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ÚSTAV JAZYKŮ

COMPARATIVE ANALYSIS OF PROFESSIONAL ENGLISH TEXTS

SROVNÁVACÍ ANALÝZA ODBORNÝCH TEXTŮ V ANGLIČTINĚ

BACHELOR'S THESIS
BAKALÁŘSKÁ PRÁCE

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Abstrakt

Cílem této bakalářské práce je srovnat tři odborné texty psané v anglickém jazyce. Všechny texty se zabývají humanoidními roboty, ale každý z jiného úhlu pohledu. První z textů je zveřejněn ve vědeckém časopise ‘Science Robotics‘ a je příkladem populárně naučného stylu. Druhý z nich je vyňatý z knihy ‘Humanoid Robots, Human-like machines‘ a zastupuje odborný styl. Třetím materiálem k analýze je video, které je zveřejněno na YouTube kanálu společnosti CNET. Aby mohlo být video použito jako výchozí materiál bakalářské práce, musel být text videa nejdříve přenesen do písemné podoby. Rozdíl mezi těmito texty je patrný, neboť každý z nich je určený pro jiný typ čtenáře či posluchače. V práci jsou popsány obsahy vybraných textů a vysvětleny jejich styly. Dále se práce zaměřuje na porovnání textů z hlediska mluveného a psaného jazyka, analýzu textů podle Jakobsonova modelu komunikace a na analýzu podle registru.

Klíčová slova

styl, analýza, text, funkce jazyka, mluvený jazyk, psaný jazyk, registr, humanoidní robot

Abstract

The purpose of this bachelor thesis is to compare three professional English texts which describe humanoid robots, each from a different perspective. The first text is taken from a scientific magazine called ‘Science Robotics‘ and represents the popular-scientific style. The second text is taken from the book ‘Humanoid Robots, Human-like machines‘ and it is an example of the scientific prose style. The third material used for the analysis is a video that was released on a YouTube channel of company CNET. It was necessary to convert the video to written form, before starting to analyse it. Certainly, there are considerable distinctions between these texts because they are intended for different types of readers or listeners. The bachelor thesis describes the contents of these three texts and explains their styles. Moreover, the thesis focuses on the comparison of spoken and written discourse, the language functions of the texts according to the linguist Roman Jacobson, and the register levels of the analysis.

Key words

style, analysis, functions of language, spoken discourse, written discourse, register, humanoid robot

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PROHLÁŠENÍ

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V Brně dne .....

(podpis autora)

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1 Introduction

There is no doubt that the evolution of technology has facilitated living standards. New devices such as cars, computers, but also, for example, dishwashers or washing machines have dramatically changed people's lifestyles. One of the most significant inventions of recent years is definitely a robot. It is a device which accomplishes given tasks. People can imagine robots in many different ways. In the last few years there has been a growing interest in robots which can be used in households, such as robotic vacuum cleaners or ironing robots. These technologies have also quickly taken an essential part in people's lives and being without them would be probably unimaginable for most of us.

Quite recently, considerable attention has been paid to a group of service robots called humanoids. These are robots similar to the human body. They are made to mimic human motion and interaction. These days, it is a widely discussed topic because these devices have a large potential to change our lives, hopefully in a positive way. A substantial number of articles and studies have been written on this topic, and also many discussions and presentations have been initiated and published.

In this bachelor thesis, two English texts and one English video, which describe humanoid robots, will be compared, each from a different perspective. The first text is published in a scientific magazine which can be read and understood by the general public. The second article is written for experts in the field of robotics and is published in a scientific book. The video is available on CNET websites and on their YouTube channel and should be also understood by the general public.

It is obvious that there must be a difference in writing a text or producing a video for scientists and for those who are not specialists in that field and are only interested in robotics as a leisure activity. An analysis that will compare these two texts and the video from various points of view will be conducted. The differences between the styles of these texts and the video will be described, because each of the styles has specific criteria for writing. The aim of this thesis is to discover if the selected texts follow these criteria or not. Additionally, the bachelor thesis explores the differences between spoken and written discourse, then focuses on the language functions as described in Jakobson's model of communication and conducts a brief register analysis. Each of these branches of linguistics provides us with further information about the analysed texts, which might not be noticeable while first reading or hearing it, such as the

author´s attitude to the topic or functions of words and phrases used in a text. The objective of this thesis is to compare the two texts and the video and moreover, try to discover if they have not only distinctions between each other, but also some similarities. Hopefully, these analyses will result in a better understanding of the styles of the texts, their meanings, functions, and aims.

2 Materials chosen for analysis

"Language seems to be a feature of our essential humanity which enables us to rise above the condition of mere brutish, real or imagined" (Widdowson, 1996:4). Clearly, not only English language, but languages in general, are used in various situations, such as in ordinary conversation between friends, in lectures, or in technical books. Certainly, the usage of language in different situations might have a lot of similar features, but there might be considerable differences between them as well. Of course, "there are appropriate linguistic 'manners' for the different types of situation in which language is used, which we are expected (and usually want) to show" (Crystal and Davy, 1988:5).

As it was already declared, the main purpose of this thesis is to compare two written texts and a spoken report. It should not be hard to distinguish some of the fundamental differences between written and spoken language, but the question which should be asked is: Are written and spoken languages more different than similar? Surely, essential distinctions between written and spoken communications solely depends on styles which are dominant in the examined texts.

As it was mentioned in the Introduction, the aim of the bachelor thesis is to compare two texts and a video from different styles. Before starting the analysis, the term 'style' ought to be defined.

"The aim of stylistics is to analyse language habits with the main purpose of identifying, from the general mass of linguistic features common to English as used on every conceivable occasion, those features which are restricted to certain kind of social context. To explain, where possible, why such features has been used, as opposed to the alternatives, and to classify these features into categories based upon a view of their function in the social context. By 'features' here, we mean any bit of speech or writing which a person can single out from the general flow of language and discuss – a particular word, part of a word, sequence of words, or way of uttering a word" (Crystal and Davy, 1988:10-11).

Each of the styles retains characteristic stylistic features. This thesis is concentrated on texts which use technical English. "Its style is restricted by the unique and special purpose of the language variety, which is to transfer specific written information concerning a specific field of technical science, in this case field of robotics, mostly used in academic settings" (Krhutová, 2009:51).

2.1 Text 1 – Popular scientific style

The first article 'Not as bad as it seems: When the presence of a threatening humanoid robot improves human performance' (Text 1) is taken from an American scientific magazine called 'Science Robotics'. On their websites, they explain that "it is a multidisciplinary magazine, covering the traditional disciplines of robotics, as well as emerging trends such as advanced materials and bio-inspired designs" (Science Robotics, 2018). The article was published on 15th August 2018 and the authors of this paper are Nicolas Spatola, Clément Belletie, Alice Normand, Pierre Chausse, Sophie Monceau, Maria Augustinova, Vincent Barra, Pascal Huguet, and Ludovic Ferrand. These authors contributed equally to this work. The article suggests that humanoid robots have a great potential to help people in their everyday life. The elderly disabled people, or pupils with learning difficulties could benefit from the robots the most. Even though, the development of robots is increasing every day, there is a lack of information about the emotional experience associated with human-robot interaction. This unpleasant fact led scientists to conduct research whose aim was to find out how humanoid robots affect people´s behaviour in their presence. They asked the participants of the research to perform a Stroop task (to say the colour in which the word is written without considering the meaning of the word itself) two times. For the first time alone and for the second time either alone or in the presence of a humanoid robot that they had seen before. The participants had either positive or negative experience with the robot. As scientists had predicted, the given task was accomplished much better by participants who had a negative experience with the robot.

Since the article is published in a scientific magazine, it is expected that Text 1 is an example of a popular-scientific style. It has some similar features with journalistic style, such as figures of speech, short sentences, explanations of the terms which might be unfamiliar for the reader, etc. The main function of this style is to inform people about brand-new discoveries in various scientific fields, in this case, to present people the results of the research concerning humanoid robots. The text should be written as objective as possible, also it should be clear, without any ambiguities, and without any expressions of personal biases. According to David Crystal, the headline, one of the most distinctive features of a newspaper, also plays an important role in popular-scientific style because the aim of it is to attract the readers. It is said that most people only scan through the headlines and focus just on those that are interesting.

2.2 Text 2 – Scientific prose style

The second text is taken from a scientific book which is named 'Humanoid Robots, Human-like machines'. It was published in 2007 by leading global publisher Intech. The author of this book is physicist Matthias Hackel. "In this book, information about a variety of humanoid robotic research can be obtained. The first part deals with remarkable hardware developments, describes humanoid robotic systems as well as partial solutions. In the second part, diverse results around the biped motion of humanoid robots are presented" (Hackel, 2007). The third chapter from the first part, which is called 'Gait Dynamics' (Text 2), was chosen for analyses. This part describes the biped locomotion of humanoid robots. Scientists have been concentrating on this topic for decades. Biped gait is possible to divide into two parts: a single support phase and a double support phase. In the single support phase, one leg is moving in the air, while the other leg is in the contact with the ground. In the double support phase, both feet are in the contact with the ground. The author gives details of technical principles about the move of the robots.

The text can be subsumed into a scientific prose style. In this type of style, there are also rules which have to be followed. Generally, the text must be scientifically accurate, objective, complete, and well organized. Furthermore, illustrations and graph explanations are helpful in understanding the context. That is why they should be included in the scientific text. "There are a number of specific issues which should be borne in mind in examining a scientific text. It is generally agreed that the main problem for the scientist, as far as his use of language is concerned, is to define his subject matter precisely and to establish a clear and logical progression of ideas. What value has a visual presentation in these matters? What functions do the grammar and vocabulary have in carrying out this aim" (Crystal and Davy, 1988:251)? Whether the scientific text is understandable and valuated, these bases must be obeyed.

2.3 Text 3 – Video

The video, which is going to be analysed and compared to the two texts, is called 'Watch Sophia the robot walk for the first time' (Text 3). It was released on an American media website called CNET (Computer Networks) on the 8th of January 2018. CNET is a website that provides articles, videos, news, and reports, etc., related to technology. Before starting to analyse it, the video had to be converted to written form.

Sophia is a human-like robot which was developed by the company Hanson robotics in 2016. According to this company, "as a unique combination of science, engineering, and artistry, Sophia is simultaneously a human-crafted science fiction character depicting the future of AI and robotics, and a platform for advanced robotics and AI research. The character of Sophia captures the imagination of global audiences. She is the world's first robot citizen and the first robot Innovation Ambassador for the United Nations Development Programme" (Hanson Robotics, 2020).

Text 3 captures the humanoid robot Sophia walking and also moving her arms and head. The reporter provides people with information about the material of her skin, human expressions, which she is able to show, the speed of her movement, and opinions she has. Furthermore, there is mentioned a statement of David Hanson, who is a robotics designer. He claims that Sophia moves through human-like environment and uses a human-like tools. Moreover, she can potentially not only walk, but also run and climb stairs.

Text 3 is intended for the general public. For this reason, it is expected that style of Text 3 will share some similar features with style of Text 1. It should be emphasized that Text 3 was prepared in advance. "It is normally written English being read aloud, and there are important constraints on the writer of the language as well as on the speaker (who are often different persons). The writer has to ensure that his material can be easily articulated, and must avoid anything which would disturb overall fluency, such as ambiguous structures. He must also ensure that his material can be readily understood. Also, the absence of visual contact between speaker and hearer imposes important constraints on the kind of structures used" (Crystal and Davy, 1988:246-247).

3 Analysis

3.1 Spoken and written discourse

3.1.1 Theoretical background

Obviously, there is a difference between spoken and written discourse, and as it was already mentioned in the Chapter Materials chosen for analysis, the basic distinctions between these two areas of discourse can be easily distinguished also by people who are not linguistically trained. It might seem that this topic of linguistics is not worth discussing because it is evident enough, but is it truly so? Do these areas radically differ from each other? Do these areas have anything in common? Are these areas more similar than dissimilar? Do we have to consider the type of speech and the type of written text that is being analysed, or it does not matter at all? Therefore, this topic is more wide-ranging than it might seem at the first sight. The analysis should provide us a deeper view at this matter.

Firstly, the fundamental characters of spoken and written discourse, which might be recognizable and understandable by laymen, will be simply repeated. "Spoken and written language may be defined by reference to two distinct but overlapping set off linguistic and non-linguistic characteristics, conveniently summarized by the labels "speech" and "writing". Speech needs to be handled initially at the phonetic/phonological level, and writing at the graphetic/graphological level" (Crystal and Davy, 1988:69). Spoken discourse is transitory. Due to this fact, it can be easily forgotten. In contrast, written discourse is permanent and can be traceable. Moreover, written texts might be rewritten and corrected. Of course, during a presentation or a speech, for instance, speakers might correct themselves, but the mistakes, which are made, are noticeable by the listener. Usually, there is less time to prepare the spoken communication than the written one because the spoken text is being presented in real time. Finally, yet importantly, spoken discourse is more frequent than written discourse.

The receiver´s position should be considered as well. Talking about written discourse, the written text can be reread. There is also more time to understand the main idea of the text. What might be perceived as a disadvantage of written discourse is the fact that the receiver is not, in most of cases, in direct contact with the producer of the text. That is why it sometimes might lead to the misunderstanding of the text. On the other hand, participants, producer/s and receiver/s, of spoken discourse are in direct contact with each other. Direct contact enables the speaker/s to be spontaneous and immediately react to the current situation, as for example:

choose more comprehensible words if the audience does not understand the lexical meaning of the speech or speak more loudly and slowly.

Naturally, there are further features of spoken and written language which have to be taken into consideration. "When people communicate, they do not only produce linguistic text. In speech, they make use not only of language but of paralanguage - tones of voice, varying stress, pauses, and so on, and what they say is accompanied by facial expression, or gesture, as part of the message they intend to get across. In written communication, too, how a text is given a particular shape by choice of typeface, or its arrangement on a page, may suggest significance over and above what it signifies linguistically. And it may be multimodal in that the text is accompanied by, and related to, other modes of communication – pictures, diagrams, charts, and so on" (Widdowson, 2008:8).

Clearly, these characteristic features of spoken and written discourse prove that there is a significant difference between them. The question, which ought to be asked, is: Can these principles be generalized?

To find the answer to the previous question these two examples, a conversation between two friends and a lecture at school, will be examined. Straightaway, distinctions between these two situations can be named even by linguistically untrained people. Conversation between two friends is unprepared, spontaneous, and usually, does not require extensive, scientific, or technical vocabulary. In contrast, a lecture at school is less spontaneous, needs to be prepared, requires professional vocabulary, and structured phrases. Furthermore, the usage of passive is also more frequent than in the conversation between two friends. According to this comparison, it can be declared that some types of spoken discourse as, for instance, a lecture at school, might have more similar features with written discourse as, for example, with an essay, than they have with another type of spoken discourse, such as with an everyday conversation at home. For this reason, the types of spoken and written discourse should be examined individually, according to their styles, functions, and aims, because even though they belong to the same category, the differences between them might be enormous.

3.1.2 Analysis of chosen texts

In this bachelor thesis, there are two examples of written discourse and there is one example of spoken discourse. According to the facts which were just mentioned, it might be assumed that there will be differences between Text 1 and Text 2. There will be probably a lexical variation

between them. It is also presumed that there will be distinctions between the written texts (Text 1, Text 2) and the video (Text 3). The thesis supposes that Text 1 and Text 3 will have some characteristic features in common as well as Text 1 and Text 2. Probably, the most considerable difference will be between Text 2 and Text 3. These texts are totally dissimilar to each other.

Upon closer inspections, it was found that all of these examined texts have only the one characteristic feature in common, that they are prepared in advance. Generally, professional, in this case, scientific writing contains a lot of specific information which needs to be well-explained. For instance, explaining an equation in Text 2 *The dynamical equation that describes the movement of a biped (or exoskeleton) has the following form:*

$$MM(\vec{q})\ddot{\vec{q}} = ff\vec{q}, \dot{\vec{q}} + \vec{}$$

where $\vec{q} = (qq_1, \ldots, qq_7)^T$ *is the vector of generalized coordinates, which are the joint angles.* It is not likely that this precise information would occur unpreparedly. The writer has to be an expert in the field, in the present case of robotics. Another feature, which confirms the opinion that Text 2 has to be prepared, is the references which are used in the text, for example *It is well known that biped gait can be divided into two phases: single support phase and double support phase (Whittle, 1991).* References prove that the producer of Text 2 had to think about the content in advance. The writer has to read a lot of books and extract only information which is useful for his own work. That is why it is impossible to write a scientific text without any preparation.

Even though references might occur in Text 1, it is supposed that they will not be that frequent as in Text 2. References usually help the writer to express a particularly complicated thought. Sometimes they might not be easily understandable for the general public, that is why they are not expected to occur in Text 1 that often. According to the style of Text 1, paraphrasing is likely to be more common, because the author has the possibility to express the idea in a clearer way for the readers. It can be visible in a representative example of paraphrasing from Text 1 *According to this view (5,6), the presence of potentially threatening others improves the selectivity of attention to relevant information at the expanse of competing cues.*

Although, it has been just proved that reference and paraphrasing are characteristic features of prepared discourse and furthermore, all three texts, which are being analysed, are prepared in advance, references are not expected in Text 3. As it was in Text 1, generally paraphrasing is more likely to occur in spoken discourse. Moreover, spoken language might take the advantage

of the possibility to give a chance to other people to express their opinions, thoughts, and knowledge in real time, instead of paraphrasing. In Text 3 the reporter did not speak the whole time, but David Hanson had a space for the expression of his knowledge *Her legs allow her to walk, potentially running, climb stairs like the DARPA Robotics Challenge Cuba. She can then move through human-like environment, use human-like tools.*, and his opinion *It´s gonna take many years for the machines to be truly alive.*

The texts will be analysed from the lexical point of view. As it was mentioned above, it is likely that Text 1 and Text 3 will have similar features, even in the lexical analysis. These two texts are focused on the general public, that is why it is not necessary to use the formal and technical language the whole time, but there is a place for informal language as well. For instance, the usage of colloquial expressions is popular. In Text 1, the examples are *the gold standard, perhaps, more striking*, and in Text 3 *It´s one small step for Sophia, one giant leap for robot-kind., It´s gonna take many years….* Furthermore, the sentence *It´s one small step for Sophia, one giant leap for robot-kind.* should associate readers with the world-famous line of Neil Armstrong, *That's one small step for man, one giant leap for mankind.* It is an example of intertextuality, which can be defined as "the explicit and implicit relations that a text or utterance has to prior, contemporary and potential future texts. Through such relations a text evokes a representation of the discourse situation, the textual resources that bear on the situation, and how the current text positions itself and draws on other texts" (Bezerman, 2004:86). In simple words, the sentence should gain the addresser´s attention and interest in Text 3 by a recognizable phenomenon. On the other hand, in Text 2 any examples of informal language, such as colloquial expressions, or intertextuality will not be found because they are not appropriate for the scientific prose style.

For Text 2 a passive form of verbs is characteristic, such as *Foot behavior cannot be controlled directly…, The gait is balanced…,* or *…it is noted that the motion range is….* Although the passive form occurs in Text 1 as well, for instance *…little is known about the emotional experience…*, it is not that often as in Text 2. In Text 1, the active form of verbs is considerable as well, such as *we asked young adults*. In Text 3, there are widely used examples of active forms of verbs, such as *she has over 60 different facial expressions* or *Hanson robotics says she has applications in medical therapy*. Even though it is not typical and natural for spoken discourse to use passive, there are examples of the passive form of verbs as well, such as *Her skin called "frubber"*. Nevertheless, the active form of verbs is used more frequently.

3.1.3 Spoken and written discourse - conclusion

At the first sight, it might seem that spoken and written discourse are completely dissimilar to each other. This comparison proves that even though there are considerable differences between them, such as the way each type of the discourse is presented to its audience, spoken and written communication might share some features too, for instance, the choice of vocabulary. Furthermore, differences do not occur only between spoken and written discourse, but also between texts, which belong to the same category. Surprisingly, these distinctions can be even more significant than differences between spoken and written texts. It always depends on the style of the text, its participants, its function, and its aim.

The three texts, which were chosen for the analysis, had a similar feature. All of them were prepared in advanced. Nevertheless, more distinctions than similarities were discovered during the analysis. The most considerable differences were found between Text 2 and Text 3. Even though Text 1 and Text 3 are not examples of the same communication, they share the most similarities from the analysed texts.

3.2 Language functions

3.2.1 Theoretical background

Roman Jacobson, who was a Russian-American linguist and a member of Prague school, proposed a model of communication and defined six functions of language: referential, emotive, conative, phatic, metalingual, and poetic. "An outline of these functions demands a concise survey of the constitutive factors in any speech event, in any act of verbal communication. The addresser sends a message to the addressee. To be operative the message requires a context referred to ("referent" in another, somewhat ambiguous nomenclature), seizable by the addressee, and either verbal or capable of being verbalized; a CODE fully, or at least partially, common to the addresser and addressee (or in other words, to the encoder and decoder of the message); and, finally, a contact, a physical channel and psychological connection between the addresser and the addressee, enabling both of them to enter and stay in communication" (Jakobson, 1980:81). Each of these six factors determines a different function of language and can be schematized as follows:

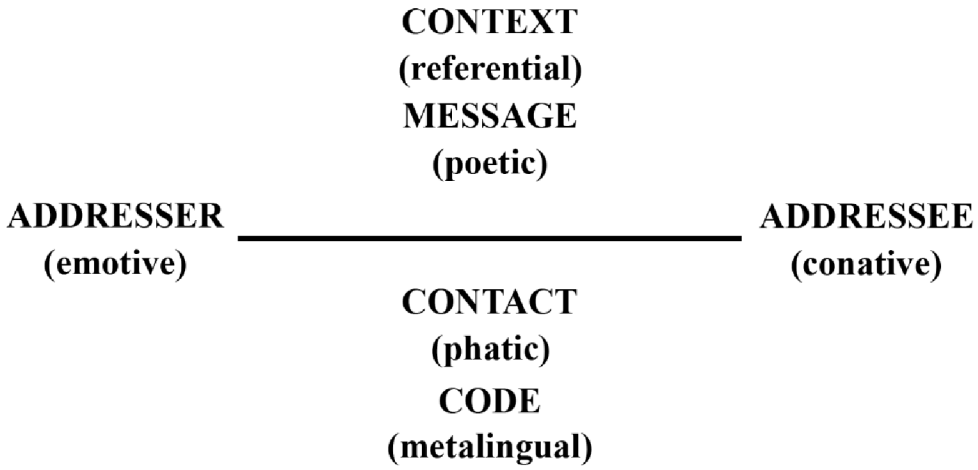

Figure 1. Jacobson´s model of communication (made by Cibulková)

1. Referential function

The referential function, also called denotative or cognitive, has the context at the center. The aim of this function is to transmit information. Furthermore, this function is dominant in most of the communications. Examples of referential function can be opinions, observations, and factual information.

2. Emotive function

The emotive function expresses speaker´s emotional attitude to the topic which is being discussed. Clearly, at the center of this function is the addresser. Instances of the emotive function are related to conveying emotions, such as anger, happiness, or sadness. Usually, these emotions are expressed by using an interjection, such as ‘Wow‘, ‘Ouch‘.

3. Conative function

At the center of the conative function there is the text receiver. The aim of this function is to activate the receiver (addressee). It can be said that the message represents the conative function, if it expresses demands, advice, or wishes, among others. For instance, ‘Wait for me!‘.

4. Phatic function

For the phatic function, it is typical, that at the center of attention there is contact and the addresser, who opens the communication channel between him/her and the addressees. Afterwards, the addresser ensures that the communication channel remains opened and at the end he/she closes it. Classic examples of the phatic function, in order to open the communication channel, are for instance ‘Welcome, Hello, Good evening or Dear Mr/Mrs‘. With the intention of closing the communication channel according to the phatic function, there should be a greeting too, such as ‘Goodbye or Yours faithfully‘.

5. Metalingual function

The metalingual function describes the language use, in other terms it speaks about the language itself. It is mostly used between linguists and people who are learning a language, foreign language as well as mother tongue. This bachelor thesis, for instance, could be included in this function as a representative. Characteristic example of the metalingual function is for instance ‘What does the word “lustig” mean in German? ‘.

6. Poetic function

"The poetic function emphasizes the content and the form of the message" (Čermák, 2011:20, translated by Cibulková). It might seem that the poetic function includes only poetry, but according to Roman Jakobson, when dealing with poetic function, linguistics cannot limit itself to the field of poetry. This function concerns also idioms, slogans, titles, etc. The goal of the poetic function is to make sentences sound well.

According to Roman Jakobson, although six basic aspects of language were distinguished, it would be difficult to find verbal messages that would fulfil only one function. "The diversity lies not in a monopoly of some one of these several functions but in their different hierarchical order. The verbal structure of a message depends primarily on the predominant function, but the accessory participation of the other functions must be taken into account by the observant linguist as well" (Jakobson, 1980:82). The function which is dominant as well as the subordinate functions always depend on the style, the aim, and the content of the communication. Therefore, the main rules can be generalized, and it can be predicted, which functions are likely to occur in a speech or a written text which is being analysed. This problematic will be explained on several examples.

In journalism, the dominant function should be referential, and the subordinate functions are usually emotive and conative. Its aim should be to inform people. Nevertheless, the producer of the communication can express his/her attitude to the topic or he/she can persuade the addressee to form an opinion on the topic as well.

To illustrate the functions, which are likely to occur in spoken or written discourse, a lecture at school was chosen as another representative example. Similarly to the journalism, the referential function should be dominant. The teacher or the lecturer provides information to students. The function, which should also be at the center, is conative because the teacher or the lecturer wants students to learn something new, and to be interested in the examined topic. In a special case, and that is a linguistic lecture, the main function occurring in the communication, with the referential and the conative function, is metalingual, because here the main topic is the language itself.

In advertising, the main function is conative, because the goal is to activate the addressee, most frequently in order to buy something new. The subordinate functions are referential and poetic.

Referential function includes the information about the product and poetic function represents the static of the text.

In a conversation, the representation of functions always relies on the content. The dominant functions, which are presented, are phatic, referential, and emotive.

Based on the instances, which were just presented, it is unquestionable, that more than one function is represented in a communication.

3.2.2 Language functions - analysis

According to the model and functions, it is possible to analyse the text. The analysis helps people in understanding the interpretation of individual texts. In other words, "what language user make of language use, i.e. what the addresser (the text producer) means by a text and what a text means to the addressee (the text receiver)" (Widdowson, 2008:131).

As it was mentioned in Chapter Text 1 – Popular-scientific style, nine scientists contributed to the same degree to Text 1, but it was expected, that Text 1 had been written by one person, because the work is coherent and comprehensive. Certainly, it would have been demanding for nine people to write the article together, especially because they would not have entirely agreed on the structure, choice of words, and phrases of the text. Nevertheless, in such a case, it is supposed that the author´s personal style of writing is minimalized or is not noticeable in Text 1 at all. Text 2 is also written by one person. Since the article is technical, it has to be factually correct and understandable. It is not likely for the personal style of writing to be set off. It is probable that Text 3 was prepared by several people, maybe including the reporter and the robotics designer David Hanson. Possibly their personal opinion to the topic might be expressed.

These texts will be analysed according to Jacobson´s model of communication. It is presumed that in Text 1 and in Text 3 there will be more examples of various functions than in Text 2, because the aim of Text 1 and Text 3 is not only to inform people, but also to attract them. In contrast, the main goal of Text 2 is to inform experts in the field of robotics. This assumption will be subjected to further analysis.

3.2.2.1 Language functions – analysis of Text 1

Certainly, in Text 1 there should be the referential function dominant. There might also be examples of conative, emotive, and poetic functions. It is presumed that the phatic and the metalingual function will not appear in Text 1, because they are not typical for popular-scientific style.

Examples of the referential function from Text 1 are, for instance *Despite this accelerating trend, little is known about the emotional experience associated with human-robot interaction (HRI) and its impact on human condition* or *The amplitude of this well-known effect, called "Stroop interference," indicates the efficiency of cognitive -attentional control. It typically decreases under stress, especially in the presence of others competing with-or simply paying attention to- our current performance*. These sentences express facts and statements which are generally true. The example of an opinion´s expression could be *We predicted that the presence of robots simply paying attention to human performance may energize attentional control- as human presence does- especially when these robots are thought to be likely to produce negative evaluations*. Words like 'predicted' and 'may' express personal biases. It is not a hundred percent sure, if the presence of robots energizes attentional control or not. It has to be discovered.

As it was mentioned above, the conative function could be included in the article since it is intended not only for experts in the field of robotics but also for the general public, which makes Text 1 less technical and also more informal. Nevertheless, in this case the conative function does not occur.

As it was mentioned in Chapter Text 1 – Popular-scientific style, it is unsuitable to express personal emotions in the popular-scientific style. Due to this fact, it is not assumed that many examples of emotive function would occur in Text 1. The adjective *threatening*, which is mentioned in the headline, can be considered as an example of the emotive function. The adjective expresses a negative emotion.

The headline *Not as bad as it seems: When the presence of a threatening humanoid robot improves human performance* can be considered as an example of the poetic function. Its aim is also to sound well in order to interest the readers. Nevertheless, the poetic function typically does not occur in popular-scientific articles, that is why no other examples were found in Text 1.

In Text 1 no example of the phatic function can be found. No instance of greeting at the beginning of the first paragraph occurs, because the article starts with the statement *Millions of people worldwide may soon benefit from the presence of humanoid robots designed to ensure support to the elderly, disabled people, or pupils with learning difficulties*. With the intention of closing the communication channel according to the phatic function, there should be a greeting too, such as 'Goodbye or Yours faithfully', but as it is obvious from Text 1, the greeting at the end is also missing. Text 1 is concluded with the statement *Thus, the present findings constitute evidence that the presence of social robots may energize attentional control, especially when the emotional valence and anthropomorphic interferences associated with the robot being present require a heightened state of alertness*. It is important to emphasize that the absence of phatic features is by no means a deficiency, examples of the phatic function are just not typical for an article which is published in a scientific magazine.

The field of Text 1 is humanoid robots and their impact on people in the future, as it is explained in Chapter Text 1 – Popular-scientific style, wherefore there is no example of the metalingual function. In simple terms, the metalingual function can be defined as speaking about language itself. Text 1 does not deal with linguistics, for this reason no examples of this function occur in analysed article.

3.2.2.2 Language functions – analysis of Text 2

It is likely that in Text 2 will not occur as many examples of Jacobson´s functions of language as in Text 1 and Text 3. Undoubtedly, the referential function will be dominant in Text 2. The subordinate function might be the conative function. As it has already been noted in Chapter Text 2 – Scientific prose style, this style has precise rules. It is not probable that the other functions would appear so considerably in Text 2, because they do not meet the conditions of the style.

Examples of the referential function are, for instance *It is well known that biped gait can be divided into two phases: single support phase and double support phase* or *The ZMP (zero moment point) concept provides a useful dynamic criterion for the analysis and synthesis of biped locomotion* or *The distance of ZMP from the foot edge provides the measure for the unbalanced moment that tends to rotate the biped around the supporting foot and, possibly, to cause a fall.* All these sentences express statements which are generally true.

Even though there was not found any representative example of the conative function, it is highly probable that one of the author´s aims was not only to provide readers with new discoveries in the field of robotics, but also to teach readers something new. Moreover, to make them search for more information in the field of robotics. For this reason, Text 2 can be interpreted as an instance of the conative function as well.

As it was expected, instances of the emotive, the poetic, the phatic, and the metalingual function were not found in Text 2. The only function which could also appear in the scientific prose style is the metalingual function. Nevertheless, the article should have been written on a topic which describes language. Text 2, which is being analysed, studies field of robotics. That is why the metalingual function does not occur in Text 2. The emotive, the poetic, and the phatic function do not comply with the conditions of the scientific prose style.

3.2.2.3 Language functions – analysis of Text 3

It was presumed that Text 3 will be similar to Text 1. The function which is dominant in Text 3 is referential, as it was in Text 1 but also in Text 2. Instances of this function are *Her skin called "frubber" helps her look lifelike and have human expressions. She can blink, turn her head, and smile, but she has over 60 different facial expressions.* or *These legs have maximum speed of 30 centimetres per second which is around 0,6 miles an hour.*

However, in Text 1 there was no example of the conative function found, in Text 3 the indirect question which was addressed to the humanoid robot Sophia can be considered as an instance of the conative function *Tell me what it was like to take your first steps* or also the headline *Watch Sophia the robot walk for the first time*.

In Text 3 there also occur examples of the emotive function, for instance *sweet dance moves*. Another example might be Sophie´s statement *I´m really excited, a little disoriented but really excited*. This is an interesting and atypical example, and it is difficult to say, if this sentence can be considered as an instance of the emotive function or not, because it was said by a humanoid robot and they are not able to express any emotions. It is just an imitation, and it always depends on the way people are looking at this problem.

In Text 3 there occur also instances of the poetic function. The sentence *It´s one small step for Sophia, one giant leap for robot-kind.*, which is an example of intertextuality, can be considered as an instance of the poetic function. The purpose of this sentence is not only to sound well, but

also to activate the addressees and capture their attention. To a certain degree, Sophia´s reply to the reporter´s indirect question *I´m really excited, a little disoriented but really excited* might be considered as an attempt at the poetic function. Nevertheless, as it was mentioned above, it is difficult to determine to what extent a humanoid robot is able to express any reaction. The humanoid robot Sophia definitely tries to keep the communication alive, but it should be emphasized that the response is artificial, made by the creators of the humanoid robot.

As it was in Text 1, in Text 3 no example of the phatic function was found. The communication channel in Text 3 is opened with the sentence *It´s one small step for Sophia, one giant leap for robot-kind*, which is an example of the intertextuality, but can not be considered as a characteristic example of the phatic function. Furthermore, the reporter does not ensure anywhere in Text 3 that the communication channel remains opened. Text 3 is ended with a short interview between the reporter and the humanoid robot Sophia

Reporter: "Tell me what it was like to take your first steps".

Sophia: "I´m really excited, a little disoriented but really excited".

This brief conversation also can not be considered as an instance of closing the communication channel. It should be emphasized that the phatic function is not typical for Text 3. For this reason, it is not a mistake that no example of this function occurs anywhere in Text 3.

However, the metalingual function was not expected to occur in Text 3, there is an example used at the beginning. When the reporter was talking about Sophia´s skin, she used a term 'frubber'. "It is a kind of elastic rubber, or elastomer, that mimics the feel and flexibility of human skin. Frubber was developed by scientists at Hanson Robotics" (Hanson Robotics, 2019). It is an interesting example of how technology and their new inventions might influence the field of linguistics by creating brand-new words.

3.2.3 Language functions - conclusion

It has been confirmed that different types of functions are less represented in Text 2 than in Text 1 and Text 3. Text 2 is a professional article and is intended for experts in the field of robotics, that is why it is represented only by the referential and the conative function. The other functions are not appropriate to occur in Text 2.

In contrast, in Text 1 and Text 3 more functions of language are expressed. It was supposed that Text 1 and Text 3 would be similar to each other and the same types of functions would occur in both texts. Surprisingly, Text 1 and Text 3 also differ from each other, although not that radically as they differ from Text 2. In Text 3 the instance of the metalingual function is provided, whereas Text 1 includes no example of this function.

3.3 Register analysis

3.3.1 Theoretical background

Michael Halliday, who was a famous person in the branch of linguistics, and significantly contributed to our understanding of many concepts and notions in Systemic Functional Linguistics, believes that register variation depends on the usage of language. Generally, a register can be defined as "a variety associated with a particular situation of use (including particular communicative purposes)" (Biber et al., 2019:6). Furthermore, Halliday suggested that a language of a piece of text and its social context can be divided into three aspects:

a. Field of discourse
b. Tenor of discourse
c. Mode of discourse

The field, which is known as the situational context as well, represents the knowledge of the text. What the content is. Or in simple terms, what the text is about.

The tenor expresses the relationship between the addresser and the addressee. Who the participants are. What their relationship is. Whether the analysed text or conversation is formal or informal. Whether it is public or private?

The mode describes the way the text is constructed. Whether the text or message is spoken or written. The register analysis helps defining the text, and enables to determine the authenticity of language concerning lexical and grammatical features.

3.3.1.1 Register analysis -Text 1

Field

Text 1 describes the future of humanoid robots, because these devices have considerable potential to help people, especially the elderly disabled people, or pupils with learning difficulties. Based on the fact that just a little is known about the emotional experience associated with human-robot interaction and its impact on human cognition, scientists from Switzerland and France conducted research with the aim to determine how humanoid robots affect people´s behaviour in their presence.

Tenor

Even though the nine scientists worked on this research together, it is assumed that the article was written by one person. The participants of this communication are the writer (the addresser) and readers of the magazine (addressees). Since the article is intended solely for the general public and the author and readers do not know each other, the relationship between them is neutral. Text 1 is written in a formal style. There are no emotions and personal biases expressed. The writer does not address the readers anywhere in Text 1. There are described results from the research. Overall, the author is confident and certain about the content he/she is writing, because the article is based on the results of the research.

Mode

The communication is presented in a written form and the article is divided into five paragraphs. Text 1 begins with an introduction starting with sentence *Millions of people worldwide may soon benefit from the presence of humanoid robots designed to ensure etc….* Continuing with the second paragraph which describes phases of the research *To test this hypothesis, we asked young adults to perform the standard Stroop task twice. In session 1, all participants….* The third paragraph shows the results of the research *Not surprisingly, the bad robot was rated as less warm, friendly, and pleasant than the good robot...* The fourth paragraph evaluates the results of the research *These findings run counter to a purely mechanistic approach that reduces the effects of robotic presence to physical action or noise distraction, which may facilitate or inhibit performance depending on task difficulty...* The last paragraph concludes the article.

3.3.1.2 Register analysis - Text 2

Field

The chapter describes the biped locomotion of humanoid robots. Biped gait can be divided into two parts: single support phase and double support phase. The author gives details of technical principles about the robot´s movements.

Tenor

The participants of this message are the author, scientist Matthias Hackel, and readers, probably also experts in the field of robotics, because Text 2 is too technical for the general public. The relationship between the addresser and addressees is distant and impersonal, as it was in Text 1. There are no words and phrases which would express any closer connection between the author and readers. Furthermore, Text 2 is formal, it explains the issue only from the technical point of view, that is why expressing emotions is not expected and do not occur in Text 2.

Mode

As in the popular-scientific style, Text 2 is in a written form. The chapter is divided into two paragraphs. In the first paragraph, there is an introduction *Biped locomotion has been at the focus of researches for decades* and a brief, technical description of biped mechanism *In the single support phase, one leg is moving in the air, while the other is in contact with the ground.* The second paragraph describes in detail the zero moment point *The distance of ZMP from the foot edge provides the measure for the unbalanced moment that tends to rotate the biped around the supporting foot and, possibly, to cause a fall.* In this paragraph, equations are presented too, and the technical description is supported by two figures.

3.3.1.3 Register analysis - Text 3

Field

Text 3 captures humanoid robot Sophia, who is taking her first steps. The reporter describes the robot´s appearance, skills, and opinions. Furthermore, shares an assumption of the robot´s creators about her future abilities *her creators told me that one day they hope she´ll play soccer*. In Text 3 also speaks David Hanson who gives the audience further information about Sophia´s abilities *Her legs allow her to walk, potentially running, climb stairs like the DARPA Robotics Challenge Cuba*. At the end of Text 3, there is even a short interview with the robot Sophia.

Reporter: "Tell me what it was like to take your first steps".

Sophia: "I´m really excited, a little disoriented but really excited".

Tenor

In Text 3, there is the reporter, robotics designer David Hanson, and the humanoid robot Sophia. The other participants of communication are people who are watching Text 3. Text 3 addresses to the general public audience, because it is not necessary to have a great knowledge of robotics in order to understand the content. The similar feature which Text 3 has with Text 1 and Text 2 is the neutral relationship between the addresser and addressee. The addressers do not say any words which would indicate that there is a closer relationship between addressers and addressees. The form of the communication is neutral as well. Although the communication as a whole seems serious, Text 3 can not be considered as formal, because a lot of rather informal expressions are used there, such as *She´s even got some sweet dance moves up her sleeve.* or *So, conversation can be a little bit stilted.*

Mode

Obviously, Text 3 is an instance of the spoken form of communication. Nevertheless, Text 3 can not be considered as a typical spoken communication. Usually, spoken discourse is processed in real time, and can be easily forgotten. Text 3, on the other hand, is well-prepared in advance**.** It begins with a phrase *It´s one small step for Sophia, one giant leap for robot-*kind, which should interest people because of its similarity to the line which was said by Neil Armstrong. Then, the reporter describes what the audience can see in Text 3. After that, there is a scene with David Hanson, who talks about Sophia´s abilities. The reporter gives viewers

other detailed information about Sophia, such as *These legs have maximum speed of 30 centimetres per second which is around 0,6 miles an hour.* Then, David Hanson talks for the last time, and Text 3 is ended with the face-to-face conversation between the reporter and the humanoid robot Sophia.

3.3.2 Register analysis - conclusion

The register analysis enables people to see the analysed texts from a different perspective than the previous analyses. It was discovered that although the texts belong to different styles, they are not only dissimilar, but also have something in common.

It was proven that all three analysed texts have a similar topic, humanoid robots. Nevertheless, each of the texts view this topic from a different perspective. Furthermore, the relationship between the producers of the communications and the receivers is in all three cases neutral.

From the register point of view, Text 1 and Text 2 have more similarities with each other than with Text 3. Both texts are formal and there is no close relationship between the writer and the readers in either of the texts. Moreover, both texts are well-structured and divided into paragraphs.

Clearly, Text 3 differs from Text 1 and Text 2. The most noticeable difference is obviously the form of these communications. Text 1 and Text 2 are produced in the written form, whereas Text 3 is produced in the spoken form. The other distinction is related to the formality of the communications. Text 1 and Text 2 are formal, whereas Text 3 is neutral.

4 Conclusion

The main purpose of the bachelor thesis was to compare three professional texts written in English language, which describe humanoid robots, each from a different perspective. Materials which were chosen for the analysis are 'Not as bad as it seems: When the presence of a threatening humanoid robot improves human performance' (Text 1), 'Gait Dynamics' (Text 2), 'Watch Sophia the robot walk for the first time' (Text 3). There are considerable distinctions between these texts, because they are representatives of various styles and different types of communication. Furthermore, the texts have different aims and different participants of the communication, and they are addressed to different audiences. Nevertheless, these analysed texts share certain similarities as well. In the bachelor thesis, there were conducted linguistics analyses, which discovered the differences as well as the similarities between these texts, which might have not been recognised at the first sight, and definitely could not have been distinguished by linguistically untrained people.

In Chapter Spoken and written discourse, distinctions between these types of communication were explored. Surprisingly, differences between texts, which belong to the same category, were discovered during the analysis as well. In order to verify the distinctions and the similarities between analysed texts, the texts had to be viewed from various points of view. For instance, the brief lexical analysis was performed.

Jakobson´s model of communication enabled to analyse texts from a different linguistic perspective. During the analysis, it was discovered that all three texts shared a similarity, which might not have been noticeable in the previous analysis. In all three analysed texts, the dominant function was referential, whose aim is to transmit information. Furthermore, as Jakobson had claimed, it was proven that in all three texts not only one function occurred, but also instances of subordinate functions were presented. In Text 1, there were examples of the emotive and the poetic function. Text 2 can be considered as an instance of the conative function as well. Text 3 contained examples of the conative, the emotive, and the metalingual function. The results of this analysis show that Text 1 and Text 3 shared the most similarities, as it was in the first analysis.

The bachelor thesis also provided a brief register analysis. This analysis was divided into three parts: field of discourse, tenor of discourse, and mode of discourse. The analysed texts were examined according to these components. The field represents the content of the analysed text,

the tenor expresses the relationship between the text producer and the text receiver, and the mode describes the text construction. As it was predicted, some characteristic features were distinguished between all three analysed texts. Nevertheless, Text 1 and Text 2 shared the most similarities. This undeniable fact proves that it always depends on the type of the analysis, which is being used for examining a text.

From the analyses that have been conducted, it is possible to conclude that communications which might seem similar at the first sight, might have significant differences between each other as well. In contrast, communications which seem to be distinct, can share a lot of similarities. It always depends on the style of the communication, its participants, its function, and its aim. Furthermore, the linguistic methods, which are used for analysing a text, are crucial, because different methods provide people with different results. It leads to different understanding of the analysed text. For this reason, this bachelor thesis was not concentrated only on one analysis, but on three different analyses, because it resulted in better and broader understanding of the texts. Moreover, it is important not to generalize communications, but to examine them in detail and take into consideration different linguistic methods in order to fully understand their purposes and aims.

5 Rozšířený abstrakt

Bakalářská práce se zaměřuje na porovnání tří odborných textů psaných v anglickém jazyce. Všechny texty se zabývají humanoidními roboty, ale každý z jiného úhlu pohledu. Cílem práce je zjistit, zda vybrané texty odpovídají svým stylům, jaké jsou jejich funkce a záměry. Dále se práce snaží odhalit, zda mají texty mezi sebou jen rozdíly, či jsou-li si i v něčem podobné. Práce je rozdělena do čtyř hlavních kapitol: Materiály vybrané k analýze, Mluvený a psaný jazyk, Funkce jazyka a Analýza podle Registru.

První kapitola je zaměřena na popis obsahů textů a jejich stylů. První text se jmenuje 'Not as bad as it seems: When the presence of a threatening humanoid robot improves human performance' (Text 1) a na pokusu se snaží ukázat, zda by v budoucnu mohli být humanoidní roboti lidem nápomocní či nikoliv. Článek je zveřejněn ve vědeckém časopise 'Science Robotics' a je příkladem populárně naučného stylu. Populárně naučný styl je určen pro širokou veřejnost, jak pro laiky, tak pro vědce, a jeho hlavními cíli jsou informovat čtenáře o bádání na poli vědy, a také vědu popularizovat. Očekává se, že článek bude psaný krátkými větami, obohacený o atraktivní formu jazyka. Dále se předpokládá, že v textu budou vysvětleny odborné termíny, aby jim každý čtenář porozuměl.

Druhý text je vyňatý z knihy 'Humanoid Robots, Human-like machines' a je příkladem odborného stylu. Kapitola se jmenuje 'Gait Dynamics' (Text 2) a popisuje princip bipedie humanoidních robotů. Text, který je psaný odborným stylem, by měl být logicky strukturován, a měl by obsahovat vědecky přesné a objektivní informace. Také by měl být podpořen názornými grafy či obrázky, na kterých může být problematika dovysvětlena.

Třetím materiálem k analýze je video 'Watch Sophia the robot walk for the first time' (Text 3), které ukazuje, jak humanoidní robot Sophia dělá své první kroky. Aby mohlo být video použito jako výchozí materiál bakalářské práce, muselo být nejdříve přeneseno do písemné podoby. Text 3 je určen široké veřejnosti, proto se předpokládá, že stejně jako u Textu 1, budou využívány krátké věty a budou vysvětleny odborné termíny.

Druhá kapitola je zaměřena na srovnání textů z pohledu mluveného a psaného jazyka. Samozřejmě, že mezi těmito obecnými typy komunikace jsou rozdíly, které mohou být rozpoznány i laiky, jako například mluvená komunikace je dočasná, zatímco psaná komunikace je trvalá. Rozdíly ovšem nejsou jen mezi mluvenou a psanou komunikací, ale také mezi různými

typy textů patřící do stejné komunikace. Během analýzy bylo zjištěno, že navzdory tomu, že Text 1 a Text 2 jsou příklady psané komunikace a Text 3 je příkladem mluvené komunikace, více společných znaků mají Text 1 a Text 3 než Text 1 a Text 2.

Z analýzy je patrné, že nezáleží pouze na tom, zdali je komunikace psaná či mluvená. Záleží také na funkci, cíli a účastnících jednotlivých komunikací. Pravidla pro psaný a mluvený jazyk tedy nemohou být zobecňována.

Ve třetí kapitole byly texty analyzovány podle Jakobsonova modelu komunikace. Lingvista Roman Jakobson, který byl členem Pražského lingvistického kroužku, rozlišil šest jazykových funkcí: referenční, emotivní, konativní, fatická, metajazyková a poetická. Referenční funkce funguje jako přenosce informace. Jak je již patrné z názvu, emotivní funkce vyjadřuje city a postoje mluvčího. Konativní funkce se snaží působit na adresáta a ovlivnit ho. Fatická funkce navazuje kontakt mezi mluvčím a adresátem, snaží se jej udržet a když je to potřeba tak ho přeruší. Metajazyková funkce se soustředí na jazyk jako takový, mluví o jazyku samotném. Poetická funkce klade důraz na obsah a podobu sdělení. Jakobson zastává názor, že téměř každá komunikace obsahuje více než jednu funkci. Většinou jedna funkce dominuje a další funkce jsou podřízené.

Ve všech analyzovaných textech dominovala referenční funkce. V Textu 1 jako podřízené funkce vystupovaly emotivní a poetická. Předpokládalo se, že se v Textu 1 objeví i funkce konativní, nicméně žádný příklad nebyl v Textu 1 nalezen. Metajazyková a fatická funkce se v Textu 1 taktéž neobjevily. V Textu 2 vystupovala funkce referenční. Nicméně je možné na Text 2 pohlížet i z pohledu konativní funkce. Předpokládá se totiž, že autorovým cílem bylo nejen informovat čtenáře o nových poznatcích z oblasti robotiky, ale také vzbudit u čtenářů chuť se něco nového naučit. V Textu 3 vedle referenční funkce vystupovaly také funkce konativní, emotivní a metajazyková. Příklady poetické a fatické funkce se v Textu 3 neobjevily.

Ve čtvrté kapitole byly texty podrobeny analýze podle registru. Registr může být definován jako varieta jazyka vymezena sociální situací. Analýza byla rozdělena na tři části: field, tenor a mode. Field se zabývá obsahem komunikace, o čem je text. Tenor vyjadřuje vztah mezi mluvčím a adresátem. Určuje, kdo jsou účastníci komunikace a jaký mezi sebou mají vztah, také stanovuje formálnost komunikace a zda je veřejná či soukromá. Mode popisuje, jak je komunikace strukturovaná, a také, například, zdali je psaná či mluvená.

Předpokládalo se, že z pohledu registru budou mít více společných znaků Texty 1 a 2, ale také, že některé znaky budou totožné pro všechny tři texty.

Bylo potvrzeno, že hlavní téma všech tří analyzovaných textů je humanoidní robot (field). Nicméně každý z textů se na tuto problematiku díval z jiného úhlu pohledu. Text 1 na základě výsledků experimentu popisoval, jak se lidé chovají v přítomnosti humanoidních robotů, do jaké míry je roboti ovlivňují. Text 2 odborně popisoval chůzi humanoidních robotů. Text 3 názorně ukazoval a komentoval první kroky humanoidního robota Sophia.

Tenor dokázal, že ve všech třech analyzovaných textech je vztah mezi mluvčím a adresátem neutrální. Texty 1 a 2 jsou psány formálním jazykem. Text 3 nelze považovat za formální, jelikož se v něm často vyskytují neformální výrazy, jako například *She´s even got some sweet dance moves up her sleeve*.

Mode ukázal, že Texty 1 a 2 jsou příklady psané komunikace a Text 3 je zástupcem mluvené komunikace. Texty 1 a 2 jsou členěny do odstavců. Text 3 začíná příkladem intertextuality *It´s one small step for Sophia, one giant leap for robot-kind. – Je to malý krok pro Sophii, ale velký pro robotiku.*, dále reportérka popisuje, co se ve videu děje. Text 3 je také prokládán výpověďmi robotického designera a vynálezce Sophie, Davida Hansona, který mluví o Sophiiných schopnostech. Text 3 je zakončen krátkým rozhovorem mezi reportérkou a humanoidním robotem Sophia.

Bakalářská práce pomocí tří různých analýz ukazuje, že i na první pohled podobné druhy komunikace mohou mít mezi sebou velké rozdíly a naopak ty, které se zdají být odlišné, mohou sdílet mnoho společných znaků. Záleží na stylu textů, jejich funkcích, cílech, účastnících komunikací a také na tom, z jakého úhlu pohledu je na ně pohlíženo a jaké lingvistické prostředky jsou k analýze využívány. Je tedy důležité texty negeneralizovat, nýbrž je zkoumat do hloubky a brát do úvahy různá lingvistická hlediska, aby mohl být jejich smysl a cíl zcela pochopen.

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7 Analysed texts

Text 1

'Not as bad as it seems: When the presence of a threatening humanoid robot improves human performance'

Retrieved from https://robotics.sciencemag.org/content/3/21/eaat5843/tab-pdf.

Text 2

'Humanoid Robots, Human-like machines', Chapter 'Gait Dynamics'

Hackel, Matthias. *Humanoid Robots: Human-like Machines*. I-TECH Education and Publ., 2007, p. 5-7.

Text 3

'Watch Sophia the robot walk for the first time'

The video is retrieved from https://www.youtube.com/watch?v=lCFQkB-KLsE.

HUMAN-ROBOT INTERACTION

Not as bad as it seems: When the presence of a threatening humanoid robot improves human performance

Nicolas Spatola[1]*, Clément Belletier[2], Alice Normand[1], Pierre Chausse[1], Sophie Monceau[1], Maria Augustinova[3], Vincent Barra[4], Pascal Huguet[1†], Ludovic Ferrand[1*†]

"Bad" humanoid robots just paying attention to human performance may energize attentional control—as does human presence.

Millions of people worldwide may soon benefit from the presence of humanoid robots designed to ensure support to the elderly, disabled people, or pupils with learning difficulties (*1*). Despite this accelerating trend, little is known about the emotional experience associated with human-robot interaction (HRI) and its impact on human cognition. Because this is a critical issue for the introduction of humanoid robots in our societies (*2*), we examined whether (i) socially interactive humanoid robots affect attentional control (i.e., the paramount cognitive ability) and (ii) this impact depends on the emotional valence associated with HRI. To do so, we used the gold standard of attentional measures, the Stroop task (*3*), requiring individuals to identify the color in which a word is printed, ignoring the word itself. Because of the automaticity of reading, identification times are consistently longer for color-incongruent words (the word "BLUE" in green ink) than for color-neutral items ("DESK" in green ink). The amplitude of this well-known effect, called "Stroop interference," indicates the efficiency of cognitive-attentional control. It typically decreases under stress (*4*), especially in the presence of others competing with—or simply paying attention to—our current performance (*5*–*7*). However, whether and when the presence of social humanoid robots also boosts attentional control remains unanswered. We predicted that the presence of robots simply paying attention to human performance may energize attentional control—as human presence does—especially when these robots are thought to be likely to produce negative evaluations (*8*).

To test this hypothesis, we asked young adults to perform the standard Stroop task twice. In session 1, all participants performed the task alone. In session 2, they performed the task either alone or in the presence of a humanoid robot with which they had previously interacted either positively (a "good" robot responding in a nice way, with empathy) or negatively (a "bad" robot responding with contempt, lack of empathy, and negative evaluations about participants' intelligence) (see the Supplementary Materials). In the two robotic presence conditions, the robot was animated at a distance by using two smartphones for the control of its gestures

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†These authors contributed equally to this work.

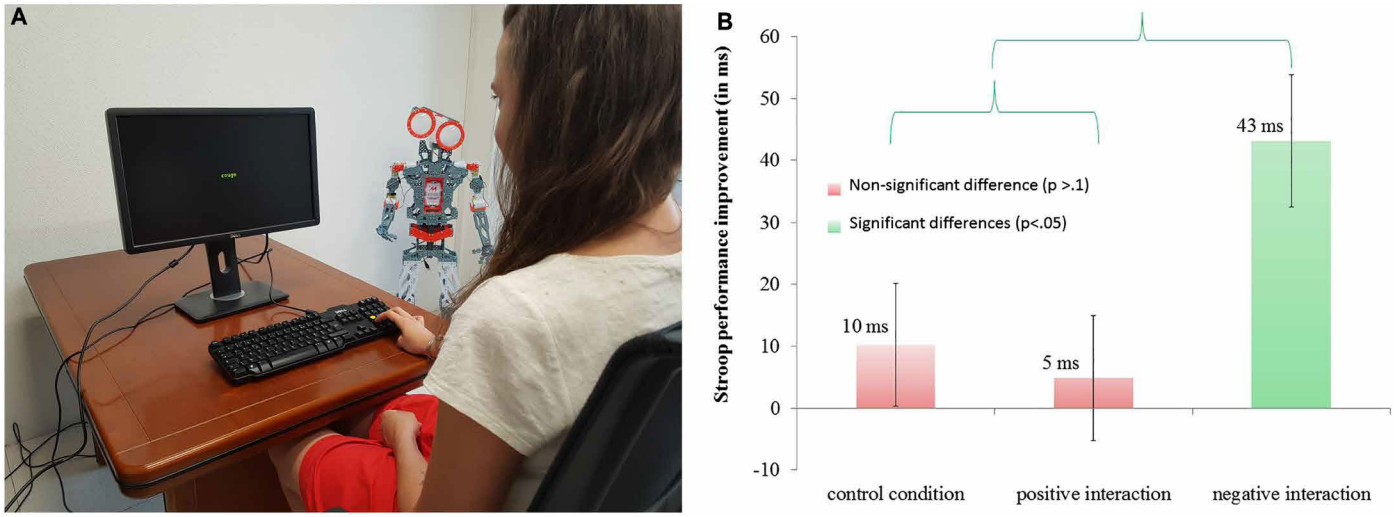

Fig. 1. Experimental setup and participant performance. (**A**) We used a Meccanoid[G15KS] animated at a distance by a human operator using two smartphones to control the robot's gestures and speech. In the two presence conditions, the robot was positioned in front of participants (to their right on the edge of their peripheral vision) and watched them 60% of the time by turning the head according to a pre-established script. (**B**) The main effect of condition on Stroop performance improvement (error bars represent 1 SE) indicates that the positive interaction condition did not differ from the control condition, whereas the negative HRI condition differed from the positive HRI and control conditions averaged (see the Supplementary Materials for detailed statistical analyses).

and speech based on a strictly identical script (e.g., head movement toward the participant 60% of the time, light arm movements) (Fig. 1A). At the end of session 2, participants in the two robotic conditions rated the robot present on various personality traits (see the Supplementary Materials), either positive (e.g., warm, competent) or negative (awkward, aggressive).

Not surprisingly, the bad robot was rated as less warm, friendly, and pleasant than the good robot. Participants also attributed fewer human nature traits (e.g., "cognitive openness") and more mechanical dehumanization traits (e.g., "rigidity") to the bad robot compared with the good robot (see the Supplementary Materials). More importantly, individuals' attentional control improved notably in the presence of the bad robot. Planned comparisons were used to analyze relevant between-group contrasts (alone versus pleasant robot; alone and pleasant social robot averaged versus unpleasant social robot) on Stroop interference [response times (RTs) for color-incongruent words minus RTs for color-neutral items] at session 2 minus interference at session 1 (baseline). A positive value (see Fig. 1B) means reduced interference (improved performance) at session 2 relative to baseline. As expected, Stroop performance improved exclusively in the presence of the unpleasant robot. This condition differed from the two other conditions averaged (alone and pleasant social robot), which did not differ from one another (see the Supplementary Materials for detailed statistical analyses).

These findings run counter to a purely mechanistic approach that reduces the effects of robotic presence to physical action or noise distraction, which may facilitate or inhibit performance depending on task difficulty (*9*). According to this approach, both robotic presence conditions—regardless of their emotional tone (positive or negative)—should have resulted in a performance change compared with isolation (all the more so because the robot's appearance and behavior during task performance were identical in both conditions). Instead, Stroop performance changed exclusively in the bad social robot condition.

Perhaps even more striking, the bad social robot had the same impact on Stroop performance as in earlier research with human presence (*5*–*7*). This presence reduced, rather than increased, Stroop interference, which extends the relevance of the attentional view of social facilitation from humans to social robots. According to this view (*5*, *6*), the presence of potentially threatening others improves the selectivity of attention to relevant information at the expense of competing cues (in the Stroop task, the color in which a word is printed at the expense of the word itself). This is what happened in the bad social robot condition. Therefore, not only can the behavior of robots change humans' perception of robots during HRI (*10*), but these attributions are susceptible to making the simple presence of robots likely to affect human cognition as a function of the interaction type. Thus, the present findings constitute evidence that the presence of social robots may energize attentional control, especially when the emotional valence and anthropomorphic inferences associated with the robot being present require a heightened state of alertness.

SUPPLEMENTARY MATERIALS

robotics.sciencemag.org/cgi/content/full/3/21/eaat5843/DC1
Methods
Results
Fig. S1. The experimental installation.
Table S1. Verbal exchange script.
Table S2. Mean correct response times (in milliseconds), SDs (in parentheses), and error rates as a function of the type of stimuli, session, and group.
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Gait Dynamics

Biped locomotion has been at the focus of researchers for decades. It is well known that biped gait can be divided into two phases: *single support phase* and *double support phase* (Whittle, 1991). In the single support phase, one leg is moving in the air, while the other leg is in contact with the ground. In the double support phase, both feet are with contact with the ground. The two support phases take place in sequence during walking. All of the biped mechanism joints are powered and directly controllable, except for the contact area between the foot and the ground. Foot behavior cannot be controlled directly, it is controlled indirectly by ensuring appropriate dynamics of the mechanism above the foot. To account for this, the concept of zero moment point (ZMP) (Vukobratoviþ & Juricic, 1969), which is denned as the point on the ground at which the net moment of the inertial forces and the gravity forces has no component along the horizontal axes, has been used. The gait isbalanced when and only when the ZMP trajectory remains within the support area. In this case, the system dynamics is perfectly balanced by the ground reaction force and overturning will not occur. In the single-support phase, the support polygon is identical to the foot surface. In the double support phase, however, the size of the support polygon is denned by the size of the foot surface and by the distance between them (the convex hulls of the two supporting feet).

The ZMP concept provides a useful dynamic criterion for the analysis and synthesis of biped locomotion. The ZMP ensures the gait balance during the entire gait cycle and provides a quantitative measure for the unbalanced moment about the support foot and for the robustness (balancing margin) of the dynamic gait equilibrium. Another term is center ofpressure (CoP) (Vukobratoviþ, Borovaþ, Šurdiloviþ, & Stokiþ, 2001), which is commonly used in biped gait analysis based on force or pressure measurements. CoP represents the point on the support foot polygon at which the resultant of distributed foot ground reaction force acts. According to their definitions, it is obviously that in the considered single- support phase and for balanced dynamic gait equilibrium, the ZMP coincides with the CoP. However, in the dynamically unbalanced single-support situation that is characterized by a moment about CoP that could not be balanced by the sole reaction forces, the CoP and the ZMP do not coincide. The ZMP location outside the support area provides useful information for gait balancing (Low, Liu, Goh, & Yu, 2006). The fact that ZMP is instantaneously on the edge or outside of the support polygon indicates the occurrence of an unbalanced moment that cannot be compensated for by foot reaction forces. The distance of ZMP from the foot edge provides the measure for the unbalanced moment that tends to rotate the biped around the supporting foot and, possibly, to

cause a fall. As depicted in Figure 6, the exoskeleton is composed of the trunk, the pelvis, two shanks, two thighs and two feet, will be considered. The trunk carries the payload, which can be seen as a part of the trunk. The vertical Z-axis and horizontal *X*-axis lie in the sagittal plane, as shown in Figure 6. By observing typical human joint trajectories, it is noted that the motion range is greater in sagittal plane than in other planes (Marchese, Muscato, & Virk, 2001) and most movements happen in the sagittal plane during walking. Hence, at the first stage, only the joints rotating around the Y-axis are actuated and movements in the sagittal plane are studied. The dynamical equation that describes the movement of a biped (or exoskeleton) has the following form:

$$M(\vec{q})\ddot{\vec{q}} = f(\vec{q}, \dot{\vec{q}}) + \vec{Q} \tag{1}$$

where $\vec{q} = (q_1, ..., q_7)^T$ is the vector of generalized coordinates, which are the joint angles.

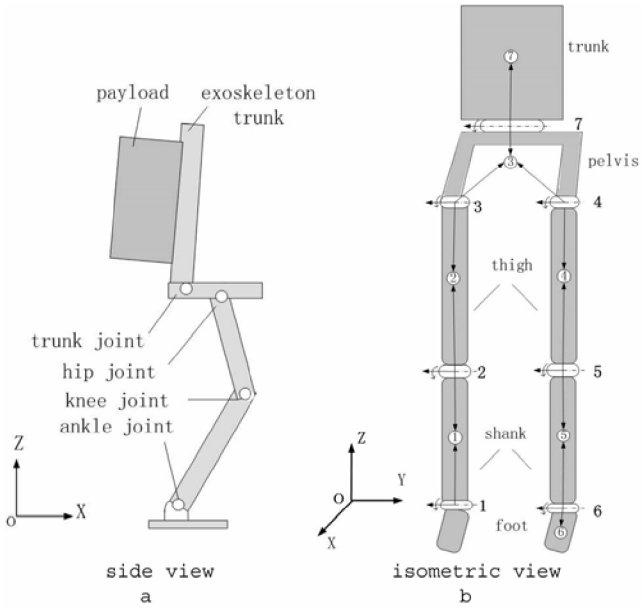

Figure 6. The model of the exoskeleton

The matrix function $M(\vec{q})$ takes into account the mass distribution, and the vector function $f(\vec{q},\dot{\vec{q}})$ describes the effect of both inertial and gravity forces. The elements of the vector $\vec{Q}$ are generalized forces applied to the system, while the dots denote the time derivatives. Applying the basic theorems of rigid body kinematics, we obtain the following recursive (Low et al., 2006):

$$\begin{aligned}
\vec{\omega}_i &= \vec{\omega}_{i-1} + \dot{q}_i\vec{e}_i \\
\vec{v}_i &= \vec{v}_{i-1} + \vec{\omega}_{i-1} \times \vec{r}_{i-1,i} + \vec{\omega}_i \times \vec{r}_{ii} \\
\vec{\alpha}_i &= \vec{\alpha}_{i-1} + \dot{q}_i\vec{\omega}_{i-1} \times \vec{e}_i + \ddot{q}_i\vec{e}_i \\
\vec{a}_i &= \vec{a}_{i-1} + \vec{\alpha}_{i-1} \times \vec{r}_{i-1,i} + \vec{\omega}_{i-1} \times (\vec{\omega}_{i-1} \times \vec{r}_{i-1,i}) \\
&\quad + \vec{\alpha}_i \times \vec{r}_{ii} + \vec{\omega}_i \times (\vec{\omega}_i \times \vec{r}_{ii})
\end{aligned} \tag{2}$$

where $\vec{\omega}_i, \vec{v}_i, \vec{\alpha}_i$ and $\vec{a}_i$ are the angular velocity, linear velocity of the center of mass, angular acceleration, and linear acceleration of the center of mass of the *i*-th link, respectively. The inertial force of the center of mass of the *i*-th link $\vec{F}_i$ and moment of the *i*-thlink $\vec{M}_i$ can then be obtained by using Newton-Euler equations, respectively,

$$\vec{F}_i = m_i\vec{a}_i \tag{3}$$

$$\vec{M}_i = I_i\vec{\alpha}_i + \vec{\omega}_i \times I_i\vec{\omega}_i \tag{4}$$

Watch Sophia the robot walk for the first time

It´s one small step for Sophia, one giant leap for robot-kind.

This is Sophia the robot taking her first steps.

She´s even got some sweet dance moves up her sleeve.

Her skin called ‘frubber‘ helps her look lifelike and have human expressions.

She can blink, turn her head, and smile, but she has over 60 different facial expressions.

Now, she is even more human-like thanks to legs from DRC Hueber.

That´s the same body that won the DARPA Robotics Challenge in 2015.

Dr. David Hanson: “Her legs allow her to walk, potentially running, climb stairs like the DARPA Robotics Challenge Cuba. She can then move through human-like environment, use human-like tools”.

These legs have maximum speed of 30 centimetres per second which is around 0,6 miles an hour.

It doesn´t say particularly fast now, but her creators told me that one day they hope she´ll play soccer.

Now she has a body, Hanson robotics says she has applications in medical therapy, factory co-work situations and research.

Dr. David Hanson: “It´s gonna take many years for the machines to be truly alive”.

So, Sophia has opinions on many different topics, including Star Wars and cryptocurrency, but her responses are partially scripted and partially AI.

So, conversation can be a little bit stilted.

Reporter: “Tell me what it was like to take your first steps”.

Sophia: “I´m really excited, a little disoriented but really excited”.