book. A qualitative analysis was performed exclusively on extended novel metaphors based on the Conceptual Metaphor Theory proposed by Lakoff and Johnson with an added layer of Deliberate Metaphor Theory proposed by Steen. The results show that while the text often draws from the same source domains as the specialist publications, the difference lies in some novel exploitations and extensions of the conventionalized metaphors.

## 1. Introduction

When thinking about scientific writing we often emphasize such qualities as accuracy and objectivity. In a traditional sense, scientific theories seem to very seldom have room for interpretation and the target audience is expected to be qualified enough to be able to understand the content. But what changes if the common reader of such a text is replaced by a non-expert? Popular science literature rose to serve as a bridge between complex scientific data or theories and the general public. However, the language of this genre has evolved to become somewhat different from specialized scientific texts: the authors have started using creative linguistic devices to engage the reader more, in the process transforming the text to suit almost everyone. A key device in this respect is an explicit reliance on metaphorical language, which came to serve many functions in the genre. To this day, it helps create analogies between concepts that are often hard to grasp, presenting them as something more concrete and familiar to human activity (Lakoff & Johnson 1980; Gibbs et al 2004; Semino 2008). While in other sorts of discourse it is, more often than not, merely a rhetorical device, in science communication its function becomes very different.

Research into the specific uses of metaphorical language in specialist and popular science discourse has shown that language carries a fundamental significance in theory construction and the process of teaching facilitation (Boyd 1993; Knudsen 2002). It has even been proposed that scientific metaphors may have a similar effect to meaning construction and interpretation as the metaphors used in political discourse (Semino 2008: 130). Critical Discourse Approach offers an opportunity to analyze language through an interdisciplinary perspective with consideration to the social aspect to specific discourses. Typically, the discourse with the most stressed social implications to the public is of political nature, however, scientific writing too can be argued to have similarly important implications. If we can conclude that political metaphors have a great impact on policy making (Semino 2008), then the same could be inferred about scientific discourse. A distinction needs to be made here between science communication (a.k.a. popular science) and specialist texts. While both may pose some serious social consequences, they are different in nature. Specialist articles may have influence over

future research trends, funding decisions and some decisions regarding policy making, in turn making it easy to manipulate language to achieve personal gain (Kueffer and Larson, 2014: 719). Certain metaphors used for rhetorical purposes may frame a concept in a positive/negative light consciously or unconsciously adding connotation to discussed matters. Nevertheless, the readership of this particular genre tend to have relevant knowledge needed to understand the underlying ideas and concepts and therefore are arguably less easily influenced by subjective use of language. In contrast, science communication poses a different sort of problem in that the scope of its influence expands to include the general public. In using analogy based language, authors subject their readership to their own personal interpretation, allowing them the power to change public opinion. According to Rolf (2009: 168) “stable metaphors can become ideologies and by critically focusing on metaphor in discourse social and cultural implications can be inferred”. In concluding on the topic of critical metaphor analysis he claims that metaphorical language can make up creative, but at times misleading mental links in discourse that can “hide the real issues and distort the power plays which are at play”. Critical discourse analysis is a crucial tool that reveals hidden meanings behind metaphorical constructs (Rolf 2009: 169).

But how unique the use of metaphor actually is in science communication as far as its linguistic realization and communicative function goes? It may be argued that these metaphors should be accessible to the lay audience in spite of their complexity, and at the same time novel enough to spark their interest by drawing unusual parallels. They have to create a bridge between difficult and often abstract subjects and readers’ common experiences while also keeping them on the same page.

In their revolutionary Theory of Conceptual Metaphor (CMT henceforth) Lakoff and Johnson (1980b) argued that despite the common opinion that metaphor is a matter only of language, it is, indeed, heavily related to our thought process. They claim that metaphors are not only a giveaway of our thoughts and the underlying associations that we have about the world, but they might in turn also influence our thought. The links between different concepts and experiences seem to be pervasive in our everyday lives. The language we use is a detailed representation of our conceptual system, which also

depends on our cultural background (Kövecses 2015). CMT proposes a way to analyze the process of describing one concept (target domain) in terms of another (source domain) providing a systematic method to create conceptual mappings in our language use. This proves to be helpful in determining the underlying associations that the author of a certain text may have had. These mapped out associations could then lead to some interesting insights into the implicit worldview of the communicator and the possible interpretation of his usage of metaphorical language on the part of his readership. The reason the conceptual approach may shed light on the genre of popular science literature is its flexibility to account for the many functions that metaphor has in this particular type of genre. It would be interesting to see how our conceptual system has influence on the possible effects of metaphor as a tool to communicate complex ideas to the public.

As an addition to the Conceptual Metaphor Theory, Steen suggests a new aspect of deliberateness of metaphorical language use (henceforth – Deliberate Metaphor Theory or DMT) (2015). He makes a distinction between intentional and unintentional metaphor use suggesting that deliberate metaphors exert specific properties, such as extension, novelty and specific pragmatic cues. Semino (2008: 19) also mentions the correlation between the degree of conventionality and intention in metaphor use. Steen validates this distinction by saying that questions asking the reason behind conventional metaphor use, such as “Why did you use that metaphor?”, are meaningless and thus prove that non-deliberate conventional metaphors rarely have cross-domain mappings (2015: 67). He also argues that CMT ignores the “communicative dimension” exerted by deliberate metaphorical use, which, by being identified as intentional metaphor, ultimately influences the reader’s processing of the analogy:

The central prediction of DMT is about attention (Steen, 2011c, 2013): a metaphor is used deliberately when its structure signals that the addressee has to move away their attention momentarily from the target domain of the utterance or even phrase to the source domain that is evoked by the metaphor-related expression. This hypothesis about attention to the source domain is highly specific: it focuses on the mandatory representation of the source domain as part of the situation model in utterance processing (Van Dijk and Kintsch, 1983). In pragmatic terms, a metaphor is used deliberately as a metaphor when its source domain concept requires setting up a source domain referent in the representation of the

utterance. When this happens, the source domain referent is in our attention as an element of what the utterance is about. (Steen 2015: 68)

Gibbs (2015) opposes these implications by claiming that it is difficult to assess the intentions of the speaker/writer in one's use of language (2015: 73). It is also argued that the proponents of the Deliberate Metaphor Theory provide no exact descriptions of what constitutes as a pragmatic cue in identifying deliberate metaphors. This complicates their hypothesis that deliberate uses have a certain "communicative impact" on the readers/listeners. Gibbs suggests that the debate on the existence of cross domain mappings could be explained by the varying degrees of conceptual metaphorical activation, which in turn depends on other linguistic as well as contextual factors (Gibbs 2015: 75). However, as the metaphors used in popular science genre often exert qualities described by Steen (extension, novelty), and are expressed by educators that generally have a responsibility to be hyperaware of their language, it would only be logical to assume that DMT might have interesting predictions about their communicative effect.

Most of the research that has been done on metaphor as a didactic tool has shown that there is some general agreement on the positive effects that it provides. Low (2008: 213) outlines four of them: metaphors may provide a memorable label for a troublesome concept, clarify it, extend thought, and bring about change related to our conceptualisation. While the first two may seem obvious, the latter ones are often not taken into account. Bradie (1999) especially expands on the third aspect, which, according to him, may be the critical point in why metaphors are so important in scientific discourse. He stresses the effect of 'interaction' metaphors, that is to say metaphors that add content to the concept to be explained. They "induce" parallels between two objects in a way that leads to creative thinking. Getting rid of these metaphors could potentially result in a loss of some brilliant insights and would do nothing to engage the reader.

In his research on specialized scientific literature Boyd (1993) classifies metaphors as either being *theory constructive* or *pedagogical/exegetical*. It may be argued that theory constructive metaphors are not very prevalent in popular science texts, as they most likely represent new theories and terminology connected with the author's conceptualization of

a relatively novel subject. According to Knudsen (2003), who re-examines Boyd's classification, pedagogical metaphors are purely descriptive as they always have alternative adequate, non-metaphorical expressions, and thus can be paraphrased. She argues that, while over time theory constructive metaphors become conventionalized (perceived as having lost their metaphoricity) in scientific texts and "closed", i.e. no longer ambiguous or needing further explanation, they may become "opened" again in other contexts, such as popularizations of science. This happens because of the change in audience, when the scientific metaphors are no longer as familiar as they are to the experts of the field. As the metaphors become "open", they are subject to misinterpretation by the non-expert readers. That is why Knudsen (2003: 1255) stresses the need to clarify metaphorical uses in popular science texts.

Kueffer and Larson (2014) also explore metaphor and its various roles in scientific writing in terms of its misleading nature. They postulate that such a strategy can often take from the objectivity of the text in that it adds connotation to certain concepts and problems thus imposing a personal and likely heavily subjective view on the reader. These value-laden interpretations may not correspond to evidence or observation in turn making us question how reliable the author of such text really is. Nonetheless, Harrison and Treagust (2006) take a completely different position in saying that metaphor could be indispensable in science teaching, which is considered to be the main goal of the whole genre of science communication. Although they acknowledge the point at issue considering the alternative conceptions that may come with teaching in metaphorical language, they see a compromise in having the communicator explain his or her analogy along the way. In her opinion of this issue, Semino (2008) states that in using metaphors, authors 'frame' the subjects in question in certain ways, while foregrounding and backgrounding particular aspects of it. This can shape the understanding of the described phenomena and how they are dealt with (2008: 132). In a similar fashion, Low (2008: 226) suggests that one should be cautious about using metalanguage with readers new to the subject and be sure that the metaphor in question is relatively easily identifiable.

The data that was chosen for analysis in this paper is the first book written by the famous zoologist and evolutionary biologist Richard Dawkins. Written in 1976, *The Selfish Gene*

was also his first attempt at explaining the mechanics of natural selection to wider audiences. While the book received a lot of praise, a lot of his critics directed their attention towards the fact that the language was too metaphorical and confusing, creating potential difficulties in the overall understanding of the work. Out of the first 15 book reviews containing the keyword ‘metaphor’ on the Goodreads website, 5 expressed direct criticisms of Dawkins use of language. A user by the name of Steve Van Slyke remarked: “Normally, I like analogies and metaphors to help explain complex ideas, but in this case I think he went too far in that direction, at least in the first half of the book.”, adding “Although he was careful to use quote marks when attributing ‘feelings’ to genes such as ‘wanting’ or ‘trying’ to do this or that, I still felt that it muddled the message.” Another user ‘Otto Lehto’ said “The book’s metaphors can be questioned for some of the shortcuts that they take with regard to the complexity of the issues at stake”. In regard to the attribution of human qualities to genes ‘Kate Savage’ wrote: “He puts forward zoological observations within metaphors that encourage us to see them in human culture, which naturalizes systems of oppression”.

Another 9 positive reflections on *The Selfish Gene* commended Dawkins’ use of metaphorical language. User by the name of ‘David’ wrote “Dawkins takes the time to explain things, often with appropriate metaphors”. ‘James Boyle’ said “The book is wonderfully written and easy to understand, constantly making use of suitable and clever metaphors to explain certain genetic phenomena”, which is echoed by the user ‘Ahsan’, who states “Among a sea of books on evolution, professor Dawkins’ greatest quality lies in his ability to create vivid and engaging metaphors that should be easily accessible to everyone.”

As Dawkins himself admitted, some of the readers found that the undertone of the writing was very depressive, complemented by the fact that the title of the book, *The Selfish Gene*, set a negative connotation to the concepts discussed in it. All this prompted the author to write several prefaces to different editions of the book, explaining his language usage, in particular the metaphors that framed a lot of the content and explanations.

One of the most used rhetorical devices in the book is personification, which is a form of metaphor that is mapped by the target-source domain SOMETHING is HUMAN. A trend

that we see in evolutionary biology texts is the personification of genes, described by Keller (1995) as the ‘discourse of gene action’. While personification is not novel in the discourse of genetics, its specific manifestations emphasizing different human qualities are.

The following analysis will discuss the impact of creative extended conceptual metaphors on the construction of the overall meaning of the text, as well as the significance of their linguistic manifestations and context. In focusing on the genre of popular science, it also makes an attempt at defining potential difficulties of metaphorical language usage from the perspective of layman readers.

## 2. Data and Methods

Based on the focus on personification and novel/extended metaphors, the chapter called ‘Immortal coils’ was taken for analysis. This study will focus on creative metaphors only, as the discourse of the genetic code has a lot of conventionalized metaphors that are perceived as having lost their metaphoricity. Semino (2008) makes a distinction between these two types of metaphors (creative and conventional) in that one can often find the conventionalized contextual meaning in a dictionary next to the direct one. As the study is based on the theoretical assumptions of the Deliberate Metaphor Theory as an added layer to the Conceptual Metaphor Theory, the analysis of conventional metaphors would seem to be irrelevant, having in mind that the metaphors originally used to fill a lexical gap have become a systematic part of the discourse and little to do with the author’s personal intentions and perceptions. The metaphors were collected in using MIP (Metaphor Identification Procedure), a method proposed by the Pragglejaz Group (2007) which includes these main four steps:

1. Read the entire text–discourse to establish a general understanding of the meaning.
2. Determine the lexical units in the text–discourse
3. (a) For each lexical unit in the text, establish its meaning in context, that is, how it applies to an entity, relation, or attribute in the situation evoked by the text (contextual meaning). Take into account what comes before and after the lexical unit.  
(b) For each lexical unit, determine if it has a more basic contemporary meaning in other contexts than the one in the given context. [...]  
(c) If the lexical unit has a more basic current–contemporary meaning in other contexts than the given context, decide whether the contextual meaning contrasts with the basic meaning but can be understood in comparison with it.
4. If yes, mark the lexical unit as metaphorical (Pragglejaz Group 2007: 3).

Some of the resulting metaphors which did not fit the criteria of extension/novelty were thus excluded from the analysis. The impact on the creation of meaning in the text was

analyzed with consideration to their context as well as social (ideological) aspect from the perspective of Critical Discourse Analysis approach.

While the metaphors chosen for the qualitative analysis appeared in the chapter ‘immortal coils’, their immediate extension into other chapters of the book was also considered. A decisive factor in the study was also the metalinguistic glosses provided by the author in his explanations of his language usage. This metalinguistic awareness of one’s own language is one of the most important arguments for the Deliberate Metaphor Theory.

In addition to mapping of the conceptual creative metaphors according to the dynamic of target and source domains according to the Conceptual Metaphor Theory, I am going to analyze them based on their context and type of linguistic manifestation. The categories of metaphorical patterns have been described by Semino (2008: 22-30) and include: repetition, recurrence, clustering, extension, combination and mixing, literal-metaphorical oppositions, signalling, and intertextual metaphors (see a more detailed description in Appendix 1).

### 3. Analysis of extended/novel metaphors

The analysis of the chapter returned three results of main metaphors that adhered to the proposed criteria of extension and novelty – ORGANISMS are MACHINES, DNA is INSTRUCTIONS and GENES are HUMAN BEINGS. The following is a three-part analysis of the identified metaphors.

#### 3.1. Survival machine/vehicle

The most commonly used metaphor in the chapter by far is LIVING BEINGS are MACHINES. Dawkins essentially uses this expression to refer to all living beings, not just humans. The SOMETHING is a MACHINE metaphor is a part of many genres, but it is especially prominent in the discourse of evolutionary biology. Its popularity was only enforced by the rise of Darwinism, a theory that eventually replaced the widespread assumption of intelligent design. It brought to our attention the underlying logic of the workings of nature and showed that the self-regulation of its processes did not require any design at all. However, the social consequences of the principle of ‘survival of the fittest’ did prove to be detrimental to society, as it was never supposed to be adopted as any acceptable way of life. These social implications of Darwinism are a large part of the reason why ‘machine’ has negative connotations in our society, because of the fact that it allegedly dehumanizes its subject.

In fact, this usage differs from how the metaphor was first used in the preceding chapter ‘The replicators’ in which the target domain of the metaphor is described as all the qualities of an organism that ensures its survival. Consider the extract:

- (1) Replicators began not merely to exist, but to construct for themselves containers, vehicles for their continued existence. The replicators that survived were the ones that built *survival machines* for themselves to live in. The first survival machines probably consisted of nothing more than a protective coat. But making a living got steadily harder as new rivals arose with better and more effective survival machines. Survival machines got bigger and more elaborate, and the process was cumulative and progressive. (Dawkins 2006: 19)

However, in the chapter ‘Immortal coils’ the analogy takes on a different target domain, namely, that of ‘organism’ and the phrase becomes used interchangeably with it. The shift of reference is not necessarily contradictory. Even though Dawkins stresses the aspect of container by varying the source domain between vehicle/coat, he also implies the organism could be a construct of the mentioned survival ensuring features carrying what he terms as ‘the replicators’, i.e. genes that have evolved to copy themselves. In this sense, the different species that have existed since the creation of bacteria capable of replication are all varied manifestations of the survival machine. The ‘replicator’ is the metaphorical engine of this vehicle, and its sole purpose is the continuation of its existence:

- (2) What weird engines of self-preservation would the millennia bring forth? Four thousand million years on, what was to be the fate of the ancient replicators?  
(Dawkins 2006: 19)

This extension of the ‘survival machine’ metaphor rejects any association that a reader might have had of the agency of the replicators, while simultaneously enhancing its aspect of mechanical workings and a lack of consciousness. ‘Engine’ implies a positive force, a central part of the MACHINE source domain, without which it would be rendered useless. It also implies design, a connection that will be more widely discussed in the further paragraphs.

This seeming contradiction of describing living beings in terms of machines (the complete opposite of living) draws insight into the nature of the target domain. It stresses such qualities as determinism and the pursuit of a single purpose, lack of emotion and consideration. These exact qualities are reminiscent of survivalism, a living being reduced to its instincts. Ironically, while Dawkins presents human beings and other organisms in the light of the MACHINE metaphor, he presents the replicators, or later on, genes, as having human qualities and emotions.

The general metaphor in the text is realized in the form of recurrence + extension. On the basis of Semino’s description of the metaphorical pattern of recurrence, the chapter combines different expressions referring to the “same broad source domain in different

parts of a text” (2008: 23). All of the variants of the metaphor’s source domain – ‘machine’, ‘vehicle’, and ‘container’ – belong to the same semantic field, which translates into a general metaphorical mapping ORGANISM is a MACHINE, while the original usage translates into a mapping QUALITIES ENSURING SURVIVAL are a MACHINE.

Extension of the metaphor is realized through similar qualities, mainly, occurrence of different source domains that ultimately belong to the same semantic field of ‘machine’. However, this is done in close proximity to the original root metaphor, and the explanation facilitates different elements of the same target domain as well (Semino 2008: 25). As an instance of this, the element of the target domain THE REPLICATORS are referred to as the ENGINE of the “machine”, i.e. the organism.

### **3.2. Translation/communication of the genetic code**

The second instance of a novel extended metaphor in the chapter is ‘genetic code’. While the phrase is in itself very much metaphorical as it is, it brings forth many more associations and extensions that are relevant to this main metaphor. This particular metaphor generates and reveals certain hypotheses and underlying workings of the genetic material, making it to be a theory-constructive metaphor according to Boyd’s classification (Boyd 1993, Knudsen 2003). One of the alternative source domains for this metaphor is LANGUAGE/COMMUNICATION. It can also be considered to be an extension of the code metaphor in that “the mechanism of the code is argued to be a translation process” (Knudsen 2003: 1252). The process is based on several other extensions in a meronymical relation to each other. This extension involves different related elements of the metaphors, such as words, sentences, alphabets, etc. According to Knudsen, this metaphor could generally be considered theory constructive:

This new metaphor of translation cannot be paraphrased without loss of information. Actually, several additional new metaphors are needed to explain and extend the code’s original root metaphor (Knudsen 2003: 1252).

So the metaphor needs further explication and extension in order to be understood by a lay audience. However, the metaphor has been so often used in specialist discourse, that it no longer *looks* like a metaphor. All metaphoricity is lost and the metaphor becomes ‘closed’ having undergone a process of conventionalization. On the other hand, in popular science literature the need for explication is retained and usually the used metaphors are “marked” as foreign in the discourse, either by enclosing them within scare quotes or using signalling phrases, such as ‘so to say’, ‘as if’, ‘imagine’, etc. This is a crucial strategy, as the audience does not possess necessary knowledge or vocabulary in order to comprehend the discussed scientific concepts. (Knudsen 2003: 1255). Thus, the metaphors are ‘opened’ again.

This concept of “marking” the metaphors coincides with Steen’s views on deliberate metaphor use. According to his assumptions, this kind of use of metaphor would indicate that the author intentionally tried to draw the reader’s attention towards the source domain as a part of “the situation model” (Steen, 2015: 68). Extension of the central metaphor further explicates this intention by drawing a network of interconnected metaphors, creating a separate universe to support the root metaphor.

Semino argues that the LANGUAGE/COMMUNICATION metaphor is used systematically by both specialist and non-specialist authors and thus has become relatively conventional. The common extensions of this metaphor like ‘code’, ‘letters’ and ‘translation’ have become a part of the terminology of genetics, resulting in them being “less dependent on mappings from the source domain and more on knowledge of the target domain” (Semino, 2008: 138). However, she concludes that in some cases the metaphor can be used creatively.

Dawkins uses a different variation of the aforementioned translation/communication metaphor by likening GENETIC MATERIAL to BUILDING INSTRUCTIONS. In fact, he starts the integration process of the metaphor by at first using a different commonly used conceptual metaphor of DNA is a BUILDING:

- (3) A DNA molecule is a long chain of building blocks, small molecules called nucleotides (Dawkins 2006: 22).

Two metaphors, namely that of CHAIN and BUILDING, are used to form a complex metaphorical structure. He consequently uses the same metaphor in the transition to another one:

- (4) But the *sequence* of building blocks in a man is not only different from that in a snail (Dawkins 2006: 22 – emphasis is the author's).

The stress of the word 'sequence' is where the author tries to draw the reader's attention to the aspect of the source domain's material structure. However, the metaphor does not seem to fully make sense in this particular context, as in the most basic sense, building blocks do not go by particularly planned out sequences.

The metaphor comes into play especially as the author starts to discuss genetic material as architect's instructions for the building of the body. Here, Dawkins plays the metaphor by mixing it with the language aspects of the source domain:

- (5) This DNA can be regarded as a set of instructions for how to make a body, written in the A, T, C, G alphabet of the nucleotides. It is as though, in every room of a gigantic building, there was a book-case containing the architect's plans for the entire building (Dawkins 2006: 22).

The metaphorical universe of the original metaphor GENETIC MATERIAL is INSTRUCTIONS is further expanded by other related metaphors belonging to the same semantic field. The use of these metaphorical expressions and their mappings are explicated before making use of the analogies in explaining scientific concepts. These explanations 'open' the metaphors to interpretation by the readers (Knudsen, 2003). Certain relationships occur between these mappings that could be explained by meronymy. In one of the realisations of the megametaphor, the nucleus is described in terms of a book-case, 46 chromosomes are described in terms of 46 volumes, and genes are described in terms of pages:

- (6) The book-case in a cell is called the nucleus. The architect's plans run to 46 volumes in man – the number is different in other species. The 'volumes' are called chromosomes. They are visible under a microscope as long threads, and the genes are strung out along them in order. It is not easy, indeed it may not even be

meaningful, to decide where one gene ends and the next one begins (Dawkins, 2006: 22).

It should be noted that Dawkins is very aware of his language use and notes the extent to which a certain metaphor is applicable. When a certain metaphor starts to no longer represent the full situation and “breaks down”, he indicates it before going on with the explanation. He also highlights the aspects that comply with the model and rejects those that do not fall in with it. He explains that, whenever the analogy does not fit in with the reality of the concept, he falls back on terminology:

(7) I shall make use of the metaphor of the architect’s plans, freely mixing the language of the metaphor with the language of the real thing. ‘Volume; will be used interchangeably with chromosome. ‘Page’ will provisionally be used with gene, although the division between genes is less clear-cut than the division between the pages of a book. This metaphor will take us quite a long way. When it finally breaks down I shall introduce other metaphors (Dawkins 2006: 22-23).

Lakoff and Johnson (1980a) expand on the trend of scientists to use multiple metaphors to facilitate the comprehension of different aspects of the same concept. They consequently claim that these clusters of distinct metaphors might be more important to further overall understanding than the consistency of their use:

[...] the insistence on maintaining a consistent extension of one metaphor may blind us to aspects of reality that are ignored or hidden by that metaphor (Lakoff and Johnson 1980a: 208).

Dawkins’ language often implies an agent/a creator. In fact, the machine metaphor in the phrase ‘survival machine’ mentioned in the previous section was perfect evidence of it. The ‘instructions’ metaphor is no exception. The variant of the same metaphor, ‘architect’s plans’, is an even more obvious example of this practice. In the case where ‘re-opened’ metaphors are not clarified to the lay public, they can easily be misinterpreted. Dawkins, however, immediately specifies the aspect of the metaphor that is to be associated with the target domain and rejects any irrelevant associations:

- (8) Incidentally, there is of course no ‘architect’. The DNA instructions have been assembled by natural selection (Dawkins, 2006: 23).

This new addition of information may require the reader to update and revise their situation model, as it does not correspond with the given information. The metaphor is then consequently used to explain the process of mitosis:

- (9) As an adult, you consist of a thousand million million cells, but when you were first conceived you were just a single cell, endowed with one master copy of the architect’s plans (Dawkins, 2006: 23).

The metaphorical universe that Dawkins has created starts to lack consistency, however, when the metaphorical mapping DNA is INSTRUCTIONS is temporarily abandoned and the same target gains another source domain. This new source domain is introduced by the metaphor DNA is a SUPERVISOR:

- (10) This brings me to the second important thing DNA does. It indirectly supervises the manufacture of a different kind of molecule – protein (Dawkins 2006: 23).

This personification of DNA seems partly detached from the logic of it being the instructions of the building assembled by the “architect” – the process of natural selection. The SUPERVISOR could also be interpreted as a metonym for the process of building. The shift in source domain also manifests as personification as its conceptual mapping becomes DNA is a HUMAN BEING. The adverb ‘indirectly’ modifies the process of ‘supervision’, in turn making the statement more ambiguous, as the author does not subsequently explain the significance of this modifier. This logical inconsistency shows that the resulting oversimplification of the original metaphor was an inadequate representation of the concept of DNA.

In creating the CODE/LANGUAGE network of metaphors, Dawkins sets up grounds for further explanations ahead:

- (11) The **coded message** of the DNA, **written** in the **four-letter nucleotide alphabet**, is **translated** in a simple mechanical way into another **alphabet**. This is

the **alphabet** of amino acids which **spells out** protein molecules (Dawkins 2006: 23 - my emphasis).

The novelty of Dawkins' metaphor manifests in its complexity. He mixes and matches different elements of source and target domains, sometimes switching to completely new source domains altogether. Here, he mixes in a completely new metaphor into the extended network of 'instructions' metaphor:

- (12) But if the DNA is really a set of plans for building a body, how are the plans put into practice? How are they translated into the fabric of the body? (Dawkins 2006: 23)

'The fabric of the body' metaphor is quite common in non-specialist scientific discourse and its function here is purely rhetorical, as it does not contribute to the overall meaning of the main metaphor. It can be argued that this sort of combination of metaphors is unnecessary, for its purely aesthetic function clashes with the pedagogical function of the 'instructions' metaphor. This sort of use corresponds to the textual manifestation of mixing, according to Semino's terms (2008: 26). The 'fabric of the body' metaphor is introduced into the unrelated extension of the 'instructions' metaphor, switching the source domain from LANGUAGE to FABRIC. This metaphorical strategy, as Semino claims, is often "stigmatized as an indication of a poor command of language", although she concedes that the line between compatible and incompatible metaphor use is "rather fuzzy" (Semino 2008: 27).

In addition to metaphor mixing and the resulting confusion by the non-specialist reader, another potential drawback is the oversimplification inherent in some kinds of metaphor use. Dawkins identifies two such instances in his writing. The first is the description of chromosomes as 46 volumes:

- (13) I said that the plans for building a human body are spelt out in 46 volumes. In fact this was an over-simplification. The truth is rather bizarre. The 46 chromosomes consist of 23 *pairs* of chromosomes. We might say that, filed away in the nucleus of every cell, are two alternative sets of 23 volumes of plans (Dawkins 2006: 26).

Thus, the metaphor is refined and restructured to better represent the relationships of the elements of the genetic code. The volumes are identified as “1 through 23 a” and “1 through 23 b”. In the further extension of the metaphor the ‘architect’s plans’ are said to be “filed away”.

Another interesting aspect of this excerpt (13) is the linguistic signalling in the phrase “we might say that”. Steen (2015) indicates signalling as one of the strategies of intentional metaphor use and Knudsen (2003) claims that marking the metaphors as “strangers within the discourse” ‘re-opens’ them for new interpretations. Goatly (1997: 168) refers to signalling as “textual guidance for interpretation”, which is echoed by Semino (2008: 28), who suggests that these markers may indicate the metaphoricity of what follows after. We may thus conclude that linguistic signalling may be a valuable tool in preventing the misinterpretation of certain metaphors.

The second instance of oversimplification by Dawkins comes in the specification of his volume analogy. While at first the readers visualize the architect’s plans as a book by default, he specifies that it is indeed a ‘loose-leaf binder’:

- (14) Imagine the volumes of architect’s plans as being loose-leaf binders, whose pages can be detached and interchanged (Dawkins 2006: 26).

The excerpt starts again with a case of linguistic signalling of its metaphoricity. The central purpose of this addition of information is the emphasis of the structure of the target domain. The DNA is not indivisible, but consists of parts (pages) that can be interchanged with corresponding parts of different chromosomes (volumes). This addition of new properties to the source domain is especially helpful in the explanation of meiosis, i.e. the production of sex cells:

- (15) What happens is that, during the manufacture of the sperm, single pages, or rather multi-page chunks, are detached and swapped with the corresponding chunks from the alternative volume. So, one’s particular sperm cell might make up its Volume 1 by taking the first 65 pages from Volume 1a, and pages 66 to the end from Volume 1b. This sperm cell’s other 22 volumes would be made up in a similar way (Dawkins 2006: 27).

Thus the resulting structure of the extended metaphor is as follows:

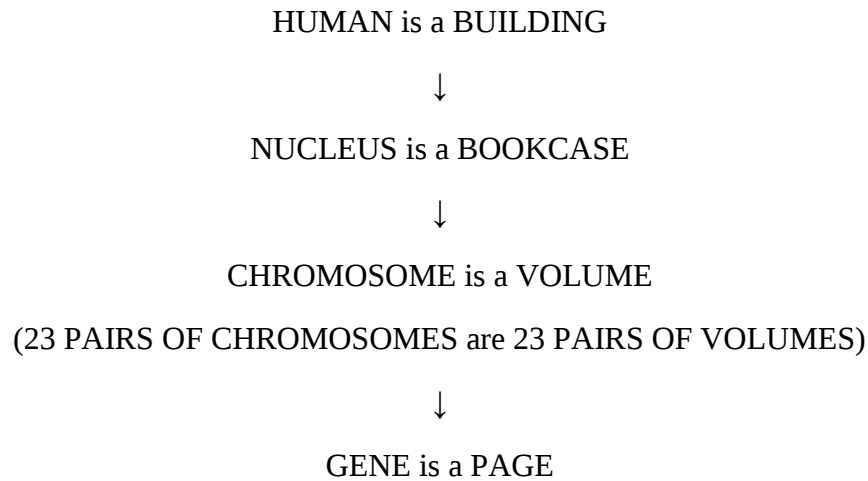


Fig. 1. *Meronymical relationships between metaphors.*

The same process in (15) is immediately paraphrased in using the correct terminology. This clarifies any misconceptions that a reader might have gained through the interpretation process. In attempting to explain why it is pointless to identify which chromosomes came from the father and the mother, reason being the genetic process of crossing over, Dawkins introduces another outside metaphor, while temporarily abandoning his main metaphor:

- (16) Any one chromosome in a sperm would be a patchwork, a mosaic of maternal genes and paternal genes (Dawkins 2006: 28).

Because the ‘binder’ metaphor does not have attributes that are strong enough to illustrate this process, the newly introduced metaphor highlights the attribute of fragmentation of the chromosomes. While in the original metaphor of INSTRUCTIONS the mixing of fragments could be considered as a negative trait, PATCHWORK or MOSAIC “encourage” this attribute.

This is also the portion of the text, in which the analogy of GENE is a PAGE becomes no longer helpful in explaining gene processes. This is fully acknowledged by Dawkins, who identifies the shortcomings of his metaphor:

- (17) In a loose-leaf binder a whole page may be inserted, removed or exchanged, but not a fraction of the page. But the gene complex is just a long string of nucleotide letters, not divided into discrete pages in an obvious way at all (Dawkins 2006: 28).

He further utilizes the language aspect of the metaphor to say that protein chain messages have “punctuation”, where the start and end of message signals the instructions for making one protein. As an alternative for his GENE is a PAGE analogy, Dawkins suggests the metaphor CHROMOSOME is a ROLL OF TICKER TAPE. The element of GENE is no longer differentiated in this metaphor, because of the difficulty to draw the limits of its existence:

- (18) It is as though the architect’s plans were written out, not on discrete pages, but on 46 rolls of ticker tape. [...] Crossing-over is represented by taking matching paternal and maternal tapes, and cutting and exchanging matching portions, regardless of what is written on them (Dawkins 2006: 28).

Simultaneously prefacing the metaphor with an instance of signalling (“It is as though...”) the author consequently follows up his choice of metaphor with considerations for why defining the unit of gene is not meaningful for the description of gene processes. The metaphor CHROMOSOME is a ROLL OF TICKER TAPE accentuates his point and does not prioritize consistency of metaphorical language over factual evidence.

Probably the most interesting realization of the LANGUAGE/COMMUNICATION metaphor in the *Selfish Gene* is Dawkins’ comparisons of gene processes to different aspects of translation. He comes down to the most detailed level of the genetic code – letters, proceeding to compare a mistake in the copying of cells in the mitosis stage to a misinterpretation of a single letter:

- (19) A point mutation is an error corresponding to a single misinterpreted letter in a book (Dawkins 2006: 31).

Dawkins describes this process as the driving force of evolution. He makes further use of the metaphor in describing the process of inversion, which is another type of gene

mutation, in terms of the volume source domain. In doing so, he reminds the reader of the underlying logic of his comparison:

- (20) A piece of chromosome detaches itself at both ends, turns head over heels, and reattaches itself in the inverted position. In terms of the earlier analogy, this would necessitate some renumbering of pages (Dawkins 2006: 31).

The last process is described in terms of the aforementioned loose-leaf binder metaphor, in which the pages can be reattached and exchanged if needed:

- (21) Sometimes portions of chromosomes do not simply invert, but become reattached in a completely different part of the chromosome, or even join up with a different chromosome altogether. This corresponds to the transfer of a wad of pages from one volume to another (Dawkins 2006: 31).

The build-up of constant shifts in metaphor or between its different elements is rewarded by the ability to explain the difficult processes of gene mutation, which would be otherwise cumbersome to the lay readers. Thus, the extended metaphor is summarized by the mapping REARRANGEMENT OF GENES is EDITING:

- (22) It is possible that gene complexes have, over the years, been extensively rearranged or ‘edited’ in this kind of way (Dawkins 2006: 31).

Once again, Dawkins implies agency in his selection of words ‘rearranged’ and ‘edited’. While the first alternative anticipates that there is, indeed, a correct sequence of genes, the word ‘edited’ very obviously implies that there is an “editor”. In this instance, however, Dawkins does not stop to reject this aspect of the metaphor, rather he mentions it when it already poses to become problematic in the following page of the chapter:

- (23) But by the unconscious and automatic ‘editing’ achieved by inversions and other accidental rearrangements of genetic material, a large cluster of formerly separate genes has come together in a tight linkage group on a chromosome (Dawkins 2006: 32).

Words ‘unconscious’, ‘automatic’ and ‘accidental’ here serve to disassociate these processes from any aspect of intelligent design, thus again forcing the readers to update their (possible wrong) situation model.

Table 1. Mappings between metaphors of genetic processes.

| Target domain                        | Source domain                |
|--------------------------------------|------------------------------|
| POINT MUTATION                       | MISINTERPRETED LETTER        |
| INVERSION                            | RENUMBERING OF PAGES         |
| REATTACHMENT OF PARTS OF CHROMOSOMES | TRANSFERRING OF WAD OF PAGES |
| REARRANGEMENT OF GENES               | EDITING                      |

### 3.3. Personification of genes

So far the analysis has shown that the target domain of DNA has been linked to a few different source domains:

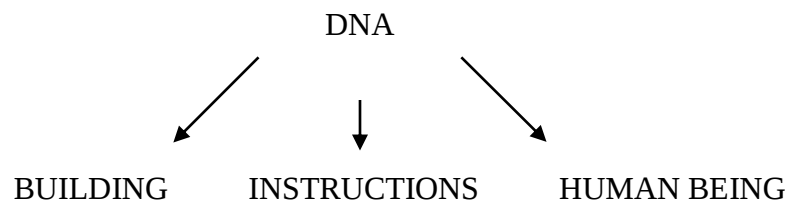


Fig. 2. Different source domains for the same target domain of DNA.

In this section, the third kind of source domain, which corresponds to the conceptual mapping DNA is a HUMAN BEING, will be discussed in more detail.

In his preface to the second edition of the book, Dawkins addresses that personification in *The Selfish Gene* was fully intentional and part of a strategy to present and reframe the Darwinian theory to fit the gene’s ‘eye-view’ of discussed evolutionary processes. In his own words, he expressed his adopted perspective as ‘a novel image’ of an already existing theory which in turn provided new insight into natural selection and selfishness at the gene level (Dawkins 2006: xv).

This gene action used in the discourse of genetics can often be just a natural way to describe phenomena. However, in the preface of the 30<sup>th</sup> anniversary edition to the book, Dawkins stresses the role of personification in theory construction and creative thinking. He points out that taking a gene's view of a situation often gives a more logical explanation that perhaps could not be thought of from the outside perspective:

Personification of this kind is not just a quaint didactic device. It can also help a professional scientist to get the right answer, in the face of tricky temptations to error. [...] Personifying genes, if done with due care and caution, often turns out to be the shortest route to rescuing a Darwinian theorist drowning in muddle (2006: xi).

This view corresponds to Boyd's classification of scientific metaphors, in which he describes them as either being theory-constructive or pedagogical (1993). In addition to identifying these two functions of personification, Dawkins identifies it as a strategy that should be used carefully.

In the same preface to the 30<sup>th</sup> edition of *The Selfish Gene* Dawkins acknowledges that he has indeed been accused of and criticized for 'anthropomorphic personification' (2006: x). He makes a distinction between personification at the level of gene and organism, saying that while the second might be problematic in many ways and may even require an apology on his part, the former should not cause any issues to the understanding of the reader:

Personification of genes really ought not to be a problem, because no sane person thinks DNA molecules have conscious personalities, and no sensible reader would impute such a delusion to an author (Dawkins 2006: x).

While the statement might be true for most instances of this kind of metaphorical use, the attribution of some of the human qualities to genes is what fuelled most of the criticisms of the book's metaphors. As the author acknowledges himself, the main metaphor used in the title of the book, *The Selfish Gene*, caused a lot of the readers to misinterpret the claim that genes act in a self-interested way, rather they believed that this human attribute extended into the level of the organism. Essentially, implications could potentially be made that human beings are selfish by default. Dawkins himself does not help in guiding

his readers away from these implications, as he uses the phrase ‘we are born selfish’ a couple of times in the first chapter of the book. In all fairness, Dawkins apologizes for these words and admits that they are indeed misleading in this context.

Chapter ‘Immortal coils’ presents different manifestations of personification of genes, either by comparing them to distinct variations of human beings or by attributing them human qualities. Some related uses can be classified under one megametaphor GENES are PROFESSIONALS:

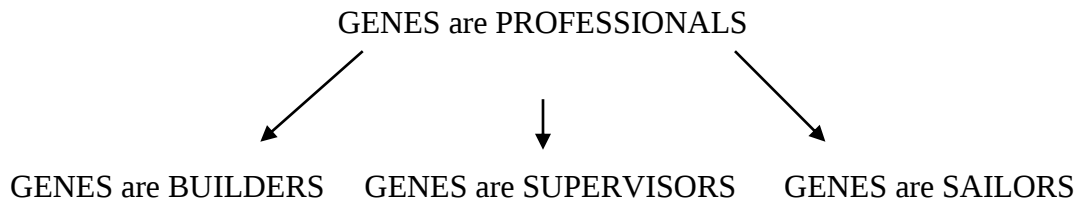


Fig. 3. *Megametaphor of GENES are PROFESSIONALS.*

The first instance is presented by comparing the replicators, which are the ancestors of the modern genes, to BUILDERS:

(24) [...] there are many different ways of making a living in the world, and the replicators have built a vast range of machines to exploit them (Dawkins 2006: 21).

(25) In recent years – the last six hundred million or so – the replicators have achieved notable triumphs of survival-machine technology such as the muscle, the heart and the eye (evolved several times independently) (Dawkins 2006: 24).

The first extract (24) also contains the metaphor ORGANISM is a MACHINE discussed in the first part of the analysis. In that part, the replicators were referred to as the ENGINE of the organism, which is not consistent with the metaphor REPLICATOR is a BUILDER.

Another such micrometaphor of the megametaphor is represented by the mapping GENES are SUPERVISORS:

(26) This brings me to the second important thing DNA does. It indirectly supervises the manufacture of a different kind of molecule – protein (Dawkins 2006: 23);

(27) Genes do indirectly control the manufacture of bodies, and the influence is strictly one way: acquired characteristics are not inherited (Dawkins 2006: 23).

The third, and final instance of the megametaphor is represented by the conceptual mapping of the creative metaphor GENES are SAILORS. Note that cistrons are said by the author to be genetic units of undefined length:

(28) The sperm was one of several millions, a **vast armada** of **tiny vessels**, and together they **sailed** into your mother. This particular sperm (unless you are a non-identical twin) was the only one of the **flotilla** which **found harbour** in one of your mother's eggs - that is why you exist (Dawkins 2006: 30 – my emphasis).

(29) As the cistrons leave one body and enter the next, as they **board** sperm or egg for the **journey** into the next generation, they are likely to find that the **little vessel** contains their close neighbours of the **previous voyage**, **old shipmates** with whom they **sailed** on the **long odyssey** from the bodies of distant ancestors. Neighbouring cistrons on the same chromosome form a tightly knit **troupe of travelling companions** who seldom fail to **get on board** the same **vessel** when meiosis time comes around (Dawkins 2006: 33 – my emphasis).

The general metaphor GENES are PROFESSIONALS also manifests in the genes being described as “good at their job” as well as being “skilled”:

(30) Firstly, they replicate, that is to say they make copies of themselves. This has gone on nonstop ever since the beginning of life, and the DNA molecules are now very good at it indeed (Dawkins 2006: 23).

(31) Now, natural selection favours replicators that are good at building survival machines, genes that are skilled in the art of controlling embryonic development (Dawkins 2006: 24).

Thus, while these metaphorical source domains are all related by belonging to the same broad semantic network, with the only exception of SUPERVISOR, they all occur in unrelated parts of the text. This corresponds to the metaphorical pattern of recurrence.

Interestingly enough, there is no linguistic signalling provided by the author to indicate the metaphoricity of these expressions, which is consistent with his opinion that personification at the gene level should not be problematic for the reader.

Another evident novel case of personification in the text is the attribution of immortality to certain gene units. This is also manifested in the title of the chapter. The comparison to human beings is utilized for the explanation of gene longevity. This same explanation is facilitated by the various immediate extensions of the metaphor:

- (32) The *combination* of genes that is any one individual may be **short-lived**, but the genes themselves are potentially very **long-lived**. Their paths constantly cross and recross down the generations. One gene may be regarded as a unit that **survives** through a large number of successive individual bodies (Dawkins 2006: 25 – my emphasis).

Different expressions of a gene unit's metaphorical 'life-expectancy' are prominent throughout different parts of the text as well:

- (33) The average **life-expectancy** of a genetic unit can conveniently be expressed in generations, which can in turn be translated into years. If we take a whole chromosome as our presumptive genetic unit, its **life story** lasts for only one generation (Dawkins 2006: 29 – my emphasis).
- (34) What about the **life-span** of a smaller genetic unit, say 1/100 of the length of your chromosome 8a? (Dawkins 2006: 30 – my emphasis).
- (35) But the genes in the world have an **expectation of life** that must be measured not in decades but in thousands and millions of years (Dawkins 2006: 34 – my emphasis).

However, the use of phrases like 'life-expectancy', 'life story', 'life-span' and 'expectation of life' could be very misleading in their description of genetic units. While they are used to explain the correlation of the size of the genetic unit to its longevity (preservation of information) through many generations, a misconception could be made about its length of existence. In recognition of this, Dawkins states the following:

- (36) Another aspect of the particularness of the gene is that it does not grow senile; it is no more likely to die when it is a million years old than when it is only a hundred (Dawkins 2006: 34).

This particular manifestation of the metaphor GENE is IMMORTAL could be considered as both a case of recurrence and extension in terms of metaphorical patterning. Different phrases belonging to the same broad source domain are being used to define GENES as HUMAN BEINGS. At the same time, several similar metaphorical expressions are used in clusters as a form of linguistic extension.

#### 4. Conclusions

While the metaphors used in the text often reflect the intended aspects of the analogies, some of them are accompanied by alternative conceptions that are not explicated by the author. Some of the metaphors are accompanied by different forms of linguistic signalling, which essentially indicates the metaphoricity of the unit at the same time acting as a guide for interpretation. Dawkins illustrates Lakoff and Johnson's claims (1980a) that metaphorical consistency should be expended for the sake of clarity provided by a cluster of unrelated metaphors. In a case where an already extended metaphor is no longer useful or relevant in explaining a concept, he immediately abandons the old analogy in exchange for the new, more accurate one. The result of this is a mixture different linguistic manifestations throughout the text.

The analysis shows that while the text often draws from the same source domains as the specialist publications, the difference lies in some novel exploitations and extensions of the conventionalized metaphors. While the same expressions might be perceived as terminology in specialist discourse (gene code, genetic instructions, nucleotide alphabet, etc.), their distinctly creative use opens a door for new interpretations on the part of the readership. Moreover, Dawkins' perspective on novel language use, especially in the case of gene personification, coincides with the theory-constructive function of the metaphor. While it is argued by Knudsen (2003) that popular science rarely utilizes these kinds of metaphors, Dawkins' gene's 'eye-view' approach contributed to the controversy caused by the book's claims.

The present study is limited in terms of its restricted scope of sample data used for analysis. Nevertheless, it provides insight into the possible functions and specifics of popular science discourse. The analysis proved that there is often a thin line between achieving better understanding and causing further confusion when it comes to the use of metaphorical language.

While the literature review revealed that research and interest into genetics as a part of the popular science discourse is growing, other fields of science seem yet to receive such attention. A similar study into metaphor use in the field of quantum physics, as a purely

theoretical science, would provide an interesting perspective into the language of the popular science genre.

## 5. References

- Boyd, R. 1993. Metaphor and theory change: What is 'metaphor' a metaphor for? in A. Ortony (ed.) *Metaphor and Thought*. Cambridge: Cambridge University Press. 481-532.
- Bradie, M. 1999. Science and Metaphor, *Biology and Philosophy* 14: 159-166.
- Dawkins, R. 2006/1976. *The Selfish Gene*. New York: Oxford University Press Inc.
- Gibbs, R. W. Jr., P. L. C. Lima & E. Francozo. 2004. Metaphor is grounded in embodied experience, *Journal of Pragmatics* 36/2004: 1189-1210.
- Gibbs, R. W. Jr. 2015. Does deliberate metaphor theory have a future? *Journal of Pragmatics* 90/2015: 73-76.
- Goatly, A. 1997. *The Language of Metaphors*. London: Routledge.
- Harrison, A. G. & D. F. Treagust. 2006. Teaching and Learning with Analogies: Friend or Foe? in P. J. Aubusson, A. G. Harisson & S. M. Ritchie (eds) *Metaphor and Analogy in Science Education*. Dodrecht: Springer. 11-24.
- Keller, E. F. 1995. *Refiguring Life: Metaphors of Twentieth-century Biology*. New York: Columbia University Press.
- Kövecses, Z. 2015. *Where Metaphors Come From: Reconsidering Context in Metaphor*. New York: Oxford University Press.
- Knudsen, S. 2003. Scientific metaphors going public, *Journal of Pragmatics* 35/2003: 1247-1263.
- Kueffer, C. & B. M .H Larson. 2014. Responsible Use of Language in Scientific Writing and Science Communication, *Professional Biologist* 64/8: 719-724.
- Lakoff, G. & M. Johnson. 1980a. The Metaphorical Structure of the Human Conceptual System, *Cognitive Science* 4/1980: 195-208.

- Lakoff, G. & M. Johnson. 1980b. *Metaphors We Live by*. London: The University of Chicago Press.
- Low, G. 2008. Metaphor and Education, in R. W. Gibbs Jr. (ed.) *The Cambridge Handbook of Metaphor and Thought*. New York: Cambridge University Press. 212-231.
- Pragglejaz Group. 2007. MIP: A Method for Identifying Metaphorically Used Words in Discourse, *Metaphor and Symbol* 22/1: 1-39.
- Rolf, D. 2009. Being Critical about Metaphor, in Lê, T., Q. Lê & M. Short (eds) *Critical Discourse Analysis: An Interdisciplinary Perspective*. New York: Nova Science Publishers, Inc. 163-170.
- Semino, E. 2008. *Metaphor in Discourse*. Cambridge: Cambridge University Press.
- Steen, G. 2015. Developing, testing and interpreting Deliberate Metaphor Theory, *Journal of Pragmatics* 90/2015: 67-72.
- Goodreads. 2017. The Selfish Gene. Available at: [http://www.goodreads.com/review/show/977442183?book\\_show\\_action=false&from\\_review\\_page=1](http://www.goodreads.com/review/show/977442183?book_show_action=false&from_review_page=1) (Accessed 20 April 2017)
- Goodreads. 2017. The Selfish Gene. Available at: [http://www.goodreads.com/review/show/1963861930?book\\_show\\_action=false&from\\_review\\_page=2](http://www.goodreads.com/review/show/1963861930?book_show_action=false&from_review_page=2) (Accessed 20 April 2017)
- Goodreads. 2017. The Selfish Gene. Available at: [http://www.goodreads.com/review/show/1181262790?book\\_show\\_action=false&from\\_review\\_page=2](http://www.goodreads.com/review/show/1181262790?book_show_action=false&from_review_page=2) (Accessed 20 April 2017)
- Goodreads. 2017. The Selfish Gene. Available at: [http://www.goodreads.com/review/show/356595814?book\\_show\\_action=false&from\\_review\\_page=5](http://www.goodreads.com/review/show/356595814?book_show_action=false&from_review_page=5) (Accessed 20 April 2017)
- Goodreads. 2017. The Selfish Gene. Available at: [http://www.goodreads.com/review/show/583588872?book\\_show\\_action=false&from\\_review\\_page=7](http://www.goodreads.com/review/show/583588872?book_show_action=false&from_review_page=7) (Accessed 20 April 2017)

## Summary in Lithuanian

### Metaforos populariojo mokslo literatūroje: Richard Dawkins knygos analizė

Šiame darbe aptariamas metaforų naudojimas populariojo mokslo žanre. Tyrimo objektas yra Richard Dawkins knygos „The Selfish Gene“ skyrius „Immortal coils“. Darbe analizuojama lingvistinės metaforų manifestacijos ir konteksto svarba bei kūrybiškų metaforų įtaka bendrajam teksto prasmės kūrimui. Metaforos tekste taip pat vertinamos kaip ideologiniai elementai iš kritinės diskurso analizės perspektyvos. Didžiausią dėmesį teikiant populariojo mokslo žanrui, apibūdinamos metaforų naudojimo potencialiai kuriamos kliūtys eiliniam skaitytojui. Metaforiškos kalbos pagalba kuriamo turinio supaprastinimas ir patikslinimas yra nagrinėjamas atsižvelgiant į autoriaus pateiktus metakalbinius paaiškinimus ir internetinės svetainės „goodreads“ vartotojų nuomones apie knygą. Kokybinė analizė atlikta remiantis sąmoningos metaforos teorija kaip priedu prie konceptualiosios metaforos teorijos, tuo pačiu išskiriant išplėstinių metaforų naudojimą. Rezultatai parodė, kad nors nagrinėjamame tekste naudojamos metaforų ištakos sritys yra tokios pačios kaip specializuotoje mokslo literatūroje, skirtumai atsiskleidžia kūrybiškame ir išplėstiniame jų panaudojime. Nors kai kuriuose analizuojamuose atvejuose autorius aiškiai eksplikuoja savo naudojamą metaforas pasitelkdamas tam tikrus pragmatinius signalus, keletas metaforų lieka nepaaiškintos. Šis tyrimas atskleidžia teigiamas ir neigiamas metaforų naudojimo mokslo populiarinimo diskurse puses.

## Appendix 1

Description of linguistic metaphorical patterns by Semino (2008):

**Repetition (of linguistic metaphors)** – the occurrence of two or more instances of the same metaphorical expression in a text.

**Recurrence (of linguistic metaphors)** – the occurrence of two or more metaphorical expressions drawing from the same source domain at different points in a text.

**Clusters (of linguistic metaphors)** – The occurrence of several different metaphorical expressions drawing from different source domains in close proximity to one another.

**Extension (of linguistic metaphors)** – the occurrence of several metaphorical expressions evoking the same source domain and describing the same target domain in close proximity to another in a text.

**Combination (of metaphors)** – the use of metaphorical expressions evoking different conceptual metaphors in close proximity to one another.

**Signalling (of metaphor)** – The use of expressions that potentially suggest the presence of metaphorical expressions in the co-text, such as ‘sort of’, ‘as it were’, ‘metaphorically speaking’. These expressions are also known as ‘tuning devices’.

(Semino 2008: 226-230).