HEAD METAPHORS IN MARINE ENGINEERING TERMINOLOGY

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Abstrakt: Cieľom príspevku je prispieť k ďalšiemu rozvoju výskumu venovaného metaforám, ktoré tvoria špecializované technické disciplíny, skúmaním použitia metafor hlavy v námornom inžinierstve. Na tento účel bol zostavený špecializovaný korpus textov námorného inžinierstva v angličtine s cieľom identifikovať a analyzovať metaforické prípady slovnej hlavy. Všetky tokeny slovnej hlavy boli extrahované pomocou softvéru Sketch Engine a výrazy, ktoré možno považovať za metaforické, boli ďalej analyzované manuálne prijatím kognitívneho lingvistického prístupu. Najčastejším koncepčným mapovaním zahŕňajúcim metaforické použitie slova hlava, ktoré sa nachádza v korpuse textov námorného inžinierstva, je HLAVA JE TOP ALEBO NAJDÔLEŽITEJŠIA ČASŤ. Keďže kognitívni lingvisti považujú proces metafory za univerzálny, neslovenské použitie slova hlava v terminológii námorného inžinierstva v angličtine bolo tiež porovnané s ich prekladmi do chorvátskeho jazyka pomocou anglicko-chorvátskeho encyklopedického slovníka námorného inžinierstva za predpokladu, že podobné výrazy by sa našli v oboch jazykoch.
Kľúčové slová: metafora hlavy, konceptuálna metafora, (koncepčné) mapovanie, terminológia námorného inžinierstva

Abstract: The paper aims to contribute to the further development of research devoted to metaphors that make up specialized technical disciplines by exploring the use of *head* metaphors in marine engineering. For this purpose, a specialized corpus of marine engineering texts in English has been compiled in order to identify and analyse metaphorical instances of the word *head*. All tokens of the word *head* were extracted using Sketch Engine software and expressions that could be considered metaphorical were further analysed manually by adopting a cognitive linguistic approach. The most frequent conceptual mapping involving metaphorical usage of the word *head* found in the corpus of marine engineering texts is HEAD IS TOP OR MOST IMPORTANT PART.

Since cognitive linguists consider the process of metaphor to be universal, the non-literal uses of the word *head* in marine engineering terminology in English were also compared to their translations in Croatian language using *An English-Croatian Encyclopaedic Marine Engineering Dictionary* assuming that similar expressions would be found in both languages.
Key words: head metaphor, conceptual metaphor, (conceptual) mapping, marine engineering terminology

INTRODUCTION

If metaphors are viewed as solely stylistic elements, they may initially appear to be incompatible with scientific language. Since the ideal of scientific expression devoid of subjectivity, ambiguity, and aesthetic marks was cultivated at the turn of the 20th century, metaphorical expressions were viewed as highly undesirable. However, the focus of this paper will be on a different view of metaphor held by cognitive linguistics, which contradicts the conventional understanding.

According to Lakoff and Johnson (1980), our conceptual system is metaphorical in nature and is responsible for conceptualizing, structuring, and utilizing metaphors. In addition, by examining one of the most important aspects of our daily lives, language, we can gain valuable insights into this conceptual system. When viewed in this manner, metaphor ceases to be merely decorative and becomes an essential component of human perception.

The cognitive-linguistic perspective on metaphor has also generated interest in the field of Terminology, specifically in the works of Temmerman (2000). Temmerman asserts, based on the works of Lakoff and Johnson (1980, 1999), that a conceptual system exists in a particular area of science and that we can perceive and comprehend it by analysing its linguistic characteristics or such as, in this case, its metaphorical expressions. As a result of the combination of the studies of language, terminology, and the perspective of metaphorization as a comprehensive and expressive characteristic inherent to Humanity, we are finally witnessing a greater reception of the topic by researchers in specialized languages (Finatto 2010, 649). The study of conceptual metaphors in scientific and technical language has provided compelling evidence of their important role in the organization of thought and knowledge (Carter, and Ionova 2020). It has been established that the global scientific community uses similar conceptual metaphors to communicate scientific findings and their evolution. For instance, it is widely acknowledged that engineering language tends to borrow from a variety of source domains associated with everyday activities,

common objects, or the natural and living world. Thus, the use of personification or anthropomorphism to describe machines appears to be quite common (Sishchuk, Gerasimova, and Goncharova 2019). Numerous metaphors have been found to be rooted in physical experience, i.e., humans' perception of the world around them, and their perception of themselves as embodied beings. In embodied metaphors, the body is viewed as a framework with parts and organs. In metaphors depicting specific parts of the human body, the allocation of names is based on the similarity between technical devices and parts of living organisms. It appears the majority of metaphorical terms are not derived from an essential semantic attribute, but rather from the perception of their shape or function (Durán-Escribano, and Cuadrado-Escladrado 2017, 97). The aim of the following paper is to analyze metaphorical expressions containing the constituent word *head* in a corpus of English texts compiled from the field of marine engineering and based on a cognitive-linguistic approach. Additionally, an English-Croatian Encyclopaedic Marine Engineering Dictionary was used to compare the metaphorical uses of the word *head* in marine engineering terminology in English to their translations in Croatian, under the assumption that similar expressions would be found in both languages. Thus, the paper's introduction is followed by a brief literature review outlining the history of the study of metaphor and some important aspects of the use of metaphor in scientific texts. The third part of the paper provides description of the methodology and data used in the research. The central part of the paper focuses on the results of the analysis of the *head* metaphors extracted from the corpus. The concluding section of the paper offers final observations and conclusions.

LITERATURE REVIEW

As previously stated, metaphors were traditionally regarded as elaborate literary devices or figures of speech, whereas cognitive linguists regard them as primarily matters of thought and action and only secondarily as a by-product of language. Temmerman (2000) believes that metaphoric thought in science aids in the understanding of new types of concepts, facts, processes, or other categories of knowledge. Metaphors are used to explain new situations using a conceptual system in a specific scientific area and human experiences. Temmerman's goal was to describe how metaphoric thought is used for designation and classification in scientific knowledge and technology, i.e., how metaphoric neologisms in a given terminology are related to the analogical thinking process. As a result, Temmerman (2000) distinguishes two types of

metaphors: didactic metaphors, which are only used in a teaching context, and creative metaphors, which generate neologisms that can be accepted as terms of a specialized language. Boyd (1993), too, distinguishes two primary functions of metaphor in science. Specifically, exegetical and constitutive. To explain scientific concepts, the exegetical or explanatory function is used, whereas the constitutive function is present whenever metaphors enter scientific thought and thus concept development, as in the case of the constitutive metaphorical unit *head*, which has become a term used in various fields of science and engineering to refer to the front, forward, or top part or end of something. Additionally, EAP (English for Academic purposes) research shows that metaphor might also be significant for second language learners since it can represent over 4% of an academic lecture (Littlemore, Chen, Liyen Tang, Koester, and Barden 2010). "These researchers have found that metaphors can carry important elements of meaning such as evaluation in academic speech, and that second language learners find metaphor difficult to identify and understand. Such information on the function and meaning of metaphor in context is useful for second language learners and teachers in ESP" (Coxhead 2018, 58).

Since this paper takes a cognitive-linguistic approach to metaphor, it is important to note that cognitive linguistics emphasizes the prevalence of conceptual mappings, conceptual blending, and integration as governing language and being used unconsciously in everyday language (Fauconnier 1997, Fauconnier, and Turner 2002).

Furthermore, there has been a growing interest in the study of conceptual mappings found in specialized technical discourse. The use of metaphors in scientific and technical discourse has already been noted (cf. Úbeda-Mansilla 2003; Roldán-Rijeos, and Úbeda-Mansilla 2006; Roldán Riejos 2012; Tominac Coslovich, and Luzer 2018; Sishchuk, Gerasimova, and Goncharova 2019; Carter, and Ionova 2020) and appears to be widely accepted. Thus, the purpose of this paper is to further contribute to the study of metaphor in specialized discourse by analysing metaphorical expressions with the constituent word *head* in a corpus of authentic English marine engineering texts.

Within the context of cognitive linguistics, the most basic definition of metaphor is that metaphors say one thing while intending another. They are frequently used when we interpret an abstract or novel phenomenon in terms of a more concrete or familiar concept. In other words, metaphor is a mechanism of analogy in which we imagine a concept from one conceptual domain in terms of another conceptual domain and establish correspondences between the features of both domains. According to the Theory of Conceptual Metaphor (TCM), the domains in question are the source domain and the target domain, and correspondences between them are referred to as mappings (Lakoff, and Johnson

1999). TCM is based on a two-domain approach to figurative expressions, and it primarily deals with common metaphorical expressions shared by members of a given culture and motivated by a common conceptual metaphor.

DATA AND METHODOLOGY

Metaphorical terms were identified by employing the corpus linguistic methodology and manual analysis based on Cognitive Semantics and Cognitive Metaphor Theory.

The Marine Engineering Corpus used in this research was originally compiled for studying multi-word expressions (MWE), in particular lexical bundles in maritime texts. (cf. Borucinsky, and Pritchard 2022). This corpus is tailored to be representative of English for marine engineering – one of the subvarieties of Maritime English (cf. Bocanegra-Valle 2013). The corpus comprises scientific article titles and abstracts from the Journal of Marine Engineering and Technology Volumes 10–21 in the year span 2011–2021, as well as relevant textbooks on marine engineering[1] collected from our work as ESP teachers over the last ten years. This corpus has been manually collected and filtered from unwanted metadata (e.g., URLs, navigation bars, ads, etc.) and automatically processed in Sketch Engine (SkE), i.e., lemmatized, tokenized, POS tagged, etc.

Table 1 **corpus details**

Subdomain	Genre type	Number of tokens	Number of unique tokens (i.e., types)	Number of documents
Marine Engineering	Abstracts Textbooks	1362139	57393	337

[1] The selected textbooks for the Marine Engineering Corpus are:
1. Taylor, D. A. 1996. Introduction to marine engineering, Revised 2nd edition. Oxford: Elsevier Butterworth Heinemann.
2. McGeorge, H. D. 1991. Marine auxiliary machinery. Oxford: Elsevier Butterworth-Heinemann.
3. McGeorge, H. D. 2015. General engineering knowledge (Marine Engineering). Abingdon: Routledge.

Concordances (shown in Fig. 1), word sketches and visualization tools (shown in Fig. 2) available in the SkE were used to extract examples of expressions with the constituent word *head*. All of the extracted metaphorical expressions were further analysed manually to identify the underlying conceptual metaphors.

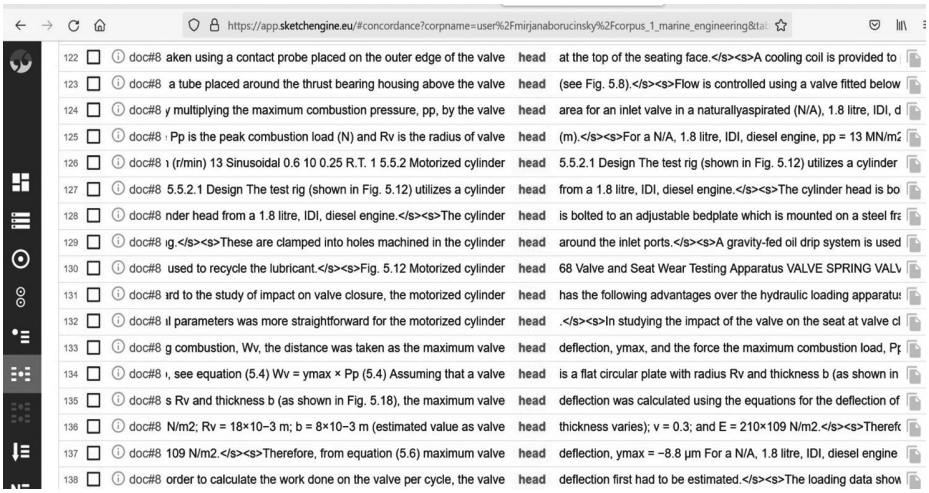

Figure 1
Concordances of the word *head* extracted from the corpus using SkE

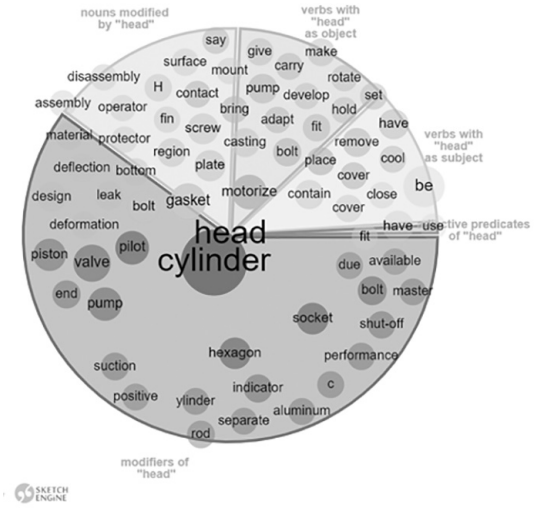

Figure 2
Visualisation of the word *head* extracted from the corpus using SkE

RESULTS

The most frequent conceptual mapping involving metaphorical usage of the word *head* found in the corpus of marine engineering texts is HEAD IS TOP OR MOST IMPORTANT PART. The mapping is structured based on specific perceived and functional resemblances projected across the domain. Since cognitive linguists consider the process of metaphor to be universal, the non-literal uses of the word *head* in marine engineering terminology in English were also compared to their translations in Croatian language using *An English-Croatian Encyclopaedic Marine Engineering Dictionary* (2013), assuming that similar expressions would be found in both languages.

Below are shown examples of *head*metaphors based on the conceptual mapping HEAD IS TOP/FRONT PART. Both English and Croatian equivalents are given. It can be noted the perceived resemblance with an indicated part of the human body is motivated by the top or front position of a mechanical element as well as its round shape. Croatian equivalent 'glava' corresponds to English *head*in almost all of the examples extracted from the corpus.

bolt head > glava svornjaka
rivet head > glava zakovice
cylinder head > glava cilindra
piston head > glava stapa/klipa
exhaust valve head > glava ispušnog ventila
drum head > glava bubnja sidrenog vitla
hammer head > glava čekića
button head > plosnata okrugla glava (of a bolt)
crosshead > križna glava (of an engine)
cubic head > kockasta glava (of a bolt)
dome-topped head > lećasta glava (of a bolt)
flat head > plosnata glava (of a bolt or a rivet)

Also, the following are examples of *head*metaphors and metonymies appearing simultaneously based on the conceptual mapping HEAD IS MOST IMPORTANT PART/PART THAT PERFORMS CHIEF FUNCTION. Again, Croatian equivalent 'glava' corresponds to English *head*in all examples provided below.

machining head > obradna glava (with functional distinction of the mechanical item)
milling head > glodaća glava (with functional distinction of the mechanical item)
boring head > glava za bušenje (with functional distinction of the mechanical item)

burner head > glava gorionika/plamenika (with functional distinction)
deareator head > glava otplinjača (with functional distinction of the mechanical item)
grinding head > glava za brušenje (with functional distinction of the mechanical item)
grip head > stezna glava (with functional distinction of the mechanical item)
torch head > glava plamenika (of a welding machine, with functional distinction of the mechanical item)

A number of examples have also been identified, which show that although certain terms are metaphorically motivated, they cannot be grouped under the same conceptual metaphor and do not lexically match in the two languages. Other examples in this group refer to terms that are metaphorically motivated in one language but not in the other, again resulting in a lack of lexical correspondence.

connecting rod ***end*** > ***glava*** *ojnice*
concave piston ***head*** > *udubljeno* čelo ***(eng. forehead)*** *klipa*
fluid ***head*** > ***tlak (eng. pressure)*** *kapljevine*
water ***head*** > ***stupac (eng. column/height)*** *vode*
cylinder ***head*** > ***poklopac (eng. cover)*** *cilindra*
ventilator ***head*** > ***poklopac*** *(**eng. cover**) ventilatora*
boiler ***head*** > ***podnica (eng. bottom)*** *kotlovskog bubnja*
combustion ***head*** > ***komora (eng. chamber)*** *izgaranja*
valve ***head*** > ***pladanj (eng. tray)*** *ventila*
spline ***tip*** > ***glava*** *klina*
tooth ***crown*** > ***glava*** *zuba*

CONCLUSION

The research on the use of *head* metaphors in marine engineering terminology in English and comparison with their Croatian equivalents seem to corroborate the findings from similar previously conducted investigations in other languages. More precisely, it appears to support the assumption that metaphor is a significant part of scientific thought. Results have shown that the *head* metaphors found in the corpus of marine engineering texts in English are grounded in human physical, bodily experience, namely in the shape, position and body functions, which seems to point that the way we experience the world physically plays a very significant role in building abstract thought. The *head* metaphors analyzed in this paper are almost identical in English and Croatian languages with minor language specific and perhaps culture specific differences.

It seems that scientists across the world share similar conceptual metaphors in structuring knowledge. The findings of this research could also contribute to research on the use of language among marine engineers, which may be useful in expanding their linguistic awareness and helping marine engineering students with translation challenges in the academic setting.

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