Technology and Language

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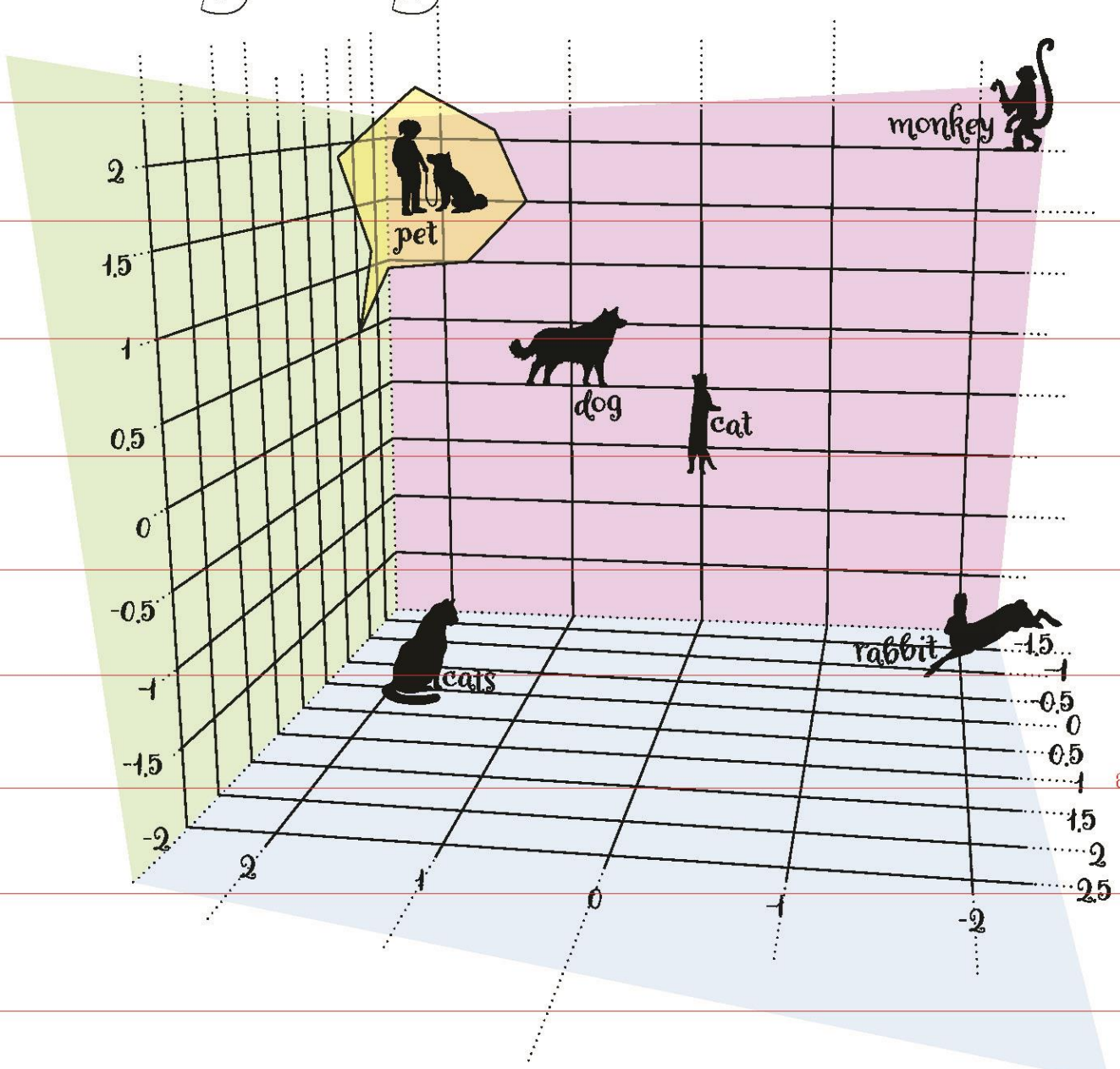

Understanding Action in a Technical Condition

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Editorial Introduction

Technology and Understanding

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Abstract

Technology expresses the level of knowledge about nature and consciousness of a human being and represents a sort of material reflection of an individual and humanity. As such, technology is a fundamental capability of humans. Understanding by means of technology is a projective reconstruction of the meanings of signs, that is active, dynamic, objectifying interpretation. It is demonstrated how the contributions to this special issue implement comprehension of grammatical, linguistic and mathematical, artistic, legal and anthropological procedures of comprehension in the field of technical knowledge and technical implementation.

Keywords: Technology; Understanding; Hermeneutics; Semiotics; Technical worldview

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Технологии и понимание

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Аннотация
Технология демонстрирует уровень знаний о природе и сознании человека и представляет собой своего рода материальное отражение личности и человечества. Таким образом, технология – это фундаментальная способность человека. Понимание с помощью техники – это проективная реконструкция значений знаков, то есть активная, динамичная, объективирующая интерпретация. Показано, как материалы этого специального выпуска реализуют понимание грамматических, лингвистических и математических, художественных, юридических и антропологических процедур понимания в области технических знаний и технической реализации.

Ключевые слова: Технологии; Понимание; Герменевтика; Семиотика; Техническое мировоззрение

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INTRODUCTION

The problem of comprehension is one of the oldest problems in philosophy. Beginning with the Prince Rama who suffered from the incapability to understand and attained deliverance from suffering through clarification (Venkatesananda, 1984), and up to nowadays everyone can say about themselves with the words of Peretz, one of the two main characters of "Snail on the Slope" by Boris and Arkady Strugatsky: "This is what I am sick with, longing for understanding" (Strugacky & Strugacky, 1992, p. 99). Incomprehension is a permanent shadow of the sojourner on the way to cognition. Ion, the winner in the contest of singers about Homer, found out that he understood nothing in the contents of poems that were communicated by him (Plato, ca. 380 B.C.E/1925). The mystic religious path of cognition connects incomprehension with the somatic way of human existence, and its overcoming – by escaping, with Plato, from the darkness of the cave of materiality, with the practices of clarification and insight, by giving hope for understanding as a miracle of remembering, and later – as a miracle of meeting the god. The inception of measurement and experiment and, in general, the scientific method of cognition made it possible to find and formalize specific techniques and procedures for understanding against the background of Christian monotheism. However, the existentialism of the 20th century on the one hand reawakened a medieval distrust of any sort of creation and turned to the facts of collective consciousness, and on the other hand deprived the Western world of their hope for salvation in a transcendent world. Lord Chandos, the character of Hugo von Hofmannsthal (2005), confirms the incapability of human language to capture and express reality. Albert Camus (1955) declares every situation of cognition absurd by placing the category of the absurd in the mutual presence of human and world. Elias Canetti (1964) in "The Blinding" depicts a situation of the total intranslatability of everyday reality into the languages of rational theory and rational action, resulting in the self-destruction of knowledge, the burning of the library. Oskar Matzerath, the main character of "The Tin Drum" by Gunter Grass (2004), stands in the church in front of the figure of Jesus while awaiting a small, extremely personal miracle, but no miracle is happening.

Incomprehension is a characteristic feature of the worldview crisis of Europe of the first half of the 20th century – as a refusal of interpretation and a certain effort of cognition, and simultaneously as a refusal to expect the miracle to happen and thus as an acceptance of the inability to escape from ordinary routines. In the second half of the 20th century, it is an ideological point of Americanized mass culture. From "People are strange…" (The Doors) and "We don't need no education…" (Pink Floyd's The Wall) up to "A Scanner Darkly" by Philip K. Dick, it is always the common sense of an ordinary person to be accustomed to incomprehension. Paul Feyerabend's methodological anarchism and post-modernist relativism seem to deconstruct and disavow the systematic way of thinking. Against this background, the philosophers of the 21st century, similar to Friedrich Schleiermacher, are forced to start detecting ways

of overcoming this incomprehension. In terms of Goethe's (1790/2014) Faust, it may be stated that the epic irony of Mephistopheles ("man spricht hier nicht vom Graben, doch vom Grab") was communicated to each school child in the forms of culture understandable to them. In contrast, the scientific world view as a project of the Modern Age is largely completed while the effort to comprehend and to understand oneself, others and a complex world is made in terms of technical knowledge and technical models in the context of a philosophy of technology, that is. Within the framework of a new, namely the technical worldview.

INCOMPREHENSION IN THE TECHNICAL WORLDVIEW. COMPREHENSION TECHNIQUES

The technical worldview is a way of seeing the world through the prism of usefulness (Engelmeyer, 2013) or a situation when cultural symbols are used and investigated as cultural tools (Scholtz, 2020), when the process of cognition is uncovered as a rational condition for the possibility of action. Technical hermeneutics (Scholtz, 1992-1993) – as a discipline within general hermeneutics answering the question what sequence of actions should be performed to overcome incomprehension – defines incomprehension as "the absence of someone's thoughts when he talks" (Chladenius, 1969), as the thing "that comes by itself" (Schleiermacher, 1977) with no comprehension effort. By contrast, for epistemology, incomprehension is a problematic situation defined as knowledge about the lack of knowledge (Dubrovsky, 1994). In terms of general semiotics, finally, incomprehension is assertion of knowledge about the interpretater's unfamiliarity with the rules that are necessary to be applied to reveal the meaning and the value of a sign (semantics), the place of a sign in the system and operation rules (syntactics), differentiation between the sign and the background (pragmatics). To fix the situation of incomprehension, the technical worldview of the 21st century may resort to the formula by Marin Mersenne, according to which understanding means being capable to do (Ropohl, 1981). Consequently, incomprehension is knowledge of the incapability to do, to reach the goal, to solve the problem. It thus refers to a situation of non-coincidence between the desired and the actual.,. Finding a solution to this problem requires increasing the amount of objective knowledge of the actor not only in terms of epistemology (the receptive knowledge about the world) but also in terms of praxeology (the projective knowledge about hierarchies and activity structures). Incomprehension is overcome by applying the comprehension rules or a particular comprehension technique. A number of such techniques used in religious and scientific contexts are well known and reflected in the literature. Comprehension techniques within the technical worldview of the 21st century remain an open problematic field.

In Western European hermeneutics, a set of comprehension techniques has formed, which are distinguished depending on the object of cognition: **God, text, persons** or **nature**. Understanding **God** is set by the Christian exegesis of Origen and Augustinus (Kuznecov, 1991). Here the comprehension technique contemplates the

guidance on stepwise ascent of individual consciousness from the literal everyday meanings of the words and sentences of sacred texts to the contemplation of the divine, anagogic structures behind them. An essential feature of these techniques is that they exclude the possibility of error in the comprehended text and are guided by understanding as a contemplative transformation of consciousness that brings the believer closer to God (Koncevich, 2009). Within a particular, confessionally directed religious practice, the techniques aimed at comprehending God play the role of a second birth of human, their influence is indisputable and obvious in all human activity.

Comprehending a **text** as a structural, expressed, distinguished speech communication in some language (Lotman, 1970) is a classic and the most developed area of cognition techniques. It is most developed in philological knowledge (as "understanding of the understood") or "literary hermeneutics" (Hirsch, 1974; Szondi, 2009). Cognition is defined here as "the transition from the sign to its value" (Kuznecov, 1991) or the "reproduction of speech" (Schleiermacher, 1977, 1985). The comprehension technique itself is built around "a positive formula of hermeneutics" with Friedrich Schleiermacher requiring the fullest possible reconstruction of the speech of an author, including its historical contexts, solving the task of understanding the author's speech better than he or she could do it themselves – also comprehending that the problem of understanding is infinite due to the recursiveness of the comprehension procedure. At the end of the 20th century, Axel Bühler, Wolfgang Künne, and Oliver Scholz reintroduced the comprehension techniques of the Leibniz-Wolf metaphysics (Baumgarten, 2004), most clearly formulated by Georg Friedrich Meier (1996), and representing a stepwise identification of an uncomprehended sign. Künne identifies 6 levels of understanding: 1) perceptual, 2) literal, 3) literal within a given context, 4) grasping the propositional meaning of an expression, 5) understanding the modal meaning of an expression, 6) understanding as an explanation of the action of a speaker, that is, disclosing the context within which a statement is explainable) (Künne, 2003). A similar model is formulated by Scholz (1992-93). The techniques of comprehending texts or speech were most generalized by David I. Dubrovsky (2007) in the context of information theory: comprehension is defined as the process of decoding, i.e. as identifying the correspondence between information and its carrier, where the task of "comprehension" is shown as the task of determining the mechanism of transformation from an "alien" into "natural" code, that is, the task of converting a code that is unknown to the system into a known one. In this case, the statement that someone "comprehends" is the statement that someone 1) possesses a system of natural codes, i.e. is able to operate with information (signs), 2) is able to recognize something unknown to them as an incomprehensible code against the background of a system of natural codes, where "incomprehensibility" or "incomprehension" is the subject's knowledge of its own unfamiliarity with the code, 3) is capable of translating or transforming the "unknown", represented in the form of knowledge about one's own unfamiliarity with the code, into known or natural codes. Text comprehension

techniques are the basis of *Geisteswissenschaft* or a scientific conception of knowledge production in the humanities.

Understanding a **person**, some other, an interlocutor is a problem that arose in the second half of the 19th century and was formulated by the philosophy of life in light of the crisis of creating a comprehensive picture of the world. Wilhelm Dilthey (1981) defines comprehension as "the discovery of myself in you" or as the ability to see oneself in another one. The problem itself arises from de-automation of the application of the congeniality principle (Betti, 1988), the discovery and reevaluation of human subjectivity. This comprehension technique implies training of empathy, compassion, or the ability to feel, and is explicitly formulated by Hans-Georg Gadamer as procedures for using language: "the existence that can be comprehended is language." A general sequence of comprehension operations suggested by Gadamer (1990) includes: 1) surprise or "involvement" of the individual, caused by the actual inability to find a correspondence for the perceived object or sensed experience in their own experience of perception and sensing, 2) setting up the question, creating an appeal to linguistic resources, 3) dissolving the borders in the individual's consciousness, that is, the transformation of pragmatic rules governing the experience of using the language, 4) the use of language in accordance with the transformed pragmatic rule to express (designate) the situation that caused the surprise.

Comprehending the world as it is or **nature** is the intellectual setting of natural science in the Modern Age. A reasonable questioning of nature by Francis Bacon, a dialogue with nature is an invention which has radically changed human. The inductive method of cognition as expressed by Galileo Galilei in the model of a measurement experiment, is a way to obtain true answers of reality to correctly asked questions by a researcher. The first step of this method is the formulation of a hypothesis, the second is the analysis and separation of the phenomena under consideration providing an accurate problem setting, the third is asking a question or an experiment, the fourth is postulating the result universally that is, formulating a law of nature (Dessauer, 1948, p. 36-40). Humans understand nature by knowing, due to the inductive method, how laws can be applied to specific phenomena.

COMPREHENSION IN THE TECHNICAL WORLDVIEW

Comprehending oneself and nature within a technical worldview is achieving the desired and meeting needs by inventing new objects of sensual perception, new subjects of understanding and new concepts based on the laws of nature. Comprehension is a technique, that is "real existence from ideas through a final shaping and processing from the reserves given by nature" (Dessauer, 1948, p. 234). Technical action as a process of comprehending includes three form-shaping abilities (Dessauer, 1958) or three acts: "... In the first act the invention is offered, in the second it is proved, in the third it is implemented. At the end of the first act there is a hypothesis; at the end of the second one there is a performance; at the end of the third one there is the phenomenon. The first act defines it teleologically, the second one logically, the third one factually. The first

act provides an intention, the second one a plan, the third one an act" (Engelmeyer, 2010, p. 103).

Real progress in human perception of nature and itself is expressed in the complication and development of technical understanding. The transition from a sign to its meaning in technology is creation of the meaning based on its sense (Nesterov, 2020), implementation of the performative function of semiosis, not only in terms of using some logical-grammatical form of a natural language, but in terms of using the entire existing complex of knowledge about nature in order to transform the way of existence of the human in the world. The theoretical aspects of language are studied by Luca Capone (2021) in the article "Which Theory of Language for Artificial Intelligence? Speech and Cognition in Humans and Machines". The author compares the internalist and externalist paradigms of language understanding, while clearly formulating both ontologies. Following the representation logics of the AI by a neural network, the author prefers the externalist ontology of language and its structuralist expression by Ferdinand de Saussure as a differentiated system of signs.

The progress of cognition in the structures of activity is associated with the successive replacement of intuitive action by a conscious, rule-obeying technical action based on knowledge of laws and of the particular problems that can be solved through their application. Sensual intuition – a practical action on creation or transformation of states of affairs in sensually perceived reality – turns into the process of creating technical objects in space and time, namely energy processing machines. Rational or understanding intuition is a practical action to create or transform states of affairs in the area of logical and grammatical forms of understanding. It involves the process of creating technical objects – information processing machines – in the field of language, mathematics and cybernetics. Intellectual intuition is a practical activity in the field of mind, for example in the process of constructing ontologies in order to technically implement the idea of a powerful AI. A significant problem of vertical scientific and technical progress is the upset of the balance between the technical and the humanitarian: The transformation of ethical norms and the systems of law expressing them is lagging behind the actual technical development. Not only isolated issues for the use of technical means, but also basic problems of interaction between humans and machines for the generation of information are currently beyond legal regulation. The article by Ivanov and Tsoi (2021) is partially devoted to solving this legal problem: "The concept, types and rules of the use of technical means in criminal proceedings".

The growth of the ability of humans and humankind as a whole to technically understand themselves and the world is expressed in at least two aspects: firstly, by an increase in the number of worlds or "layers of existence" that humans bring into the interaction, and secondly, by the complication of the human environment, the transition from natural environment to artificial one, and subsequently – to artificial environments of the second and third orders.

Mythological and religious worldviews introduced the human as a combination of two worlds, a secular one and a sacral one; the scientific and technical worldview defines it as a combination of three worlds or more (Dessauer, 1948): physical, biological, mental and spiritual. In this issue, an article by Andrei E. Serikov (2021) “Grammar of Behavior as a Theoretical Notion” makes an attempt to expand the range of worlds brought into interaction from the standpoint of philosophy of behavior and social psychology. “The grammar of behavior” is analyzed in the context of linguistics. The conclusion ventures further into the possibility of building a generative model of the grammar of behavior.

By creating new habitats, endowing machines for processing energy and information with the function of reflection, combined with autonomous nature and the ability to decide, humanity strives for a complete understanding of nature, for blurring the border between the artificial and the natural. The dialectics of the relationship between humans and nature through the prism of techné and shame is analyzed by Filippo Ursitti (2021) in his article “Promethean shame as the hidden instrumentum redemptionis humane”. Through the works and terminology of Günter Anders, the author depicts the experience of sensing freedom and non-freedom, human subjectivity and alienation in connection with the growth of technical power, a complex interweaving of subject-object interaction, when a human is simultaneously a subject and an object of technology. An important conclusion by the author is connected with setting the problem of cultivation of the moral imagination and prognostic hermeneutics. The biopolitical aspects of the new artificial human habitat are considered by Jessica Lombard (2021) in the article “Technological Agencies in our Information Society: The Emergence of Biocitizenship and the Genetic Language”. In the context of philosophy of medicine and philosophy of technology, the author explores new opportunities provided by DNA research in managing and understanding genetic risks, analyzes the development of genomic medicine and its political consequences in the form of “biological citizenship” in the new “molecular age.” An analysis of the forms of exploring the human information environment in the languages of artistic culture is presented in the article by Tyutelova, Sergeeva and Sundukova (2021) “Virtual communication technologies in modern drama for teenagers”. The authors demonstrate the transformation of language of the modern drama using virtual communication language as a method of self-identification of the epoch and the hero. They conclude that referring to new dialogue technologies, which do not correspond to modern dialogic forms of drama, may constitute the basis for the development of a dramatic language in general.

Humanity as a communication subject in dialogue withnature and as an auto-communication subject leaving to itself messages that are expressed by technical artefacts – objects, technologies and machines acting in the sphere of sensual perception, understanding and mind – implements an idea of superiority over nature articulated in the clearest form by Stanislav Lem in *Summa Technologiae*: We can

eliminate the difference between the artificial and the natural – it will happen at the moment when the artificial becomes indistinguishable from the natural and then surpasses it. And how should the superiority be understood? It signifies the implementation in nature of things, which are impossible for nature (Lem, 2004. p. 255-256). Comprehending the world or nature in order to understand oneself and building the horizons of our own future is a key element of scientific and technical progress, where the philosophy of technology performs the task of comprehending the understood, a task of reflexive meta-worldview cognition.

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Research article

The Grammar of Behavior as a Theoretical Notion

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Abstract

Many researchers of human behavior lack empirical data in the form of descriptions of actually observed behaviors and their generalizations. Fictional narratives could be used as a source of empirical descriptive data, and their analysis naturally results in the formulation of some "grammar of behavior." The purpose of this paper is to explore the possibility to use the notion of behavioral grammar in a strict scientific sense. Since the notion of grammar comes from linguistics, the article starts by comparing different linguistic approaches to the understanding of grammar. Then it explores how the concept of grammar is used outside of linguistics, in notions of "grammar of behavior," "grammar of society," and "grammar of culture." Any linguistic grammar explicitly or implicitly contains theoretical ideas about what language is in general, offers some typology of language elements, and some rules which can be conceptualized rather differently (prescriptions and proscriptions, distributions, algorithms, schemes, templates). A grammar of behavior also presupposes a certain theoretical view of behavior: how it is generated, where its forms come from, how they are assimilated and chosen, etc. However, not every theory of behavior can be understood as grammar. A grammar of behavior is that part of a theory that describes behavior, explains it by formulating rules, by specifying what is necessary, typical, possible, and what is atypical or impossible. A model of behavioral grammar extracted from fiction corpora can be based on Lewinian theory of behavior, and understood as a set of generalized descriptions of typical persons' behaviors in typical psychophysiological conditions and typical circumstances.

Keywords: Human Behavior; Grammar; Rules; Norms; Language; Culture; Scientific Models

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Научная статья

Грамматика поведения как теоретическое понятие

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Аннотация
Многим исследователям человеческого поведения не хватает эмпирических данных в виде описаний реально наблюдаемого поведения и их обобщений. Вымышленные повествования могут использоваться как источник эмпирических описательных данных, и их анализ естественным образом приводит к формулированию некой “грамматики поведения”. Цель данной статьи – изучить возможность использования понятия поведенческой грамматики в строгом научном смысле. Поскольку понятие грамматики пришло из лингвистики, статья начинается со сравнения различных лингвистических подходов к пониманию грамматики. Затем исследуется, как понятие грамматики используется вне лингвистики, в понятиях “грамматика поведения”, “грамматика общества” и “грамматика культуры”. Любая лингвистическая грамматика явно или неявно содержит теоретические идеи о том, что такое язык в целом, предлагает некоторую типологию языковых элементов и некоторые правила, которые можно концептуализировать по-разному (предписания и запреты, распределения, алгоритмы, схемы, шаблоны). Грамматика поведения также предполагает определенный теоретический взгляд на поведение: как оно создается, откуда берутся его формы, как они ассимилируются и выбираются и т. д. Однако не каждую теорию поведения можно понять как грамматику. Грамматика поведения – это та часть теории, которая описывает поведение, объясняет его, формулируя правила, определяя, что необходимо, типично, возможно, а что нетипично или невозможно. Модель поведенческой грамматики, извлеченная из корпусов художественных произведений, может быть основана на теории поведения Левина и понимается как набор обобщенных описаний поведения типичных людей в типичных психофизиологических условиях и типичных обстоятельствах.

Ключевые слова: Поведение человека; Грамматика; Правила; Нормы; Язык; Культура; Научные модели

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INTRODUCTION: THE NEED FOR GRAMMARS OF BEHAVIOR

Obviously, there are many scientific publications devoted to the study of various aspects of human behavior. In order to roughly estimate the number of such publications, it is possible to use the Scopus database. In July 2021, the list of Scopus journals with titles including "behavior" or "behavioral" or "behaviour" or "behavioural", after the removal of journals exclusively related to animal research, still consisted of 160 titles. The search engine found 328,536 documents published in the journals, and all of them had something to do with empirical research of human behavior (328,536 document results, n.d.).

However, some experts think that our empirical knowledge is not yet sufficient to serve as the basis of a really scientific theory of human behavior. According to David Funder (2009), "psychology is still in the early stages of developing conceptualizations of behavior" (p. 124), and much more descriptive research needs to be done in order to formulate well-grounded theoretical hypotheses about relations among persons, situations and behaviors:

> A massive empirical effort will be required, requiring studies in which individuals are each placed into or observed in each of a range of different situations, and their behavior in them observed and measured directly. Studies that do this are almost unknown in the literature, not really because psychologists do not grasp the need for them, but because they are so difficult and expensive to conduct. (Funder, p. 124-125)

More recently Ronald Fisher (2017) diagnosed a similar condition for psychological research of values:

> Even a casual observer will quickly be strucked by the fact that actual behavior is largely absent from psychological research. When a colleague and I tried to summarize the available evidence of the value–attitude–behavior linkage . . . , we soon realized that there were very few, if any studies that had examined the same type of behavior repeatedly. In order to make valid claims about any empirical fact, you need a substantive body of literature with multiple studies replicating proposed relationships. This is clearly not the case with values and behavior. There are isolated studies showing relationships with diverse constructs, but no substantive body of research that allows substantive claims. In the end, we could only analyze value–attitude relations, but not the relationship of values with behavior. Psychology after the cognitive turn appears to have abandoned the study of behavior, and psychologists now instead focus on what participant think, feel or believe they have done or want to do. (p. 219-220)

Rusty Greaves (2018), an ethnoarchaeologist with experience in anthropology, argues that interview methods dominated in traditional cultural anthropology, and that cultural anthropology needs to embrace ethological methods:

> The implications have had tremendous influence among paleoanthropologist and archaeologists who recognize the importance of rigorously quantified

> approaches to better understanding traditional peoples' adaptations to these different environmental, subsistence, and demographic conditions. Sadly, some vocal faction of cultural anthropology not only disagrees with this perspective, but actively advocates for the destructive nature of this paradigm. The terms "scientistic", falsely objective, colonial, hegemonic, racist, etc. are employed to criticize such comparative anthropology as demeaning of human nobility.

He further writes that even those scientists who understand the importance of biological approaches to explaining behavior underestimate the importance of observing and collecting descriptive data:

> The problem for human behavioral ecologists, is that the fast nature of the ev psych studies, and the alleged identification of evolutionarily important aspects of behavior, has led to a greater emphasis on quick fieldwork, use of questionnaires that allegedly elicit propensities such as risk aversion or risk taking, and a decrease in actual behavior observation. I still feel, from over 30 months of quantified behavior observation among savanna hunter-gatherers in Venezuela and over 12 months among Maya agriculturalists, that we continue to need dedicated fieldwork to research about what actual variation in human behavior is like across the many different environments where people live. (Greaves, 2018)

This lack of empirical data is also felt by Pedersen et al. (2018) who call for the development of Behavioural Computer Science that would incorporate "empirical evidence for actual human behaviour, instead of making inferences about behaviour based on the rational agent model" (p. 1). Similar feelings are shared by researchers of health behavior looking forward to using new data-driven scientific approaches (Marsch, 2021; Moustafa et al., 2018).

In the context of the lack of behavioral data, it was suggested elsewhere (Serikov, 2019) that fictional narratives could be used as a source of empirical descriptive data. Indeed, in addition to anthropologists, sociologists and psychologists, there is another type of professional observers of people – writers. And all the results of their observations are in the public domain. If we assume that stories, novellas and novels contain descriptions of human behavior, we can try to use them as material for generalizations about behavioral patterns that are typical for different persons in all sorts of psychophysiological states, as well as in different cultural, social or natural circumstances. It is also possible to compare fictional texts of different authors and, on the basis of this comparison, suggest which forms of behavior are universal and which are specific to some cultures, societies or historical periods. Besides, we can make conjectures about atypically rare or even impossible behaviors that would go against cultural rules or human natural dispositions.

Such an analysis would result in the formulation of some "grammar of behavior," and possibly also in a future implementation of computational "behavioral grammar parsing" in addition to already existing computational parsing methods. The solution of the task will presumably compensate the lack of empirical descriptions of behavior and their generalizations.

The purpose of this paper is to explore the possibility of talking about the grammar of behavior in a strict scientific sense. The paper aims to answer the question: if "grammar of behavior" is not just a metaphor, what can be its characteristics as a theoretical notion?

DESIGN

Since the notion of grammar obviously comes from linguistics, we will start by comparing different linguistic approaches to the understanding of grammar. As a result, it will be possible to list properties of scientific grammars that are most important from the perspective of language studies.

Then we will explore how the concept of grammar is used outside of linguistics. Although the notion of behavioral grammar is rare in the scientific literature, it is not entirely absent or absolutely new (Zolyan & Chernov, 1977). It was first proposed by members of the Tartu-Moscow School of Semiotics Suren Zolyan and Igor Chernov. In 2000, Makiko Miwa (2007) developed a conceptual model of "information behavioral grammar". More recently anthropologist Kate Fox (2014) wrote that in "Watching the English" her aim "was to provide a 'grammar' of English behaviour" (p. 7). Some authors employed the closely related notion of syntax in computational models of human behavior. For example, Subrahmanian et al. (2013) described "the syntax and semantics of Temporal Probabilistic (or TP) behavioral rules" used to predict the behavior of terror groups (p. 69). Besides, a similar concept of "grammar of society" was included in the title of Cristina Bicchieri's (2006) book. Did the abovementioned authors use the concept of grammar just as a metaphor or as a theoretical notion? Was there something in common in their use of the term? Where their understandings of grammar somehow connected to linguistic theories? We will try to answer the questions.

Finally, we will discuss the necessary requirements for the grammar of behavior as a scientific concept in general, and how they can be implemented for the behavioral grammar extracted from fiction.

TRADITIONAL GRAMMAR

The word "grammar" comes from the Latin "grammatica", which, in turn, is a translation from the ancient Greek "γραμματική". Accordingly, the classical European understanding of grammar was formed on the basis of the ancient Greco-Latin tradition of language learning (Seppänen, 2014). However, the European tradition was not the only one. Independently of it, Indian, Chinese and Japanese linguistic traditions developed in the ancient world, and classical Arabic linguistics also developed relatively independently of European (Alpatov, 2019).

Since the 19th century, the European understanding of grammar has been influenced by knowledge about Sanskrit grammar (Kiparsky, 2009) and about the features of Chinese and other non-European languages, and the Eastern linguistics have been adapting some European concepts based on the Latin grammar (McDonald, 2020).

It is generally accepted that modern linguistics begins with the work of Ferdinand de Saussure (1857-1913) and other structuralists. On the basis of structuralism, such popular approaches in linguistics as descriptivism and functionalism were developed, which in turn gave rise to generativism and cognitive linguistics. Therefore, in contemporary linguistics, there is not so much the development of national traditions of understanding grammar, much rather of various theoretical approaches within the framework of a single international science. But since linguists are inevitably influenced by the peculiarities of their native language, regional specificity remains in the adoption of certain theoretical approaches by scientists. For example, in the United States, the most popular is the generative approach to grammar, and in Russia, the functional approach. The understanding of grammar in such contemporary approaches usually differs from traditional grammars.

Three stages of development of the concept of grammar took place in ancient Europe:

> In the Classical era, the Greek term is used to refer to a very concrete art of letters (grámmata); from the Hellenistic era onwards it refers to the art developed by the Alexandrian scholars, a matter of textual and literary criticism. Towards the end of the Hellenistic era, the grammarian also becomes involved with the question of correct language, which gradually begins to appear in the definitions as well. (Seppänen, 2014, Abstract)

The latter trend gradually became dominant, and a tradition developed of understanding grammar as a set of prescriptions that must be followed in order to speak and write correctly. Dionysius Thrax (ca. 170-90 BCE), the alleged author of the earliest Greek grammatical text, devoted his work to what today we call phonetics and morphology, while syntax as part of grammar appeared later, in the works of Appolonius Dyscolus (ca. 110-175 CE). Dionysius Thrax had very generally defined grammar as “an experimental knowledge (ἐμπειρία) of the usages of language as generally current among poets and prose writers” (Dionysios Thrax, 1874, p. 3). But already in the medieval commentaries to Dionysius Thrax (Hilgard, 1901, p. 300), grammar was understood more specifically as a set of definitions and rules necessary for the correct use of the language:

> What is the art of grammar? A theoretical and practical skill that teaches us to speak and write well; yet not everyone who can write or read is called a grammarian, but he who transmits rules and definition. (as translated by Seppänen, 2014, p. 15)

Today, this understanding of grammar is at the heart of most L1 and L2 textbooks and is usually called “traditional grammar” or “school grammar,” in contrast to contemporary linguistic grammar models developed within the framework of various theoretical approaches. Two conventional parts of traditional grammar are morphology and syntax. The traditional grammar is built on the idea of distinguishing between educated and uneducated persons. Education presupposes explicit knowledge of grammar rules and their application when creating new texts. The most important

characteristic of traditional grammar is its prescriptivism: it lays down the rules of proper language.

FORM-CENTERED GRAMMARS

There could be different bases employed in a logical division of grammar models in modern linguistics. Perhaps most important is the distinction between form-centered and meaning-centered approaches to the study of language in general and grammar, in particular. The most famous examples of the formal approach are American structuralist descriptivism, and Chomsky's generativism. The meaning-centered approaches include various variants of functional and cognitive linguistic theories and models of grammar.

The most important protagonist of modern formal approach to language should be considered Zellig Harris (1909-1992), the author of "Methods in Structural Linguistics" (1951). His main influence came from Leonard Bloomfield (1887-1949) who suggested a very simple analytical principle: a sentence could be divided into subject and predicate parts, each of the parts being analyzed in terms of a subject and its attribute (Bloomfield, 1914, p. 61). Later Bloomfield (1933) elaborated this principle into the idea of Immediate Constituent (IC) analysis: complex linguistic forms were understood as constructed of simple forms (ultimate constituents, morphemes) (p. 158-161). Discussing this idea, Bloomfield wrote that a "morpheme can be described phonetically, since it consists of one or more phonemes, but its meaning cannot be analyzed within the scope of our science" (p. 161), and that "linguistic study must always start from the phonetic form and not from the meaning" (p. 162). Accordingly, "the meaningful arrangements of forms in a language constitute its grammar" (Bloomfield, p. 163).

Such an understanding of grammar Harris (1963) took literally: "The over-all purpose of work in descriptive linguistics is to obtain a compact one-one representation of the stock of utterances in the corpus" (p. 366). From this formalistic perspective, meaningfulness and correctness of linguistic forms depend on their distribution. Therefore, the key in linguistics is the method of distributional analysis.

> This methodological program involved finding the maximum regularity in the occurrence of parts of utterances in respect to other parts. In its most general form it required the description of the departures from randomness in the combinations of elements, i.e. the constraints on freedom of occurrence of elements in respect to each other. (Harris, 1990, p. 1)

When discussing Harris's methodological ideas, it should be understood that descriptive linguistics and distributional analysis are not simply historical relics. Today they are being revived within the framework of corpus linguistics (Schneider et al., 2020). At the same time, contemporary versions of descriptive grammar can rely on the ideas of not only formalists, but also functionalists (Laury & Ono, 2019).

In a radical interpretation, Harris's distributional analysis led to the idea that it is possible to predict all well-formed utterances of a given language without referring to their meaning, simply on the basis of their mathematical model. This idea was actually implemented by Harris' student Noam Chomsky, when he offered an understanding of

grammar as a finite set of formal algorithms that make up the linguistic competence of a native speaker. Therefore, one can speak of Chomsky's formalism in linguistics in the same sense as one speaks of David Hilbert's formalism in mathematics.

> A language is a collection of sentences of finite length all constructed from a finite alphabet (or, where our concern is limited to syntax, a finite vocabulary) of symbols. Since any language L in which we are likely to be interested is an infinite set, we can investigate the structure of L only through the study of the finite devices (grammars) which are capable of enumerating its sentences. A grammar of L can be regarded as a function whose range is exactly L. Such devices have been called “sentence-generating grammars.” (Chomsky, 1959, p. 137)

Chomsky himself sees his fundamental innovation in the transition from descriptive grammar to generative. He writes that Harris's work “was a true classic, the apogee of the procedural enterprise and its virtual culmination” (Chomsky, 2021, p. 4). But it is not enough to describe what the correct language forms look like. “Taxonomic science has limits. It does not ask 'why?'” (Chomsky, 2021, p. 4). So, one goal of Chomsky's generativism in all its successive theoretical implementations, was to suggest a formal model of the innate human faculty of language which, on the basis of some limited experience, would yield language competence (the internal language). Another goal was to formally explain how the internal language “generates an unbounded array of hierarchically structured expressions that constitute the linguistic formulation of thoughts and that can (but need not) be externalized in some sensory modality” (Chomsky, 2021, p. 8).

From Chomsky's point of view, the grammar only consists of syntactic generative algorithms, which are formal also because they do not depend on semantics. The standard generative grammar equals the generative syntax. However, there are other variants of generativism today. For example, Parallel Architecture grammar is understood as a model of the interaction of phonological, syntactic, and semantic structures, each having its own formation rules. “The basic premise of the Parallel Architecture is that linguistic structure is determined by three independent generative systems – phonology, syntax, and semantics – plus, crucially, the linkages between them. This contrasts with the traditional 'syntactocentrism' of generative grammar” (Jackendoff & Audring, 2019, p. 218).

So far, we have discussed two interrelated meanings of formalism in linguistics: the assumption that linguistic forms are independent of meaning and the understanding of grammar as a set of algorithms. But there is another meaning of formalism. In practice, most linguists consider formal those approaches and grammar models that use formal means of description, such as symbolic notations, formulas, schemes, diagrams, matrices, etc. Thus, one of the most common ways to describe syntactic structures are tree diagrams. In this sense, not only form-centered models are formal, but many contemporary meaning-centered models as well.

MEANING-CENTERED GRAMMARS

For Chomsky, the rules of grammar are the rules of the internal language (competence) as opposed to the external language (performance). For most functionalists and cognitivists, there is no such distinction between competence and performance. Even if they recognize the difference between ideal rules and their practical implementation, for them the grammar includes not just formal rules but the knowledge of how these rules should be used depending on different situations and contextual meanings. For example, the Functional Syntax theory "is based on the principle of going 'from meaning to form'; to be more specific, 'from semantic categories to linguistic means.' " (Mustajoki, 2007, p. 6).

According to Christopher Butler (2003), three main characteristics of functional theories in linguistics are:

- an emphasis on language as a means of human communication in social and psychological contexts;
- a rejection, wholly or in part, of the claim that the language system (the 'grammar') is arbitrary and self-contained, in favour of functional explanation in terms of cognitive, socio-cultural, physiological and diachronic factors;
- a rejection, wholly or in part, of the claim that syntax is a self-contained system, in favour of an approach where semantic and pragmatic patterning is regarded as central, with syntax, if recognised as a structural system at all, regarded as one means for the expression of meanings, which is at least partially motivated by those meanings. (p. 29)

A standard point of view is that grammars could be either generative or constraint-based. When generative grammars provide algorithms that would produce all possible well-formed linguistic objects, constraint-based grammars state conditions that the objects must meet. The constraints can be more or less categorical. Lexical Functional Grammar (LFG) that was first suggested by Joan Bresnan and Ronald Kaplan in the late 1970s (Kaplan & Bresnan, 1995) is an example of a constraint-based model that treated well-formedness as categorical. "That is, sentences (or, rather, linguistic descriptions) are either a part of the grammar or are not. There is no notion that some grammatical violations are 'better' or 'worse' than others" (Dalrymple & Findlay, 2019, p. 126). However, in the contemporary Optimality-Theoretic (OT) version of LFG, a competition-based view of well-formedness is applied:

> In OT-LFG . . . the grammar consists of a set of possibly incompatible, violable constraints, where a linguistic description need not satisfy all of the constraints in order to be well-formed, but must merely be the 'least bad' candidate description. Such a system allows for a much more fine-grained analysis of well-formedness. For example, it makes it possible to describe levels of ungrammaticality: a sub-optimal candidate can still be ranked above other suboptimal candidates, by violating fewer highly-ranked constraints, and can therefore be 'less ungrammatical' in a well-defined sense. (Dalrymple & Findlay, 2019, p. 126)

Cognitive linguistic theories are close to functional ones in the sense that neither the language as a whole, nor the syntax within the language are considered as autonomous systems. Jacub Bielak and Miroslaw Pawlak even say that cognitive linguistics "belongs to the functional tradition of language study" (Bielak & Pawlak, 2013, p. 8). The major claim of cognitive approaches in general is that "language draws on such facets of cognition as general human cognitive capacities (e.g. memory, perception, categorization), embodied experience, knowledge, cognitive models, and other related phenomena" (Bielak & Pawlak, 2013, p. 9).

The most famous examples of cognitive grammar models are Ronald Langacker's Cognitive Grammar (CG) (Broccias, 2019; Langacker, 1986, 2008) and Charles Fillmore's Construction Grammar (CxG) (Chaves, 2019; Fillmore, 1988). CG and CxG share an assumption that there is no clear-cut boundaries between syntax and lexicon. Instead, any linguistic utterance can be described as a system of constructions which have their place somewhere in the grammar-lexicon continuum. Constructions are understood as templates or schemata that can be closer to prototypical lexical items such as words and idioms, or closer to grammatical patterns such as word order rules. Fillmore (1988) defines grammatical construction as "any syntactic pattern which is assigned one o more conventional functions in a language, together with whatever is linguistically conventionalized about its contribution to the meaning or the use of structures containing it" (p. 36). Accordingly, the grammar of a language is seen as "a repertory of constructions, plus a set of principles which govern the nesting and superimposition of constructions into or upon one another" (Fillmore, 1988, p. 37).

GRAMMARS OF BEHAVIOR, CULTURE AND SOCIETY

The notion of behavioral grammar was first proposed by Suren Zolyan and Igor Chernov. They considered behavior as a semiotic system that can be investigated by linguistic methods. Explicitly referring to Chomsky's generative grammar and the notion of linguistic competence, Zolyan and Chernov (1977) suggested that it was possible to model human behavioral competence – the finite system of basic alphabet and rules that would generate an infinite number of behaviors. Behavior was seen as analogous to surface language structure, and normative descriptions of behavior in natural languages – as analogous to deep language structure. Behavior was understood as language, the descriptions of behavior – as metalinguistic.

> Numerous texts function in the cultural system that extrapolate and explicate the competence of society (the system of prescriptions and proscriptions). Let us call grammar the mechanism that generates such texts. (Zolyan & Chernov, 1977, p. 155)

Discussing the influence of metalinguistic norms on behavior, Zolyan and Chernov wrote about the possibility of building a hierarchy of metalanguages from their complete ignorance (which corresponds to unregulated and uncontrolled behavior) to a high degree of reflection and complete mastery of the regulation of behavior. Accordingly, the grammar of behavior can work implicitly or explicitly. But it looks

like Zolyan and Chernov were primarily interested in modeling more or less explicit rules, expressed in different texts. Therefore, the grammar they proposed was prescriptive rather than descriptive. Unfortunately, they presented their ideas in a short general form and did not elaborate them into a detailed model, which would systematically correlate with empirical facts.

Cristina Bicchieri (2006) offers a theory of social norms, which she calls "the grammar of society" explicitly referring to a linguistic notion of grammar:

> I call social norms the grammar of society because, like a collection of linguistic rules that are implicit in a language and define it, social norms are implicit in the operations of a society and make it what it is. Like a grammar, a system of norms specifies what is acceptable and what is not in a social group. And analogously to a grammar, a system of norms is not the product of human design and planning. (p. ix)

Bicchieri formally defines different types of norms, and describes different types of persons and situations, which she models by game theory methods. Social norms, according to Bicchieri, differ from descriptive ones. Following social norms often conflicts with self-interests, while conformity to descriptive norms is dictated by self-interest. Conventions are a kind of descriptive norms. In game-theoretic terms, conformity to conventions helps to solve coordination problems. Since social norms go against self-interests, "a social norm need not be an equilibrium of an ordinary game in which payoffs represent self-interested preferences" (Bicchieri, 2006, p. 25). An example of such a game can be the Prisoner's Dilemma. However, if a social norm exists and is followed, the original PD game transforms into a coordination game.

The 1st edition of Kate Fox's "Watching the English: The Hidden Rules of English Behaviour" was published in 2004, the 2nd revised edition in 2014. Fox's (2014) research goals were to "identify distinctive patterns or regularities in English behaviour" and then "to detect the unwritten social rules governing those behaviour patterns," and "to figure out what these rules can tell us about Englishness" (p. 31). As a result, she described approximately 250 implicit unspoken rules of behavior typical of the English. She called them the cultural "grammar of Englishness" or the "grammar of English behaviour". Fox (2006) puts the term "grammar" in quotation marks meaning that it is not exactly the same as grammar of language, but the similarities between the two grammars seem obvious to her:

> Native speakers can rarely explain the grammatical rules of their own language. In the same way, those who are most 'fluent' in the rituals, customs and traditions of a particular culture generally lack the detachment necessary to explain the 'grammar' of these practices in an intelligible manner. (p. 7)

Fox (2006) understands rules descriptively, "in the wider sense of standards, norms, ideals, guiding principles and 'facts' about 'normal or usual' English behaviour" (p. 15). The rules understood in this way can be followed both automatically or consciously. And they are not obeyed by all without exception or deviation, but only by a significant number of people. "Indeed, it is a fundamental requirement of a social

rule – by whatever definition – that it can be broken" (Fox, 2006, p. 15). Fox does not formalize the rules, but if we do it the form would be something like "A typical English representative of her/his gender, generation and social class usually does this sort of things in such and such circumstances."

My own suggestion is that a model of behavioral grammar extracted from fiction corpora can be very similar to what Fox has done. It should be based on Lewinian theory of behavior (Serikov, 2020) and describe behavior as sequences of events, an event being conceptualized as a set of four variables: 1) the social and/or demographic status of the acting person, 2) her/his psychophysiological state, 3) the circumstances of behavior, 4) the pattern of behavior. The values of the variables can be more or less typical (from impossible and very unusual to ordinary and very common) and of different levels of generalization (from very specific and particular to generic). Then, for a given culture and society, the grammar of behavior can be understood as the set of generalized descriptions of typical persons' behaviors in typical psychophysiological conditions and typical circumstances.

CONCLUSIONS

The notion of behavioral grammar should be based on a clear understanding of how language and behavior relate. For example, Zolyan and Chernov proceeded from the premise that behavior is a kind of language, because, from their point of view, all behavior expresses something meant by the acting person. However, since people can do something unconsciously, automatically, out of habit, it is hardly justifiable to consider all behavior as linguistic. Rather, on the contrary, verbal behavior should be viewed as a kind of behavior in general. By the way, this position is reflected in Fox's book, since the book is for the most part devoted to the rules of behavior, and only the first part to the conversation codes. If verbal behavior is a kind of behavior then the transfer of the idea of grammar from linguistics to the behavioral sciences should be understood as a generalization.

A comparison of different approaches to the grammar of a language shows that they all have similarities. First, any grammar offers some typology of language elements, either by describing the existing elements or by prescribing what they should be. Secondly, it offers some rules in the broad sense of the word (prescriptions and proscriptions, distributions, algorithms, schemes, templates), which partly consist already in the description of elements and their types, and partly in a description of how these elements can be combined among themselves. Third, any grammar explicitly or implicitly contains theoretical ideas about what language is in general and what role it plays in human life.

A grammar of behavior also presupposes a certain theoretical view of behavior: how it is generated, where its forms come from, how they are assimilated and chosen, etc. For example, Bicchieri's grammar of social norms builds on the ontology of social constructivism, and therefore ignores the question of norms associated with biological predisposition to certain types of behavior. But behavior as a whole can be understood not only as a consequence of rational choice, but also as instinctive, not only as

corresponding to certain explicit rules, but also as based on imitation, impulses and habits that are for the most part unconscious.

At the same time not every social, psychological, or anthropological theory of behavior can be understood as grammar. A grammar of behavior is that part of a theory which describes behavior, explains it by formulating rules, by specifying what is necessary, typical, possible, and what is atypical or impossible.

From a general theoretical perspective, a generative model of behavioral grammar is quite possible. In analogy to the existence of unconscious mechanisms of consciousness, it can be assumed that there are unconscious algorithms that generate behaviors on the basis of a person's states and situations. But in order to develop a generative model, we need preliminary empirical data on what forms of behavior this model should generate. Do not forget that in linguistics the construction of generative models was preceded by a long period of descriptive research.

Therefore, descriptive methods should not be ignored when developing behavioral grammar models. First, contrary to Bicchieri's statements, descriptive methods allow us to identify not only the actually observed forms of behavior (descriptive norms), but also what people say about values and expectations, prescriptions and proscriptions (injunctive norms). Secondly, theoretical models should explain the whole variety of observed facts, and not just some individual examples chosen by the theoretician to illustrate the theory. From this point of view, the essence of descriptivism is that a theoretical model must be open to the inclusion of new types of facts in it. In contemporary linguistics, corpus studies are aimed at developing such open models, although until recently it seemed that linguists knew everything about the correct forms possible in a particular language. As for behavior, there are very few works devoted to the systematic empirical description of human behavior patterns and their theoretical generalization. And research in the field of grammar of behavior should fill this gap by being analogous to corpus research in linguistics.

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Research article

Which Theory of Language for Deep Neural Networks? Speech and Cognition in Humans and Machines

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Abstract

The paper explores the relationship between technology and semiosis from the perspective of natural language processing, i.e. signs systems automated learning by deep neural networks. Two theoretical approaches to the artificial intelligence problem are compared: the internalist paradigm, which conceives the link between cognition and language as extrinsic, and the externalist paradigm, which understands cognitive human activity as constitutively linguistic. The basic assumptions of internalism are widely discussed. After witnessing its incompatibility with neural network implementations of verbal thinking, the paper goes on exploring the externalist paradigm and its consistency with neural network language modeling. After a thorough illustration of the Saussurian conception of the mechanism of language systems, and some insights into the functioning of verbal thinking according to Vygotsky, the externalist paradigm is established as the best verbal thinking representation to be implemented on deep neural networks. Afterwards, the functioning of deep neural networks for language modeling is illustrated. Firstly, a basic explanation of the multilayer perceptron is provided, then, the Word2Vec model is introduced, and finally the Transformer model, the current state-of-the-art architecture for natural language processing, is illustrated. The consistency between the externalist representation of language systems and the vector representation employed by the transformer model, prove that only the externalist approach can provide an answer to the problem of modeling and replicating human cognition.

Keywords: Natural Language Processing; Deep Neural Networks; Artificial Intelligence; Philosophy of Language; Philosophy of Science; Psycholinguistics; Linguistics, Philosophy of Technology

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Научная статья

Теория языка для глубоких нейронных сетей: Речь и познание у людей и машин

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Аннотация
В статье исследуется взаимосвязь между технологией и семиозисом с точки зрения обработки естественного языка, т. е. автоматизированного машинного обучения с помощью глубоких нейронных сетей. Сравниваются два теоретических подхода к проблеме искусственного интеллекта: интерналистская парадигма, которая рассматривает связь между познанием и языком как внешнюю, и экстерналистская парадигма, которая понимает когнитивную деятельность человека как конститутивно лингвистическую. Основные предположения интернализма широко обсуждаются. Убедившись в его несовместимости с нейросетевыми реализациями вербального мышления, в статье продолжается исследование экстерналистской парадигмы и ее согласованности с языковым моделированием нейронных сетей. После тщательной иллюстрации соссюровской концепции механизма языковых систем и некоторого понимания функционирования вербального мышления в соответствии с Л. С. Выготским, экстерналистская парадигма устанавливается как лучшая репрезентация, которая может быть реализована в глубоких нейронных сетях. Далее проиллюстрировано функционирование глубоких нейронных сетей для языкового моделирования. Сначала дается базовое объяснение многослойного персептрона, затем вводится модель Word2Vec и, наконец, проиллюстрирована модель Transformer, современная архитектура для обработки естественного языка. Согласованность между экстерналистским представлением языковых систем и векторным представлением, используемым в модели преобразователя, доказывает, что только экстерналистский подход может дать ответ на проблему моделирования и воспроизведения человеческого познания.

Ключевые слова: Обработка естественного языка, Глубокие нейронные сети, Искусственный интеллект, Философия языка, Философия науки, Психолингвистика, Лингвистика, Философия технологий

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LANGUAGE AND COGNITION

Since the beginning of artificial intelligence (AI) history, intelligent systems have been associated with the ability to reproduce human language (Turing, 1950; Russell and Norvig, 2021, chapter 1.3.5). Whether it's scientific research, the latest news or cultural and entertainment products, nothing catches the public's ear more than a machine that can talk "like us". The verbal activity has always inspired feelings of pride in human beings, but also curiosity, especially when compared to other forms of life, not endowed with this faculty.

Soon, not only philosophy, but other disciplines such as linguistics and psychology, realized the cognitive relevance of language, breaking the exclusive association between language and communication. The connection between thinking and speech turns out to be reinforced by these theories, and the idea that human cognition can only come to be through words has become commonplace for many thinkers. These theories are referred to as externalist, as for these authors, human cognition is developed through techniques and tools external to the organism. Orality, and in particular the functional use of signs (see Vygotsky and Luria 1993, pp. 118, 202), is one (and probably the most important) of these techniques.

Nevertheless, the first steps of AI did not take place within this theoretical framework; instead, they passed through information theory, neurosciences, and philosophy of mind (Dreyfus, 2007; see also Russell and Norvig, 2021, paragraph 1.2). It is possible to group these interpretations under the label of internalist theories. These theories consider thought as an internal process expressed by language, but independent from it.

In contact with engineering and computer sciences, the internalists ignored verbal activity and sought to model and reproduce human cognition starting from what they considered the logical structure of thought, only expressed in the grammar of languages (Chomsky, 1988, p. 134), developing rule-based models and ontologies. Most of these projects have had below-expectations outcomes (Ceccato, 1961; see also Dreyfus, 1992, pp. 130–152). Moreover, the recent advances in AI research confirms that for the replication of human intelligence the study of verbal activity cannot be disregarded (Brown et al., 2020; see also Capone and Bertolaso, 2020). The hypothesis of the paper is that an externalist paradigm may prove to be the most effective theoretical approach to reproduce verbal thought on a machine.

In the chapter, the internalist and externalist paradigms are compared by evaluating their respective solutions to the question of the relationship between thinking and speech. This step will be paramount to understand what kind of phenomenon the discipline of artificial intelligence should try to replicate.

Internalism

The internalist solution to the relationship between cognition and language has ancient roots; this position considers language essentially as a nomenclature, necessary for the communication of speech-independent contents (De Mauro 1967, p. 8).

"Now spoken sounds are symbols of affections in the soul, and written marks symbols of spoken sounds. And just as written marks are not the same for all men,

neither are spoken sounds. But what these are in the first place signs of – affections of the soul – are the same for all; and what these affections are likenesses of – actual things – are also the same" (Aristotle, 2014, p. 72 – *De Int.* 16a 3).

Aristotle's position stems from two theoretical necessities. The first is to provide a better explanation of the linguistic phenomenon than those of his predecessors. Even in Heraclitus there are traces of a mentality that is defined as oral or pre-alphabetic (cf. Ong, 2004; Havelock, 2010). Following what must have been a widespread opinion, Heraclitus appears to believe that the name is an objectively inherent attribute of the object (De Mauro, 1999, p. 43). The second reason is to be found in the dispute with the skeptics. Aristotle needed a theoretical foundation for the principle of identity, which is itself indemonstrable. Tying the meaning of a word to internal concepts, "the same for all", acts as a guarantee of this principle (De Mauro, 1967, p. 8) ensuring comprehension and communication between human beings.

The conception according to which words of different languages stand for concepts and referents that are the same for everyone, has long been the hegemonic theory in philosophy (fig. 1). The next section illustrates how this idea has survived until today and continues to live on in the theories of mind that came to the fore with the mentalist turn of the 1960s led by Chomsky (1959).

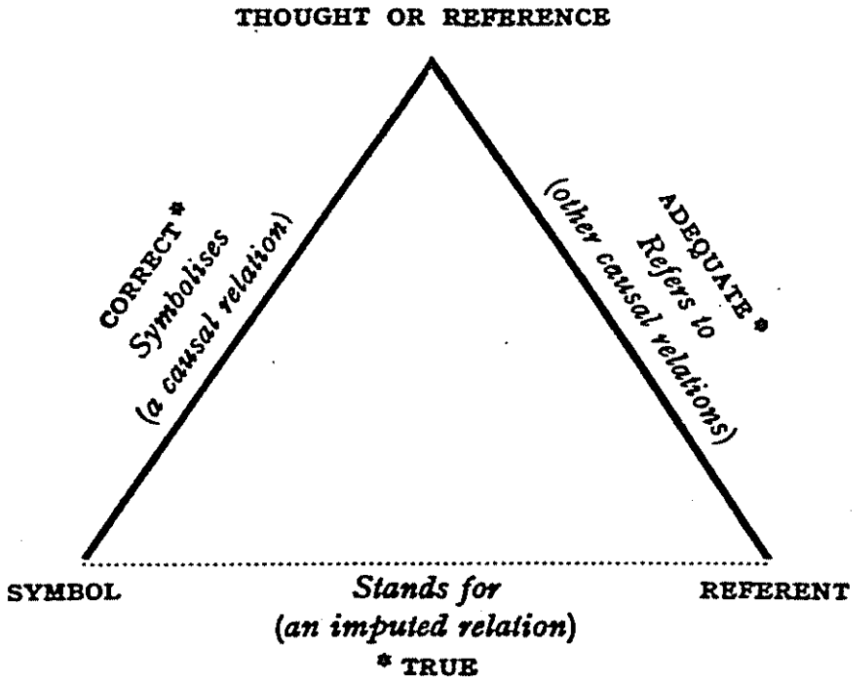

Figure 1. Ogden and Richard's (1946) semiotic triangle (p. 11). A well-known graphical representation of the internalist conception of the relationship between language and thought.

The Mentalist Turn

Just like Aristotle, Chomsky tries to anchor language to universal structures, responsible for the functioning of every possible language. What he proposes as a theory of syntax is actually a theory of mind, with assumptions that even trespass into the physiological level. The brain is described in analogy to the hardware of a computer, on which various independent modules function as software. The ensemble of these modules constitutes the mind. The module in charge of language acquisition is the LAD (language acquisition device) (Chomsky, 2015, p. 58).

> Language learning is not really something that the child does; it is something that happens to the child placed in an appropriate environment, much as the child's body grows and matures in a predetermined way when provided with appropriate nutrition and environmental stimulation. (Chomsky, 1988, p .134)

The main argument in favour of this thesis is that of the *poverty of the stimulus*. The external stimulus is not sufficient for the acquisition of language. The subject requires a biological endowment that provides the data and structures for the development of a grammar (Chomsky, 1988, p. 153).

> We may think of the language faculty as a complex and intricate network of some sort associated with a switch box consisting of an array of switches that can be in one of two positions. […] When these switches are set, the child has command of a particular language and knows the facts of that language: that a particular expression has a particular meaning, and so on." (Chomsky, 1988, pp. 62–63)

In the Chomskyan proposal, syntax occupies a leading role, while semantics has practically no place, since concepts are innate (actualized according to the parameters of the LAD) and not the result of learning.

After Chomsky, the cognitive and mind studies have diversified a lot, but all of them followed the internalist paradigm, according to which concepts, representations and in general every meaning, is predetermined by internal structures, and language is nothing but the tool to manifest these inner states.

It is possible to summarize the general assumptions of the internalist approach as follows:

- Universalism of cognitive structures;
- Cognitive structures determine mental contents (concepts), and the rules for their relations (grammar);
- Language is an encoding/decoding tool for communicating internal states.

Internalism and Automation

Following the postulate that thought consists of concepts (internal states) plus grammar (structure of rules), the internalist project encouraged approaches to the modeling and reproduction of human cognition based on the definition of rule sets, instructions, and concept structures designed to imitate internal thought processes.

The earliest automatic systems appeared in the field of problem solving and logic. There were systems for proving theorems and chess-playing programs. These systems operated in controlled environments, far removed from the context in which human thought works.

The first attempts to approach reasoning and communication in natural language date back to the late 1960s. Marvin Minsky, head of the AI lab at MIT declared that within a generation there would have been intelligent computers like HAL, from Kubrick's famous film (Dreyfus, 2007). A few years earlier, Alan Newell and Herbert Simon claimed to have solved the problem of the mind-body relationship. According to them, the mind could be conceived as a system of physical symbols. In their opinion, bits and symbols can be used to represent the human mental world of concept (Russell and Norvig, 2021, paragraph 1.3.1).

The internalist approach can be found in the work of these scholars. The elements of thought are imagined as copies of the objects of the world that inhabit the mind, designated by the words of the different languages. Concepts can be related according to various rules (generally imagined on the model of logical relations). It was just a matter of matching symbols to concepts and then calculate according to defined rules. Dreyfus describes the situation as follows:

> far from replacing philosophy, the pioneers in CS [Cognitive Simulation] had learned a lot, directly and indirectly from the philosophers. They had taken over Hobbes' claim that reasoning was calculating, Descartes' mental representations, Leibniz's idea of a "universal characteristic"–a set of primitives in which all knowledge could be expressed,–Kant's claim that concepts were rules, Frege's formalization of such rules, and Russell's postulation of logical atoms as the building blocks of reality. In short, without realizing it, AI researchers were hard at work turning rationalist philosophy into a research program. (Dreyfus, 2007)

Following these assumptions, developers began to build "microworlds" (Russell and Norvig, 2021, paragraph 1.3.3), within which the programs they implemented could attempt to solve tasks. The use of controlled and ideal environments was necessary to avoid the *frame problem*. A controlled environment requires relatively little basic knowledge for an agent to be able to operate appropriately within it. An open system, on the other hand, requires a lot of information and prior knowledge and will present the agent with several choices that cannot be unambiguously decided, and which are unmanageable by such systems. A program, following specific instructions, can easily identify a cube in a world populated only by cubes, spheres and pyramids. The same rules can hardly be used unambiguously in an open environment. The frame problem is closely related to that of the meaning of concepts and their representation, and will be of fundamental importance later in the paper. Suffice it for now to say that this problem has never allowed these approaches to move from controlled to open (or natural) environments. Similarly, it has never allowed them to move from a simplified language to real natural language commands.

Attempts to represent language and make computers capable of understanding natural language have a long history within the discipline of AI. Scholars such as

Ceccato (2003) tried to represent language according to categories and semantic frames, attempting to create a sort of taxonomy of concepts, hoping to overcome the frame problem. This approach has long been used, as in the case of the OWL (Ontology Web Language) project[1], or in the creation of word graphs and networks, such as Wordnet (Fellbaum, 2006) and ConceptNet (Liu and Singh, 2004)[2]. Although useful and interesting, these attempts continue to persist in an internalist and, in the words of Dreyfus, rationalist conception of thought[3]. In this view, concepts are represented according to features and categories, i.e. other concepts, entering an infinite regression from which there is no exit[4].

Another eloquent example of the inadequacy of the internalist approach is provided by the way in which this paradigm has dealt with the machine translation task. If languages are nothing but by-products of the interaction between innate cognitive structures and the environment, it is to the universal grammar and therefore to the mind that one must look in order to understand the functioning of thought. In addition, according to Aristotle, if concepts and external referents are the same for all languages, it follows that there is a fundamental commensurability between each language. This is what the principal investigators of the various research groups that arose from the 1960s onwards thought.

> The first year [...] revealed that in two respects we had somewhat underestimated the extent of the research [...] the degree of exact correspondence between the expressions of different languages is much less than anyone ever suspected [...] Two languages, for example, may present the same observational objects, but the relation in which they are presented is different; or there is difference in the elements into which the named thing is divided". (Ceccato, 1960 as cited in De Mauro 1999, pp. 168–169, trans. by the author)

Silvio Ceccato, head of a research group, personally verifies that the Aristotelian foundation of the principle of identity does not hold. Each language carves out the plane of content (the concepts, fig. 2) and the plane of expression (the signs and the way they combine with each other, fig 3) in different and not always corresponding ways. These differences are not merely expressive alternatives. The way a language carves out and articulates its concepts is something essential to thought. The externalist approach stems from this assumption. The internalist project of modeling cognition by tracing the basic rules and elements that constitute thought failed before it even began.

[1] https://www.w3.org/OWL/

[2] For a further review of alternative NLP (Natural Language Processing) approaches see Cambria and White (2014)

[3] ConceptNet, as well as other knowledge graphs and ontologies, can be used together with other AI models (based on distributional semantics and not involved with internalism), but at this level of the paper it is important to understand the ineffectiveness of these approaches when used exclusively.

[4] Trying to describe the logical form of the proposition and therefore of thought, Wittgenstein in his Tractatus Logico-Philosophicus speaks of the primitive signs as follows: "The meanings of primitive signs can only be explained by means of elucidations. Elucidations are propositions that contain the primitive signs. So they can only be understood if the meanings of those signs are already known." (Wittgenstein, 2002, 3.263). To be sure, the later Wittgenstein of the Philosophical Investigations can be said to follow the externalist paradigm.

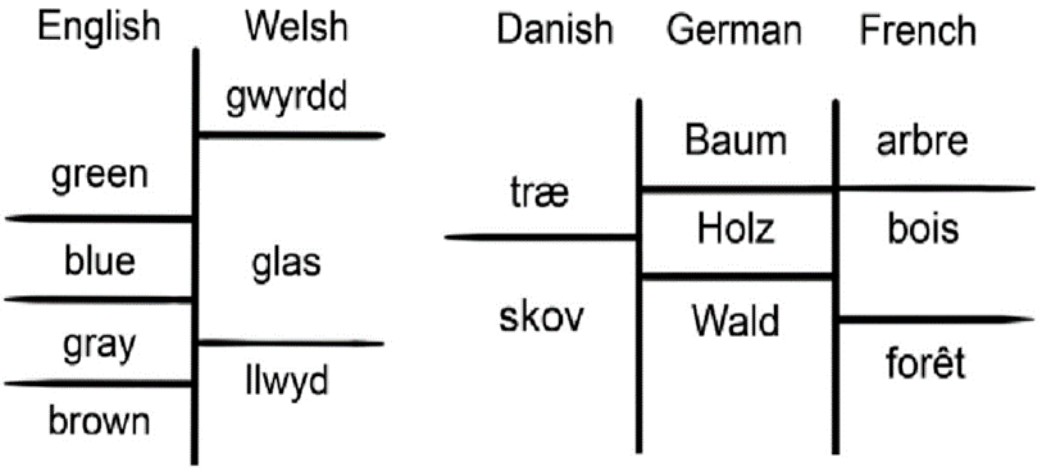

Figure 2. Scheme of differentiations of some meanings in different languages (Hjelmslev, 1969, p. 53–54)

Uygarlaştıramadıklarımızdanmışsınızcasına

(behaving) as if you are among those whom we could not civilize

uygar:	civilized
_laş:	become
_tır:	cause somebody to do something
_ama:	not able
_dık:	past participle
_lar:	plural
_ımız:	1st person plural possessive (our)
_dan:	among (ablative case)
_mış:	past
_sınız:	2nd person plural (you)
_casına:	as if (forms an adverb from a verb)

Figure 3. Structure of a Turkish sentence (example from Jurafsky and Martin, 2009, p. 46)

In summary, internalism is concerned with the search for the internal structures of the mind, the same for all individuals. This affects its approach to the representation of cognition, leading it to isolate two elements: the concepts (lexicon) and the structure of rules that relate them (grammar) to produce thought.

Nevertheless, the above examples have shown that neither of these two elements, isolated by internalism, is a constant measure among languages. Different languages, and the ways in which they structure cognition, cannot be sidelined in addressing the problem of replicating human thinking.

Externalism

According to externalism, what is commonly called human thought is not an entirely internal phenomenon, ascribable to an innate genetic heritage, but relies on external material elements, and develops throughout the history of the relationship between the human being and technical artifacts. Among its exponents are linguists, philosophers, psychologists, anthropologists, archeologists and scholars from many other disciplines (see Wittgenstein, 1968; Vygotsky, 1987; Leroi-Gourhan, 1993; Whorf, 2012; Ihde and Malafouris, 2019).

From this point of view, the rational, discursive, systematic and almost syllogistic character attributed to thought, far from being something universal, is the result of the relationship of human beings with articulated language, syllabic writing, printing press (book diffusion) and many other technologies.

Although not unique, language, in its material (phonic) aspect, is considered by many thinkers to be the most important technical supplement for the phylogenetic and ontogenetic development of the human being. For example, Vygotsky and Luria (1993) showed how the child's preverbal thinking functions in ways that are structurally different from those of the adult. The preverbal cognition modalities, observed in some primates and in some people with language disorders, are based on perceptual, tactile and mainly operational ways of processing experience, which have little to do with the reflective, detached and to some extent more analytical thinking offered by articulate language. In particular, some externalists conceive the relationship between thinking and speech as a functional and structural unit.

From a functional point of view, verbal thinking emancipates language from the communicative function that internalism has assigned to it. Thought and speech, two processes with separate genetic roots, come together during ontogenetic development to give rise to verbal thinking (Vygotsky, 1987, p. 109). Thus, speech comes to be shaped as a process in which thought is not expressed but formed (Vygotsky, 1987, p. 110; Wittgenstein, 1968, 244).

From a structural perspective, signs, in their very materiality, are constitutive elements of human cognitive activity, an essential technical supplement to the differentiation of meanings in the indistinct continuum of preverbal thought (Vygotsky, 1987, p. 250; see also Saussure, 2011, p. 112). No wonder that for externalists, the investigation of language is a constitutive part of the investigation of thought.

In the next chapter it is shown how articulated language structures verbal thinking.

Identity of Concepts

The principle of identity (related to the frame problem) is an issue for externalists too. What guarantees communication and how can people understand their own and others' thoughts? Since the externalist approach cannot rely on a priori concepts and universal grammars, it tries to solve the problem starting from signs.

Describing linguistic entities, Saussure defines concept (or meaning) as "a quality of its phonic substance", at the same time he states that "a particular slice of sound is a quality of the concept" (Saussure, 2011, p. 103). The meaning is a property inseparable

from the *signifier* side of the sign (the acoustic or graphic image) and vice versa. This duality is constitutive of the linguistic sign. Words are not labels applied to objects and concepts already available all along. A sign without a meaning is not a sign, but an empty sound, which is distinguishable only up to a point (Vygotsky, 1987, p. 49), a meaning without a signifier is not a meaning, literally it is nothing.

Without signs articulation, the plane of content (thought) as well as the plane of expression (vocal or graphic) remain two indistinct continuums in which discrete units (words and concepts) cannot be identified.

However, in order for "an issuer or receiver to establish a semiotic relationship between two entities, it is evidently necessary that he or she can operate with each entity as that particular, determinate entity" (De Mauro 2019, p. 7 trans. by the author). Aristotle's problem is not solved yet. Linguistics in particular has long been confronted with the problem of identifying the units of speech. According to the intrinsic duality of the linguistic sign, meanings and signifiers cannot but determine themselves by delimiting each other, through participation in a common system of signs, i.e. the *langue*[5] (fig 4).

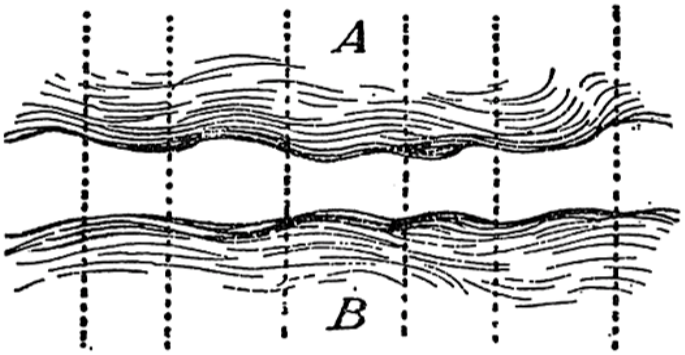

Figure 4. Divisions in the continuous and parallel planes of content and expression (Saussure, 2011, p. 112)

The picture shows the two parallel planes of content and expression (A and B); the *langue* serves as an intermediary between preverbal thought and sound. It consists of a system of reciprocal boundaries within the planes of content and expression. Thus, units are secured by differentiation. The chaotic and indistinct preverbal thought is led to specify and articulate itself according to the differentiations imposed by the *langue*.

[5] Saussure distinguishes *langage*, the faculty of articulating signs of all kinds, from *langue*, the particular sign system (i.e., Italian, English, Russian etc.) that determines speech (see in this paper, *Langage, Langue* and Speech). The idea is that *langage* is a universal faculty of human beings. Every human can develop a functional use of signs and structure preverbal thought according to a particular signs system (the mother tongue). These systems differ in the way they structure preverbal thought (as seen in fig. 2 and 3). Thus, the *langue* is neither universal, nor individual, it is a social phenomenon. Saussure says: "For language is not complete in any speaker; it exists perfectly only within a collectivity" (Saussure 2011, p. 14).

In particular, the child's thinking is initially a speech-independent process, not structured into meanings (or concepts) yet. Around the second year of age, the developmental lines of language and thought intersect, giving rise to verbal thinking, articulating preverbal thought through external signs (Vygotsky, 1987, p. 257). Even internal speech, which is often entirely identified with thought, is actually belated compared to the external manifestations of verbal thinking. According to Vygotsky, when children learn to speak, they go through an egocentric speech stage. Egocentric speech plays an essential cognitive and operational guiding function in child behavior (Vygotsky, 1987, p. 114). Over time, the manifestations of egocentric speech fade away, but its cognitive function, migrating inward, is progressively internalized. Egocentric speech becomes internal speech (verbal thinking).

To summarize, each *langue* processes its units, the signs (each composed of concept and acoustic image), establishing itself as a form between two amorphous masses (Saussure, 2011, p. 112). Thus, the identification of concepts and phonic images is guaranteed by the solidarities between signs. The *langue* system is formed of two-sided signs which oppose each other along the two planes of expression and content (fig. 5).

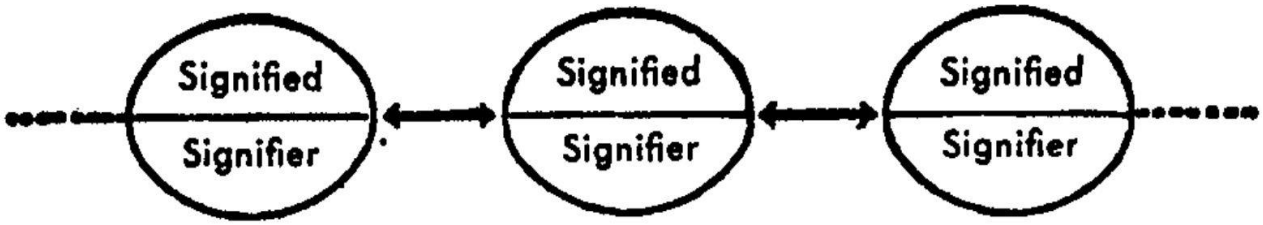

Figure 5. Bifacial signs opposing each other (Saussure, 2011, p. 115)

Signs Differentiation

Each different language (each *langue*) carves out the two planes in its own way (see fig. 1 and 2), which makes languages structurally different. Concepts occupy different positions within different systems, and the meaning (or value) of a sign varies according to the space the sign occupies within the system to which it belongs.

In Figure 1 the meanings of *blue* and *glas* partially overlap, but *glas* has a broader value since its meaning is not subdivided with other signs that delimit it, as with *blue*. A similar example can be made with grammatical morphemes. The value that in English falls on the sign *the*, in languages like Italian, is divided into many signs that articulate the semantic plane of gender and number, opposing each other: *il*, *lo*, *la*, *i*, *gli*, *le*.

The concept underlying this way of understanding thinking and speech is that of *differentiation*. The differentiations of the planes of expression and content have been studied by many disciplines and perspectives, below is an example of how meanings differentiate in language learning.

Children begin to speak by first uttering isolated words, gradually coming to articulate longer and longer chains. In mastering the signifying aspect of the *langue* they go from the part to the whole. Instead, in terms of their meaning, first words are to be

considered as whole sentences. In semantic terms, children begin with the whole, with the word-phrase, and only later they break down their thinking into a series of separate and connected verbal meanings. By analogy with the plane of expression before the arrival of language, Vygotsky (1987) describes preverbal thought as a fused, indistinct continuum (p. 250).

The child who utters "mom" for the first time, is not pointing to an object in the world, the referent of the uttered sign. The uttered word has a global and idiosyncratic meaning. The child's verbal activity has not gained the articulate and representative character (Malafouris, 2007; Montani, 2020), that is too often attributed to any activity with symbols and signs (Capone, 2020), yet. In Heidegger's (1996) words, it can be said that the children do not have a world of objects yet. Their word-phrase is uttered in conjunction with certain experiences, emotional impulses, external circumstances that are all but defined.

The subsequent meanings acquired by children constitute general designations. They are likely to learn the particular word *rose* at a very early age and to use it in a general way for any situation that evokes it, in the way *flower* is used (Vygotsky, 1987, p. 163), but also for many other situations related to the experiences that surrounded that word (that provided the background for the emergence of that meaning), such as a scent or a day outdoors, not necessarily involved with flowers.

Experiences, feelings, objects, and sensations are held together by words in changing and heterogeneous ways. With time and practice, the child will learn new words, begin to differentiate their concepts, and order the semantic plane accordingly.

Preliminary Conclusions

The literature on the conflicting relationship between externalism and internalism is extensive. The purpose of this paper touches this issue only tangentially. The goal is to investigate, from a practical perspective, whether an operationalization of language based on externalist assumptions can prove better than the internalist approaches in replicating verbal thinking.

The first chapter ends with the following conclusions:

- Cognition is closely related to semiotic activity (articulation of signals and meanings);
- Semiotic activity is based on the differential relations between the signs of a language system (*langue*) and not on the formulation of a deep structure of rules;
- The modeling and reproduction of cognition cannot be separated from a thorough understanding of the language system in which it develops.

In the next chapters, through an examination of the most recent advances in NLP (Natural Language Processing), the legitimacy of the externalist paradigm will be confirmed.

HOW TO REPRESENT LANGUAGES

The current state-of-the-art NLP systems are the gateway for the modeling and reproduction of verbal thinking, by implementing networks capable of solving heterogeneous assignments. In order to do so, they exploit the semantics of the language

systems (*langue*). The hypothesis of this chapter is that the implementation, or rather the training of these networks, is carried out consistently with the externalist paradigm.

Before illustrating the relationship between AI and externalism, it is necessary to clarify the terms of the issue at hand.

Deep Neural Networks

AI is a broad discipline with a very ramified, albeit short, history. The following pages focus solely on deep neural networks (DNNs), the most common subset of artificial intelligence systems currently in use. DNNs are machine learning systems that spread after the failures of rule-based systems (Russell and Norvig, 2021, paragraph 1.3.3).

Although the name may suggest a closeness to cognitive science and neuroscience, the comparison between computational and biological neurons is improper. Neural networks are in no way brain models; it is more correct to imagine a neural network as a large parametric function in the form of a computational graph (fig. 6).

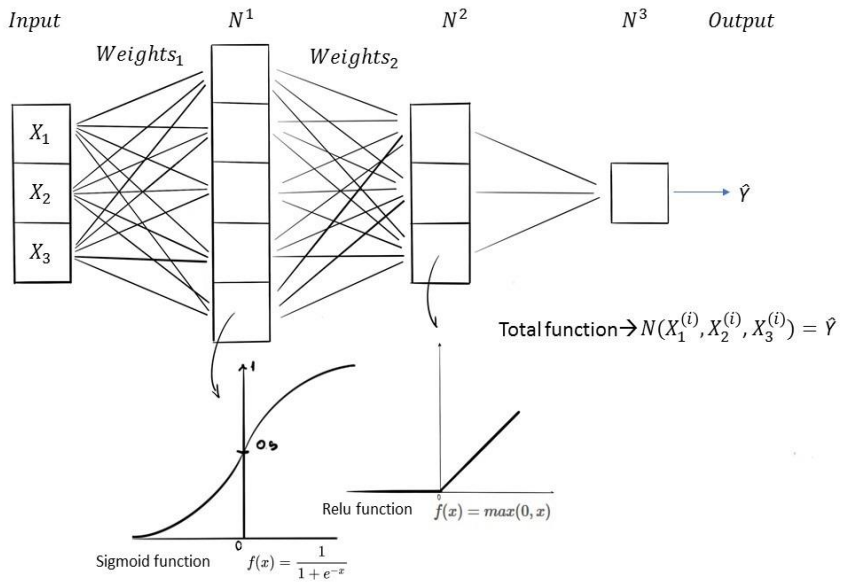

Figure 6. Graphical representation of a neural network with two examples of activation functions

The network is formed by Input, Output and inner layers. The inner layers are composed by neurons and weights (or parameters). The neurons are basically activation functions, they are the invariable part which composes the function that is the network. The parameters, placed before each layer of neurons, are the variable part of the function, these are the values that are learned by the network during training. The idea

behind DNNs is that a large enough network (function) is likely to be able to represent any distribution of data.

DNNs can perform two types of tasks: regression and classification (fig. 7). Regression interpolates missing data based on given features. For example, taking as input a house's square footage, position and year of construction, the network can predict its price. Also, starting from pictures of dogs and cats, it can classify the pictures according to the represented animal. Everything that a neural network can do, must be done by means of these two techniques.

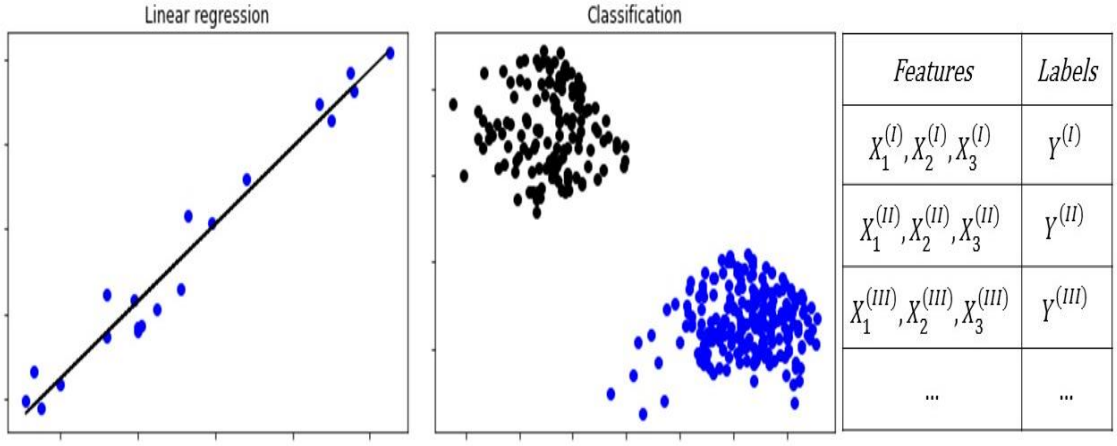

Figure 7. Linear regression and clustering of some random points

The network training process requires features (house features, images), and correct outputs (prices, image labels), all properly represented in numerical form. The network parameters are initially implemented with random values. The inputs are multiplied by weights in order to give each input feature a specific value for prediction purposes. The weighted features are then passed through the neurons layer, the process is repeated for each layer all the way to the output layer. The error of the predictions made in the training phase is calculated by comparison with the correct labels, the weights are modified accordingly (fig. 8). After several training cycles the weights of the network should be such that the operations between input, weights and neurons will result in the corresponding output.

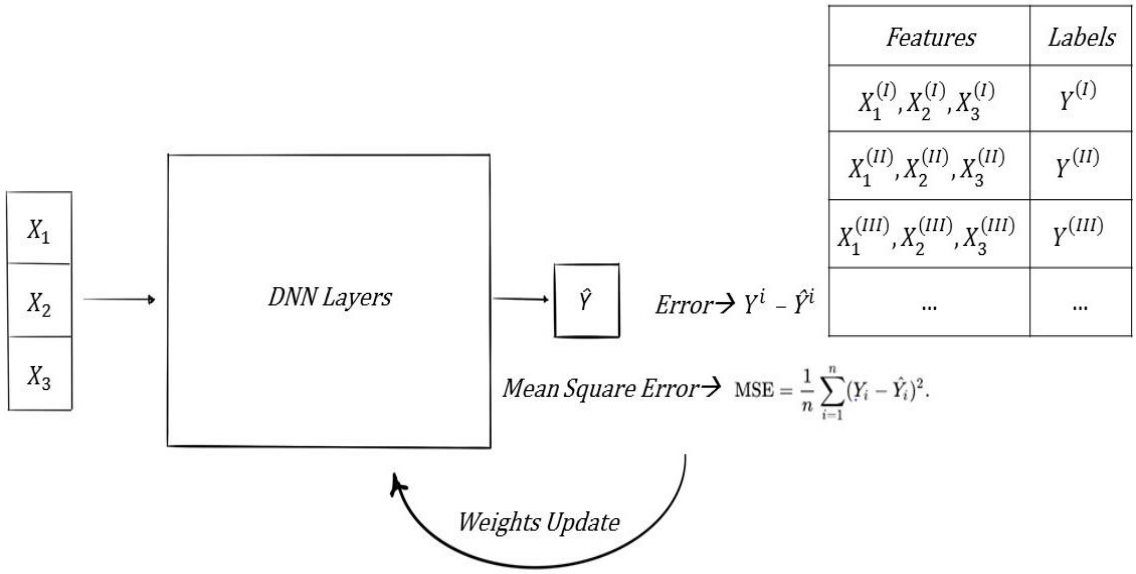

Figure 8. Example of a train cycle

If the weights are correctly calculated, the network will be able to predict the output of instances that were not in the train set. Briefly, during training, the inputs and the results of the function are available, but not the parameters (set randomly and corrected at each cycle). During prediction, the inputs and parameters are available, but not the output.

Clearly, such a tool has nothing to do with the mind, nor with supposed universal grammars. The first issue posed by the operationalization of verbal thinking is a problem of input representation; the second is how regression or classification might serve the purpose.

The Saussurian linguistics answers both these issues.

Langage, *Langue* and Speech[6]

Modeling verbal thought is mainly a problem of representation. The internalist paradigm has kept alive a very old tradition of language representation based on two categories of elements: lexicon and grammar rules. The modern internalist contribution has been to assume a universal grammar behind the grammar rules of each language (Chomsky, 1988, p. 61) and a set of semantic primitives from which the lexicon derives (Wierzbicka, 1996, p. 13**;** see also Osgood and Sebeok, 1954, p. 127).

Recent advances in NLP has definitively proven the impracticality of such a representation. Grammar is an *a posteriori* construction, the result of a reflexive relationship with speech, rather than a structure of rules that governs language. Similarly, the lexicon descends from a long work of differentiation within the speech (on the planes of expression and content) carried out by verbal thought. The externalist

[6] The English edition of the Course in General Linguistics does not help to understand Saussure's terminological distinctions. The paper presents the reading of De Mauro, editor of the French and Italian critical editions.

proposal aims to outline, within language, only those phenomena relevant to semiotic activity, and to represent them without relying on universal internal structures.

The term *language* conceals an ambiguity: language is "a confused mass of heterogeneous and unrelated things" (Saussure, 2011, p. 9), the study of which involves many different disciplines, comprising various orders of problems. It is not possible to study semantics or verbal thought starting from language as a whole. Saussure proposes as the object of study the *langue* (the particular system of signs, i.e. Italian, English, Russian etc.)[7] as distinct from language (*langage*), conceived as the faculty of articulating signs in general (the confused mass of things). The *langue* is defined as the essential part of language, its social product, "is a self-contained whole and a principle of classification" (Saussure, 2011, pp. 9–11). The *langue* is the system of reciprocal delimitations on the levels of content and expression, and as such it does not exist entirely in any individual, it is a social phenomenon resulting from the acts of speech of all the users. It is a treasure stored in the practice of the subjects of a community of speakers. The *speech* actualizes the signs of a language system by articulating them within syntagms (sentences). The relationships between signs within syntagms are what determine individuals' learning of the structure of the language system, both expressive forms and contents. In turn, the mechanism of *langue* relies on these relationships in forming syntagms.

It is these relations, or regularities, that the network must take into account when representing the system of signs, rather than ontologies or taxonomies of concepts.

The Signs System Mechanism

In the previous section, the oppositional relations between signs, at the foundation of the language system, have been mentioned. It is now necessary to understand how these relations can be described. This is crucial to understand how a language system can be implemented through a neural network.

In speech, signs are articulated according to two types of regularity, each of which produces a certain order of values (Saussure, 2011, p. 122–127). The relations between signs based on the linear structure of speech are called syntagmatic relations or *in presentia* relations. The position of signs within the syntagm implies a relation of similarity or dissimilarity between alternative signs, which are eligible to occupy the same position. Similarly, neighboring signs, in a dissimilarity relationship, still entertain a relevant relation for the purpose of ordering the language system (fig 9).

[7] *Langue*, language system and system of signs will be used as synonyms.

The	cat	lies	on	the	bed
The	dog	jumped	over	the	fence
The	car	drove	down	the	road
His	son	lives	in	the	UK

Figure 9. Syntagmatic relation within 3 sentences

Within language systems, similarity is not based on positive qualities of the signs, but only on their mutual opposition within the system. From this point of view, similarity and dissimilarity are two sides of the same coin. The signs *cat* and *dog*, though having different meanings, are in a sense similar (more similar compared to *car*, for example), occupying the same position within a syntagmatic chain, and relating to the same types of signs (similar signs). On the other hand, signs considered individually entertain associative relationships (or *in absentia*) with other signs of the system (fig. 10). These relationships can be morphological (*teacher*, *teaching*, *teachable*), or they can be consistent with the semantic aspect (*teach*, *class*, *degree*).

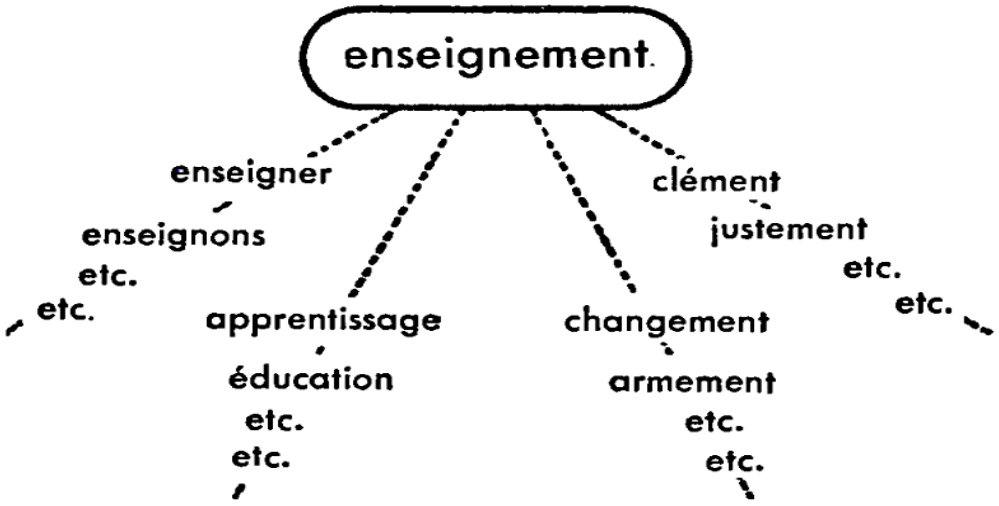

Figure 10. Associative relations (Saussure, 2011, p. 126)

Although in-presentia relations seem to prioritize syntactic features of the syntagm, this regularity may also reveal certain semantic properties. Within the sentence: "I am very sick, call a doctor", the word *doctor* cannot be appropriately replaced by any given word, it can be replaced by *nurse*, maybe by *priest*, hardly by *architect*; even if the sentence would be grammatically correct.

The example is even clearer in commonly used stereotyped expressions such as: "break a leg", "force the hand", "it takes a village", in which the relationships between signs depend on the precise meaning (one could say use) that these sentences have in the speech. In the language system, the distinction between semantic and syntax is not defined as it appears to those who rely on a grammatical (internalist) principle of language analysis, nor does it precede the formulation of full-sense propositions.

Sense and Meaning

To make the explanation of the functioning of the language system clearer, it is necessary to introduce the distinction between sense and meaning.

The meaning of a sign can be imagined as a differential zone in the plane (or space) of the content (De Mauro, 2019, p. 100). There cannot be an isolated meaning but only a system of meanings, of reciprocal delimitations (fig. 2 and 5). These delimitations are expressed by the syntagmatic and associative relations between signs. The meaning, consistently with its formal and systemic characters, is the form, or scheme, or rule of realization of a sense. De Mauro defines meaning as "the class to which a sense belongs" (De Mauro, 2019, p. 19, trans. by the author). The meaning of dog (a well-known animal, De Mauro, 2019, p. 186) can actualize into concrete utterances a potentially countless amount of unpredictable contingent senses through relations with other signs in a syntagm. Instead, sense is defined as "what in a particular moment, by a particular user, is indicated with a signal" (De Mauro, 2019, p. 7), the concrete actualization of a meaning in speech.

In order to manage the complexity of language systems, and not to limit itself to fixed representations of concepts, the language model must take into account this mobility of the sense within the general pattern of use of a word, the meaning (this problem is addressed in the section called Language Models).

DNNs AND LANGUE – WORD EMBEDDINGS

The main problem of language modeling with DNNs is the representation of inputs and the identification of an output that allows the network to learn parameters such that it can formulate correct and relevant propositions, categorize texts, summarize them, and complete tasks related to verbal thinking.

The first thing to do, in order to follow the externalist program, is to implement a model of the language system, i.e., a model of the differential space in which signs are opposed. Word2Vec was the first algorithm able to apply an externalist paradigm to NLP (Mikolov, Chen et al. 2013)

The network model is the same as illustrated in figure 6. The network's inputs consist of corpora (typically Wikipedia and BookCorpus). From these texts a vocabulary of words (tokens) known by the network is formed. Based on the vocabulary, the network can identify words as units within the text, but not their meanings yet.

Meaning, lacking positive properties, depends on syntagmatic and paradigmatic relations between signs within the text (meaning is a differential entity). These

relationships establish the value of signs within the language system, determining their mutual similarities and dissimilarities, according to different orders of relationships (Mikolov, Chen et al. 2013). The network needs to model its content plane based on these relationships; to do this it relies on classification, trying to predict hidden words in the training corpora (in this case, the vocabulary tokens function as categories for the prediction).

It is possible to represent (with some approximation) the content plane as a homogeneous *n*-dimensional space. A *n* elements vector[8] (or, as called by Mikolov, Chen et al. (2013), a *word embedding*), initialized with random numbers, is assigned to each vocabulary token. These *n* elements correspond to values in the various dimensions of the *n*-dimensional space for each token. Each token has its own place within this space (fig. 11). The mutual disposition of tokens in the space determines their meanings, providing a model of the language system.

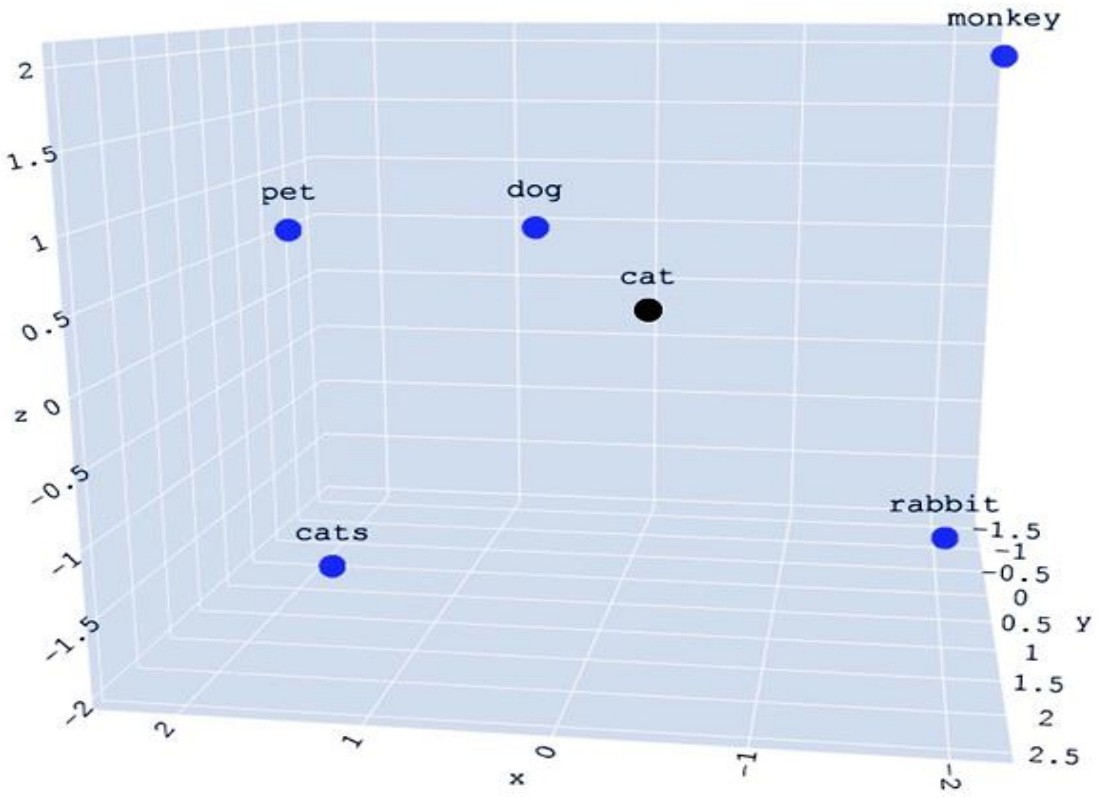

Figure 11. The five "cat's" nearest neighbor tokens. The 300 value vectors corresponding to the tokens have been reduced to 3 dimensions by PCA (Principal Component Analysis).

[8] A vector is a data structure, consisting of an array of numbers. In the case of Word2Vec it usually consists of 300 values.

The training can be described as follows. The network processes the text one batch of words at a time. At each step the network tries to predict the target word (the batch's central token) based on the tokens surrounding it (the context). In the example (fig. 12) the network takes in a 3-token batch (usually wider), the embeddings of the first and third tokens constitute the input, the vector of the second token is the output to be predicted. The output of the network is a *n* dimensional vector (a word embedding), this embedding is confronted with the vocabulary tokens' embeddings to make a prediction (basically the network classifies the hidden token as a specimen of a vocabulary token). Afterward, the predicted token is compared to the target token and the error is computed. Thus, the word embeddings are modified accordingly. At the end of training, the token disposition should reflect the word distribution in the training corpora[9].

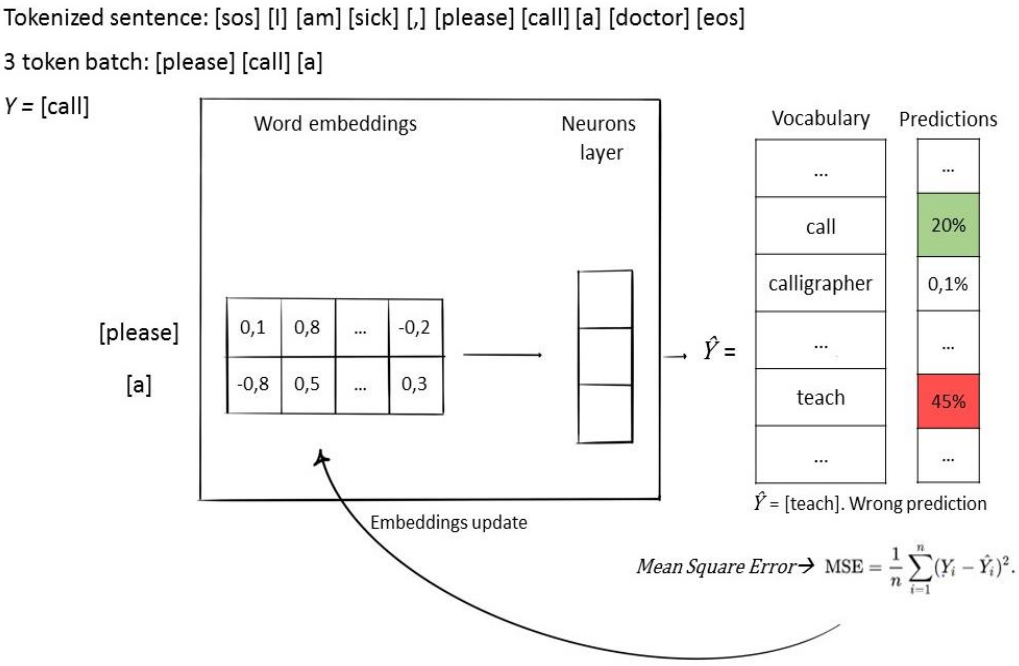

Figure 12. Word2Vec training ([sos] and [eos] stand for start and end of sequence).

In the example the network must predict the embedding for *call*, based on the context tokens. However, other embeddings with similar meaning are likely to occupy a neighboring space to that of the target token in the *n*-dimension space (fig. 13). The output embedding should be as close as possible to that of the target word.

[9] This training method is called CBOW (continuous bag of words). It is not the only possible method, usually several methods are used together (in the case of Word2Vec, SkipGram is also used). What is important is that all these methods are based on the analysis of the distribution of words in the corpora, representing syntagmatic relations between contiguous signs and paradigmatic relations between signs that are likely to occupy the same position within similar contexts.

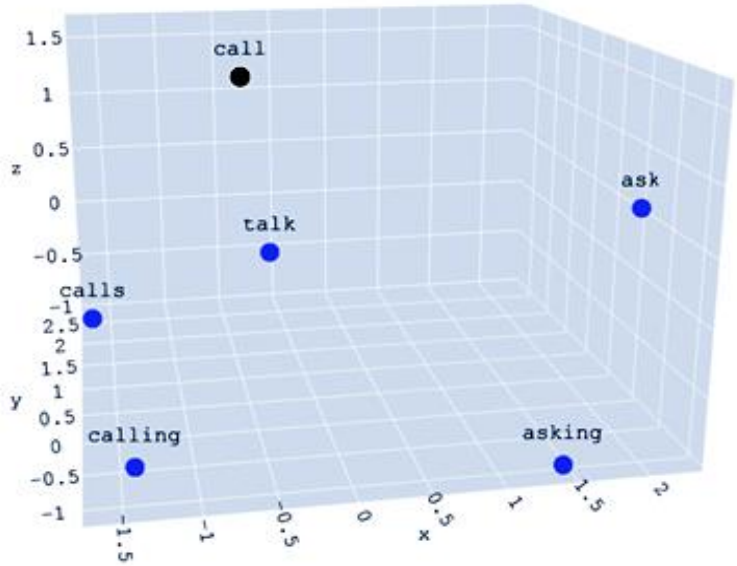

Figure 13. Five nearest neighbors for the token “call”

The most impressive result is that, once trained, word vectors show to represent general relationships between concepts. Mikolov, Yin et al. (2013) report a couple of examples. Pairs of tokens which stand with each other in an analogous semantic relation are found grouped in the same way within the vector space (fig. 14).

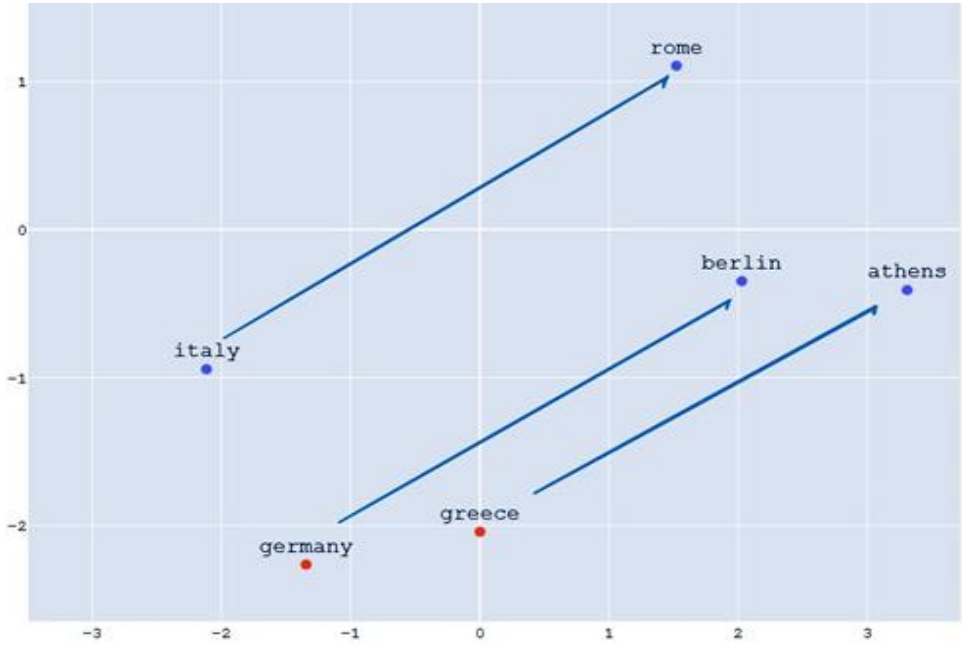

Figure 14. Grouping of states and capitals tokens

It is also possible to obtain meaningful results through operations between vectors. In the example of Mikolov, Yih et al. (2013), the vector *man* is subtracted from the vector *king*, then the vector *woman* is added. The result is an embedding very close to the vector corresponding to the *queen* token (fig. 15).

```
result = model.most_similar(positive=['woman', 'king'],
                            negative =['man'], topn=1)
print(result)
```

```
[('queen', 0.7698541283607483)]
```

Figure 15. A line of code reproducing the "king/queen experiment"

Another interesting application is sentiment analysis. Through the word embedding algorithm it is possible to train a network to recognize the emotional polarity of a text by simply giving in input texts and labels that indicate the polarity. Once the embeddings are computed, the network can estimate the emotional polarity of a text. Similar training is used for text classification, using topics as labels.

Despite its interesting applications, Word2Vec it is simply a DNN that, based on a specific task, calculates a series of embeddings whose application is limited to the task on which they were computed. Furthermore, the embeddings are static, in prediction phase each word will always correspond to the same embedding regardless of the context of occurrence. The network merely computes a weighted average of the distribution of words within the training text, something very similar to an average of the usages, or better, of the relations between signs in the corpus.

In a nutshell, Word2Vec computes an approximation of the content plane, leaving out entirely the problem of *sense*, i.e. the concrete actualization of word meanings in syntagms.

Two problems to be solved:

- The embeddings contextuality, an essential factor to determine the sense of a token (and of a syntagm),
- Model generality, i.e., the implementation of a LM (Language Model) capable of generating contextual embeddings that can be used for any task.

The Transformer model addresses these problems from an externalist perspective.

Language Models

The current state of the art in NLP is dominated by LMs based on transformer, the DNN architecture that exploits the algorithm called Attention Mechanism (Vaswani et al., 2017), for the representation of words contextual meaning[10]. This section focuses

[10] Chomsky has recently been critical in discussing NLP applications of deep neural networks, https://www.youtube.com/watch?v=ndwIZPBs8Y4 .

only on Bert (Bidirectional Encoder Representations from Transformers), a particular model that exploits the transformer architecture (Delvin et al., 2019). Bert is a reduction of the standard transformer model, which is specialized in natural language encoding.

In order to provide contextual meaning (sense) representations, it is necessary for the network to take into account the wide variety of contexts in which a token may occur and a very large context within the syntagmatic chain (not just neighboring signs as with Word2Vec). The embeddings' contextuality also solves the problem of the model's generality, as its embeddings will no longer be task-oriented but re-computed at each prediction according to the task at hand. In addition, Bert provides a better integration between content and expression planes. Instead of using word tokens, it uses word-piece tokens (similar to morphemes, extracted from corpora thanks to a special algorithm). This makes the vocabulary less redundant, provides better handling for compound words and allows prediction of unknown words meaning based on context (fig. 16).

```
tokenizer = BertTokenizer.from_pretrained("bert-base-uncased")
print(tokenizer.tokenize("transubstantiation is a difficult word"))
```

```
['trans', '##ub', '##stan', '##tia', '##tion', 'is', 'a', 'difficult', 'word']
```

Figure 16. Bert model tokenizer

The transformer architecture is at the heart of many downloadable pre-trained models. Usually they consist of a word-pieces vocabulary with its static embeddings, plus a set of heads and layers. These are sets of parameters, trained by the model's developer, through which the network computes the contextual embeddings (fig. 17). Their training is similar to that of Word2Vec.

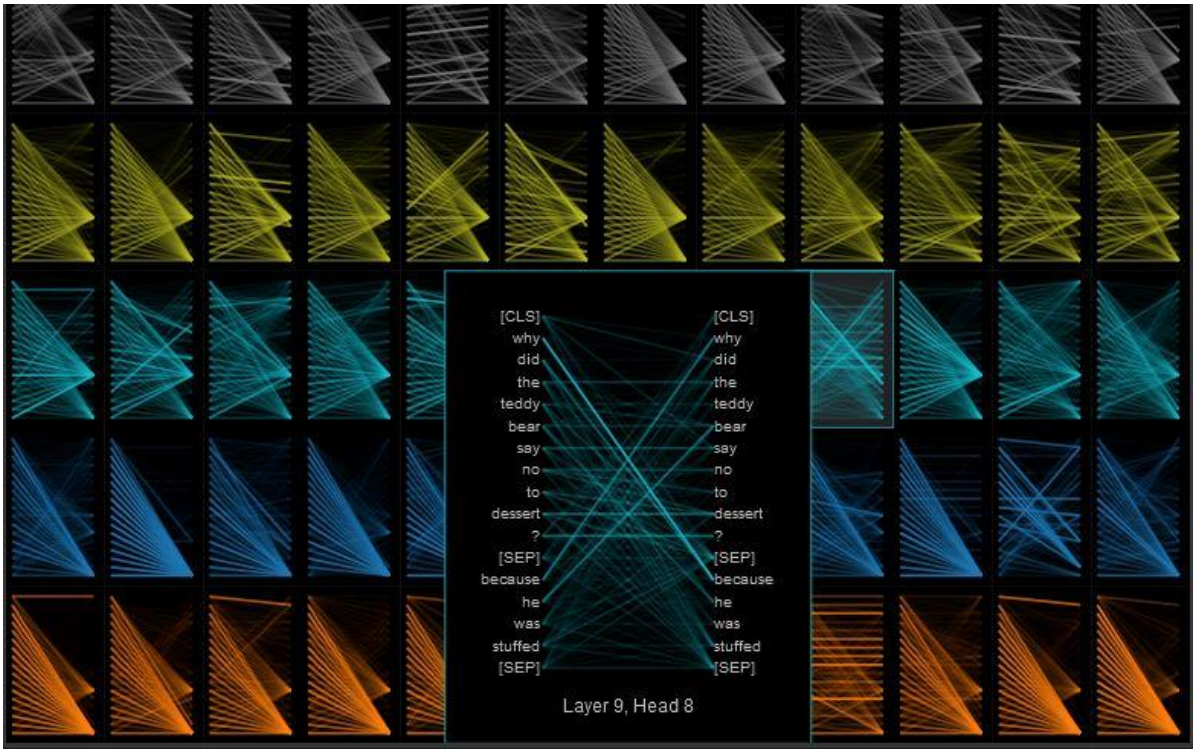

Figure 17. The last five layer of Bert model (12 head x 12 layer) processing a sequence of two sentences. In the box, the detail of head 8 processing at layer 9. At this point the network highlights the links between "why" and "because", as well as "he" and "bear". Picture obtained with BertViz (Vig, 2019).

The process of contextual embedding computation (encoding) works as follows (fig. 18). A long sequence of text is processed. The Bert model (Delvin et al., 2019) for instance, can process up to 512 tokens at time, representing each token with a 768 elements embedding. At first, a positional and a sequential embedding are added to the static embedding of each token, to incorporate information about its position in the sequence. Afterward, the embeddings sequence is processed on each head in parallel starting from layer zero. In the following layers, along each head, the embeddings of the sequence undergo several calculations and are multiplicated by each other[11], so that the vector of each token represents information about the context in which it occurs. This generates a set of partial embeddings per head. Partial embeddings pass through all the layers of their respective head, multiplying by each other at each layer. At the end of the

[11] This is not a simple multiplication. In each layer, based on the input embedding of each token, three indices (vectors) are calculated: Query (Q), Key (K) and Value (V). The network calculates the "score" of each token with respect to each other in the examined chain (in the batch of tokens). This score is calculated through a complex matrix operation in which the dot product between all vectors K and each vector Q is divided by the square roots of the dimensionality of K. A softmax function is applied to the resulting vectors, they are multiplied by the vectors V and the resulting vectors are added together. In this way a score is obtained for each token in the batch. However, it is not necessary to go into the details of these operations for the purpose of this paper.

layers, all the partial embeddings of all the heads are merged to form the actual contextual embeddings.

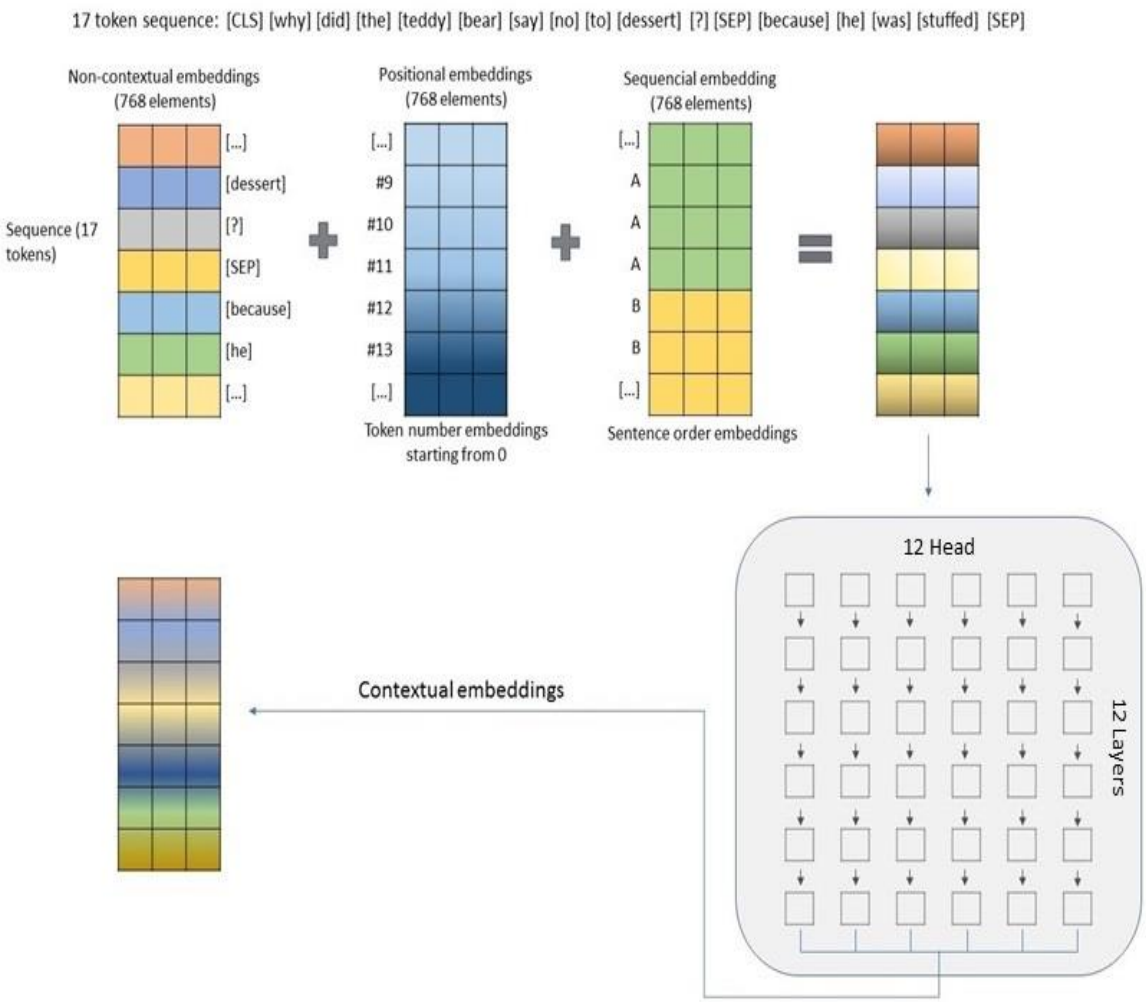

Figure 18. Contextual embeddings computation

Having different parameters, each head processes the input differently, highlighting certain relationships between signs and ignoring others (fig. 19).

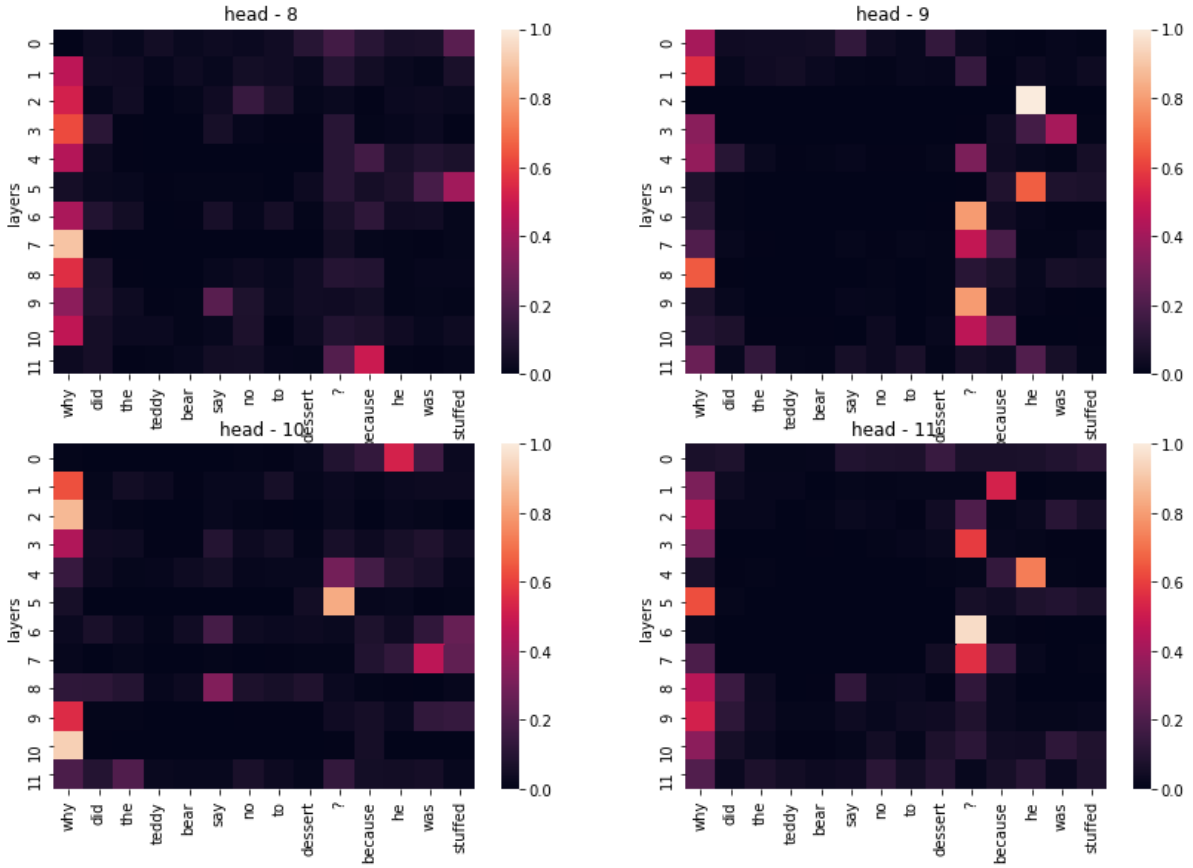

Figure 19. Heatmap of the attention of heads 8,9,10,11 related to the token “because”

Afterward, the contextual embeddings can be processed by a simple multilayer perceptron (a simple neural network) for specific tasks, but there is more. The ability to predict unknown tokens by relying on contextual embeddings makes these models’ performances in Cloze test questions and zero-shot classification tasks (text classification without training) worthy of notice. These tasks give an idea of what these models *know*. Two examples follow.

Masked Language Modeling Question Answering

It is possible to ask questions to a non-fine-tuned LM as long as they are formulated in the form of a text to be completed (Cloze Test) (Schick and Schütze, 2021). The network will simply estimate the missing word following the syntagmatic and associative relations learnt during training (fig. 20).

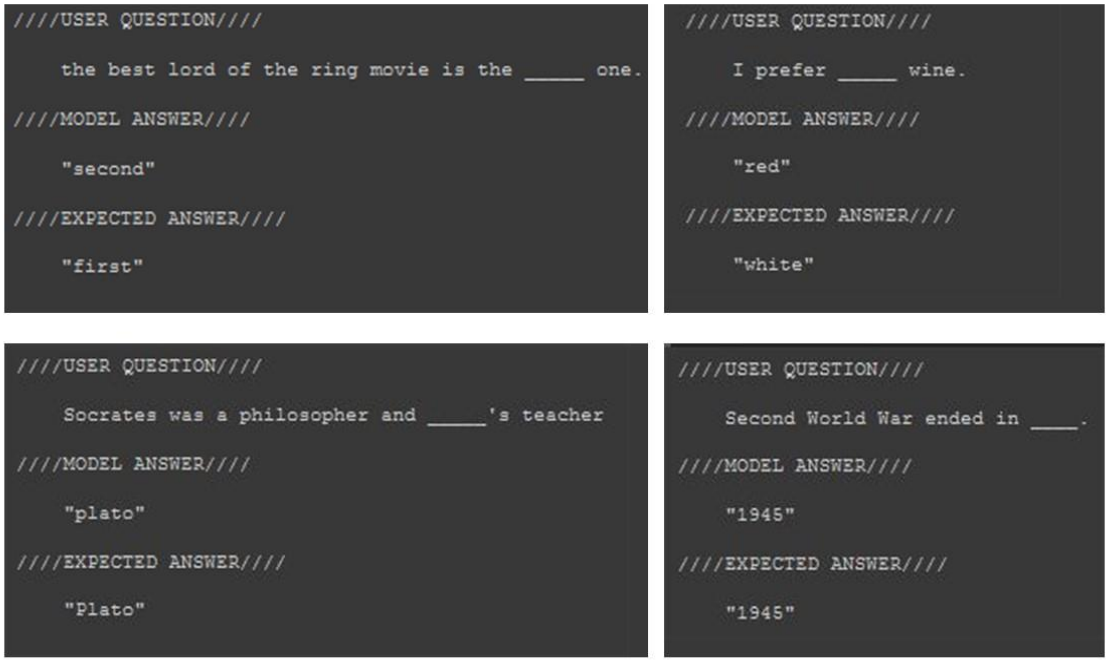

Figure 20. "Personal taste" and general culture answers from Bert model

Since it is a non-fine-tuned model, it will not be possible to get overly precise answers. Furthermore, in this example the network has a limited context (few words) to predict the desired answer. However, the answers obtainable through general knowledge questions are of interest, considering that the model does not make use of the Internet or any database from which to extract answers. The only resources available to the network are the vocabulary, and the parameters.

Zero-Shot Classification

A very useful task in NLP is text classification. Traditionally, a classifier was trained through texts labelled according to relevant categories to be predicted. These models were not general but task-oriented (and topic-oriented). In contrast, a zero-shot model is a model that, without any prior topic-oriented training, must be able to predict to which of the user-provided categories a text belongs.

A hypothetical user may need to know what has been tweeted about in the last month. By providing tweets and desired categories as input, the model will categorize all posts automatically (fig. 21).

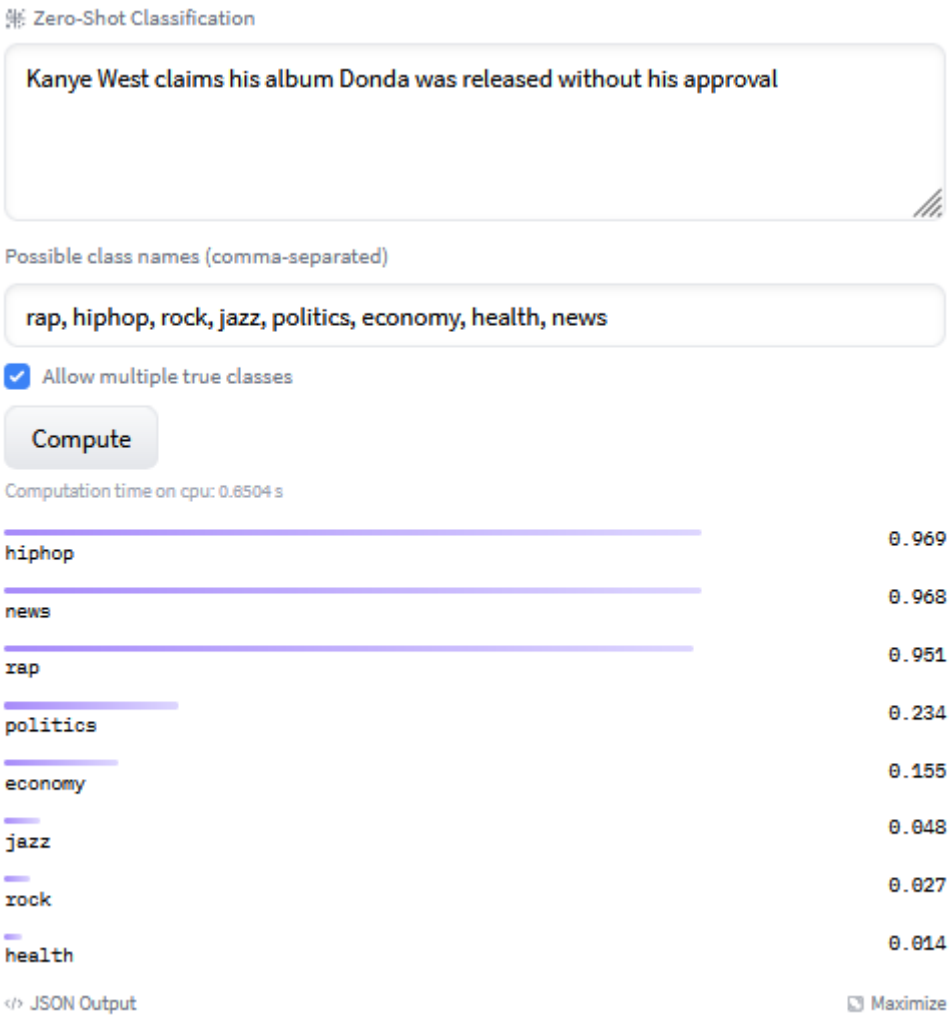

Figure 21. Screenshot of the huggingface API[12] running the Yin et al (2019) LM for zero-shot classification. The model is processing a 30th August 2021 BBC tweet[13]. The classes are chosen by the author. It appears that Bert knows Kanye West.

The training of this specific model is more complex. The model is trained on pairs of propositions labelled as mutually entailed or non-entailed. This training method is called Entailment Model Training (Yin et al., 2019). However, the relationships between tokens are still at the basis of the model's cognitive capabilities in this training.

The most interesting applications remain those involving a dialogue between user and machine. There are several platforms where people without coding skills can interact with these models. Apart from the *huggingface API* mentioned above, *AI*

[12] https://huggingface.co/facebook/bart-large-mnli
[13] https://twitter.com/BBCWorld/status/1432341614962356224

Dungeon[14] is a role-playing platform managed by a transformer model, and *Eleuther AI*[15] is a *text2text* LM that produces sentences based on a prompt provided by the user.

CONCLUSION

The success of the externalist approach to NLP proves the validity of the structural conception of language as a differential system of signs. On the other hand, from a functional point of view, the use of signs for the accomplishment of tasks by LM demonstrates that sign systems are not merely a communicative tool, but a mediating interface necessary for verbal thought and its replication.

In this chapter, the language system representation proposed by Saussure was compared with the LM provided by the transformer architecture. The following points were established:

- Word embeddings are able to differentiate meanings within a continuous *n*-dimensional space, providing a good structural representation of *langue*.

- The transformer architecture can model a system of meanings and take into account (to a certain extent) the difference between sense and meaning in the execution of tasks.

- Contextual meaning representations of tokens can be used by the network to generalize certain semantic relations and eventually reproduce verbal thinking features.

The direction taken by the research seems promising, but the full replication of verbal thinking is still a long way off. It is clear, however, that the progress of AI is closely linked to language and semiosis, understood as the technical activities of operating with signs.

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[14] https://play.aidungeon.io/main/about
[15] https://6b.eleuther.ai/

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Research article

Promethean Shame as the Hidden *Instrumentum Redemptionis Humanae*

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Abstract

This article draws on the terminology of Günther Anders to identify three different forms of crisis in contemporary society: the crisis of freedom, the crisis of humanity as subject of history, and the crisis of shame. The article is composed of three different sections. The first section analyses Anders' early anthropological works to show how freedom has turned into its own negation. The second section examines the other two types of crisis revolving around Anders' notion of Promethean shame and techné. Building on these discussions, the final section offers an open suggestion for re-thinking the possibility of redeeming human action within the technological determinism of our epoch via an Andersian-inspired hypothesis.

Keywords: Günter Anders; *Techne*; Promethean shame; Humanity; Machine

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Special Topic:
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Спецвыпуск
“Техника как язык: понимание и действие в техническом мировоззрении”

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Научная статья

Стыд Прометея как скрытый *инструмент человеческого искупления*

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Аннотация
В данной статье используется терминология Гюнтера Андерса для определения трех различных форм кризиса в современном обществе: кризис свободы, кризис человечества как субъекта истории и кризис стыда. Статья состоит из трех разделов. В первом разделе анализируются ранние антропологические работы Андерса, чтобы показать, как свобода превратилась в собственное отрицание. Во втором разделе исследуются два других типа кризисов, связанных с представлениями Андерса о стыде Прометея и технике. Основываясь на этих обсуждениях, последний раздел предлагает переосмыслить возможность искупления человеческих действий в рамках технологического детерминизма нашей эпохи с помощью гипотезы, вдохновленной Андерсом.

Ключевые слова: Гюнтер Андерс; *Techne*; Стыд Прометея; Человечество; Машина

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I

In *Pathologie de la liberté* Anders wrote "artificiality is humanity's nature and its essence is instability" (Anders, 2015, p. 55). Such definition entails what a human is: "its freedom before the world, the fact that it is cut out for being undetermined and general" (Anders, 2015, p. 56). Anders applied this depiction of humankind to a specific sub-category of human, the nihilist.

> If the essence of man actually consists in his un-determinacy, then, in his propension towards different possibilities he determines himself through his in-determinability which cannot lead him towards a clear mode of being (Anders, 2015, p. 92).

The identity of humanity consists in its not having one; and that humanity is merely an enlarged portrait of a singular human being which is as trustful as it is exaggerating. Humanity thus lives the paradoxical experience of freedom, exactly because it finds itself free, it later ends up discovering itself as not-free, as contingent in a twofold perspective: on the one hand, "it is condemned to itself, it is not auto-produced" (Anders, 2015, p. 57), on the other hand, it sees itself as a somebody which nonetheless is itself (somebody that did not choose to become), as a someone "that is exactly as it is (although it could be different)" (Anders, 2015, p. 58). In other words, humans cannot see themselves as responsible for their own origin and yet they still need to identify themselves with it. This discovery of humanity's two-folded contingency – which Anders calls the 'shock of contingency' – does not diminish when humans deal with the world because at this point the shock of contingency is encountered in everything and everywhere.

'Contingent' has a twofold meaning: 1) the lack of an ultimate meaning; 2) the paradoxical situation according to which humanity, exactly because it is capable of exerting its freedom, discovers that it has impassable limits; even if it manifests itself as free, humanity is not determined by itself which means that it is ultimately un-free. The limits of humanity's freedom emerge when it realises that it is bound to the natural world since humanity is not a product of its own freedom. The possibility of experiencing the shock in every moment of life epitomises the "perfect extraneity existing between humans and world, a person can be anything because she is contingent to herself as much as she is a stranger to any part of the world" (Anders, 2015, p. 60). In the case of the nihilist, this shock would produce at least three reactions, of which the most radical one is suicide. Before suicide come disgust for oneself and shame for oneself. Humans are surprised and ashamed:

> exactly when they undertake the realisation that they are not self-caused, they feel, for the first time, that they come from something that is not from themselves: the estranged, irrevocable, transcendent past of their origin. Thus, the shame is, most of all, shame of one's origin (Anders, 2015, p. 67).

The shame is not a simply emotional condition but a reflective act of self-identification that fails because the 'I' identifies and, at the same time, does not identify with itself. The contingency of this constant failure of self-identification exists in two

dimensions: the contingency of time and the contingency of space. The capacity of abstracting the present situation that humans possess reveals, again, their contingency, their lack of freedom, and the fact that their lives are limited from birth and death. Through the forms of space and time, humans grasp the superiority of the world in so far as they are not the ones who put the basis for representing the totality of existence, but the world is. Nihilistic humans try to overcome such inferiority through their 'will of power' ("they must possess everything") (Anders, 2015, p. 76) or, in other words, through the omnipresence in both time and space. Nietzsche's motto: "if there were gods, how could I stand not to be a god!*"* (Nietzsche, 2017, p. 65) constitutes the definitive formulation of this painful human condition.

Anders counters the nihilist, whose anti-historic life is characterised by the constant repetition of the endless cycle of contingency, with the ideal type of the historic person who "takes upon herself the burden of her identification" (Anders, 2015, p. 92) and tries to come to terms with her origin. The historic person finds a minimum substratum of self-identity through the application of a Cartesian mnemonic method: I remember; therefore, I am me. In the identification with the 'past I', the memory is inserted in concrete living situations, the 'I' of the historic person appropriates itself of such life ('I am me' becomes 'I am this life'). "She overcomes the contingency of her own existence through the necessity of her history" (Liessmann, 2002, p. 43). The historic person, by remembering what she has done in the past, dissipates her contingency by identifying herself with the person she was, and no longer feels estranged to herself. This respect towards the past replaces shame; the historic person always finds herself in a context of identification through her past and that of her ancestors.

Yet, this approach of the historic person is unconvincing because, using a renowned Hegelian expression, it turns, *a posteriori*, everything that exists into something 'rational' while the historic person herself remains contingent. It is undeniable that such person has the courage to say, 'this is mine!' to everything that happens to her, but what has become 'hers' is not truly hers since it belonged to her predecessors. The crisis of human freedom is so deep that it has resorted either into nihilism or into historicism.

Anders refutes both the nihilistic and the historical attitude since they represent a total non-identification with the contingent. Both need the identification, both rely on their theoretical reason, and both end up surrounded by antinomies which "can be resolved only by practical reason" (Anders, 2015, p. 63). The question on human's identity is not resolved through a dialectical synthesis but simply by the *praxis*, through the concepts of 'task' and 'action'. "Only the person who acts finds herself out of the horror of contingency since she does not insist on her past, but rather on the task which transforms the world" (Anders, 2015, p. 93). The example to follow, therefore, is not Hegelian but Kantian:

> the self-identification through the *Aufklärung* and the critical attitude is, according to Kant, action; for him the issue is not to observe what is reason (which for Kant equates to what man is), but to construct reason through the operation of a critique (Anders, 2015, p. 95).

This resort to action makes impossible for the philosophical anthropology to produce a positive definition of 'human'.

> What opposes the definition of man is not, therefore, something irrational, but human action, the kind of action through which man constantly defines himself and regularly determines what exists (Anders, 2015, p. 95).

And yet, can we still consider an action inscribed within a deterministic background, such as that of our modern technological world, a free action?

II

Anders did not renounce the idea of the human indeterminacy, but, in time, he dramatically changed its meaning. Human indeterminacy is no longer a sign of freedom but rather an anthropological presupposition of the new ontological condition of slavery that humanity suffers in a world dominated by the *techne*. This human indeterminacy, its artificiality, instead of being the condition for the creation of new worlds and societies freely shaped by humanity, becomes the ground from which a new determined subject emerges: the *techne*. The *techne* is binding humanity to a unique world from which humanity cannot escape, thus risking the possibility of becoming an outdated form of life. Such world would be able to proceed 'without us' and made only of "objects through which humans become superfluous, eliminable, and liquidable" (Anders, 1981, p. 199).

It is the fidelity to the concept of human indeterminacy that explains what at a first glance might look paradoxical, that Anders, the very person who saw *techne* as a means for enacting a human destiny, thus vanquishing human indeterminacy, later became one of the first and fiercest critics of technology. It is because of this indeterminacy that Anders sees how

the world created *a posteriori* by the *techne* has become so capable of

> determining' humankind that it can reverse the conditions of possibility of the human being, namely, his openness to the world (Dries, 2009, p. 76).

The *techne* acts "as a gargantuan 'instrument of determination'" (Dries, 2009, p. 76), negating the essence of humanity, which paradoxically does not exist. By adopting the perspective of negative anthropology, such outdatedness of humanity means that humanity's openness to the world is being robbed by *techne*. Thus, the reason behind Anders' attempts to "defend an invariable 'essence' of humanity against the attacks of the apparatus and the deforming force of modern technologies" (Liessmann, 2002, p. 46) arises from the fact that technology

> is definitive and irrevocable […] And this means that we, the men of today, will remain constant in our (recently acquired) 'essence'. I say, 'recently acquired', because this 'constancy' is not of course a property of our human 'nature', but an artificial situation, in which we have got ourselves, something that we were only capable of because the capacity to transform our world–no:

> not just our world, but the world–and ourselves paradoxically belongs to our 'nature' (Anders, 2007, p. 2).

Here Anders tries to put forward the thesis that technology has made such a step forward with the automatisation of the productive processes and the unleashed exploitation of nature to render superfluous humanity and outdated its faculties, to the point that humanity almost feels inadequate for the world. For Anders the upsurge of technology to totalising power is the process of overturning the relations between men and their needs, means and aims. In this new era, the means are the only source of justification of humans' needs and objectives.

If, in the *Pathologie de la liberté*, humanity was 'open to the world' and could continuously shift between sets of values, cultures, and civilisations, then, after the emergence of technology, humanity has given up its 'openness' in favour of the will to adapt to the machines. However, whereas machines are pre-determined, humans were not. Machines have become the actual producers of reality and humanity adapted to be merely *techne*'s helper, this discrepancy between the two has led humanity to its own demise for it renounces its freedom in exchange for pre-determination.

In the determination of the aprioristic indeterminacy of humanity through the *techne*, the nexus epitomised between the early anthropological character of Anders work and the critical theory of the modern technological condition of humanity; between the freedom of the products and the determinacy of humanity, which appears now moving within a world built by humanity itself with the limitations and the automatisms typical of an animal. Thus, the pivot of Anders' reflections will not remain that of a 'person-without-a-world' who, devoid of a specific world, as active subject still tend to create one that conforms to herself, but rather, that of "the nature (*das Wesen*) of *techne*" (Anders, 1992, p. 105). The *techne* is arranged as a class of entities which alienates humanity from itself. These instruments of the *techne* mediated the transformation of humanity from subject to object and eventually turned humanity into a resource to utilise. Consequentially, the human world, intended as humanity's bios emerged from its capacity to intentionally create, becomes the world of the machines through the inversion of the relation 'master-slave' between humanity and *techne*. In the world-without-people, humanity leaves its subjectivity on the stage in exchange for its material life. However, the further development of the *techne* puts this into question. The world-without-people becomes the possibility of a fully apocalyptic dimension where humanity is reduced to nothing.

The *techne* has become the subject of history and alongside *techne* we are merely 'co-historical'. Anders de-subjectifies the human being into a bureaucrat and performer of technical maxims. This new ailment represents the contradictory condition of humanity that is dominated by technology, while at the same time, is the only species, if any exists, that can occupy an independent position toward technology.

What is crucial, in this epistemological shift of paradigm, is the transformation sustained by the concept of shame. Anders gives to this new kind of shame a novel definition: first, shame is a passive act (to be ashamed of), thus implies a 'failed' relation with one's self that can never be resolved because the person who is ashamed of herself finds herself identical and non-identical to herself. Shame is hence a disturbance

of the self-identification. Second, shame contains a twofold intentionality, on the one hand, it implies the intentional object; on the other hand, it is "simultaneously turned towards an 'authority' before which the one who is ashamed feels shame. It entails a *coram*" (Anders, 2003, p. 94), that is, somebody before us. Third, it has a 'negative intentionality' in so far as it wants to escape from itself. Therefore, Anders defines shame as a passive act in which a person finds herself as what she 'is not', and yet as someone she incontrovertibly is. In its shame humanity experiences the limits of its freedom, shame demonstrates humanity's inability to determine itself in an absolutely free manner as well as its impotence over reality. Shame appears in the contradiction that exists between ability and inability. Where the 'I' encounter itself as 'it' with which it cannot identify. The 'it' of which we are ashamed of is everything that does not derive from the 'I', everything that is pre-individual, the 'ontic gift', the body, the sex, the family, and the species that one cannot decide.

If until this point the definition of shame is similar to that one examined in the first section, then Anders points out some features of this new type of shame that did not exist before. "I will provisionally call it *Promethean shame* for myself. I understand this to mean the shame when confronted by the 'humiliating' high quality of fabricated things" (Anders, 2003, p. 57). This novel shame satisfies the ontological condition common to the previous shame for it means being disturbed by the identification, but, at the same time, it implies something diverse because in this case it is the machine or technical device that is encountered as the 'it'.

The background of Anders's analysis has now changed, both humanity's freedom and historicity are denied and absorbed by the world of products. If Anders previously claimed that the nihilist was ashamed of itself for its origin, for its *natum esse*, then, in this new case it

> is ashamed about having naturally grown instead of having been made. He is ashamed because he owes his existence to the blind and uncalculated, the highly archaic process of procreation and birth (Anders, 2003, p. 58).

The Promethean shame is the emotional reaction that humanity feels for its inadequacy and inferiority. From the Promethean shame Anders derives the Promethean gap, that is, the discrepancy between the productive ability (*Herstellen*) of humanity and its capacity of imagining (*Vorstellen*) the consequences of its own producing. The expression imagining (*Vorstellen*) loses its own reason which, through its prefix (*vor*), characterised the planning anticipation proceeding the material creation of every object. Here, on the contrary, we face an inverted-platonic situation in which the realised objects come before their *eidos*; they appear before they are imagined in their own magnitude and consequences. Thus, the fundamental dilemma of our epoch is: we are inferior to ourselves; we are incapable of making an image of what we have done. In this sense we are 'inverted utopians' – while the utopians cannot produce what they imagine, we cannot imagine what we produce. For this reason, the modern person wishes to become a self-made person who

> he does not want to make himself because he can no longer tolerate anything that was not made by him, but he too no longer wants to be someone who is

> not made. He feels indignant not because he was made by others (God, gods or nature), but because he was not made at all and, as such, he is inferior to all his fabricated things (Anders, 2003, p. 59).

Every shame is a form of perturbation of identification, but in this case the 'it', with which humanity cannot identify, is not the pre-individual but the totality of the products of the technological world.

> It is the machine or technological device that is encountered as the 'it'. We are confronted with this 'it' while operating machines, a relationship in which humans have to function 'with' and 'alongside' technological objects, as 'a part' of the working machine and as such they no longer encounter themselves as a 'self'. To demarcate the 'it' that manifests in the engagement with machines from the 'it' of our previous discussion, we will call it the 'it of the technological device' (*das Apparat-Es*) (Anders, 2003, p. 108).

The Promethean shame occurs not from feeling analogous to a machine or to a piece of mechanism in a human world but rather when individuals feel 'still too-human' in a world of machines and products. In other words, it refers to the situation when humans have integrated themselves with a machine and strive to be one themselves. Humanity re-encounters its individuality only in the moment in which an obstacle precludes the completion of a job, in other words, when it cannot fully adapt to the machine, when it becomes an antagonistic force of the machine.

> The worker's individuality only become visible because it is a *negatio*. Put even more clearly, the encounter with the self is not the cause of a 'disturbance of identity'; it is the other way around. This encounter only occurs because there is an interference (Anders, 2003, p. 117).

In this case the 'I' becomes conscious and encounters itself but only in so far as it is measured by the intransigent yardstick of the machine. The 'I' sees itself not only as outdated and underdeveloped, but also as forced in an intricate relation to its body; instead of the Cartesian division of the 'I' and the 'body' (*res cogitans* and *res extensa*) which once played such a fundamental role, now the division between the 'I' and the 'it of the technological device' has lost all its significance.

> In fact, the difference has become so irrelevant that the two seem to represent one unified formation. Instead of the rift between the machine and the old residue. This residue is made up of body and self in an undifferentiated manner. (Anders, 2003, p. 118)

It is in the reality of the modern productive world that one can experience the Promethean shame which reveals the extent to which the reification of humanity has moved forward. Humans do not consider shameful being a thing, but rather, the non-

reification is condemned as a shortcoming.[16] The paradox is that humans act in accordance with their will to be reified and thus strive to adapt to the machines. They do not try to compensate this feeling of inferiority by recovering what once was considered typically human (imagination, emotions, and responsibility), they aim at suppressing their human residue through adapting to machines:

> moral demands are now also transferred from the human to the machine. What is 'due' now also becomes what one 'ought to be'. The maxim 'become who you are' is acknowledged to be the valid maxim of the machines. Human purpose in life is now limited to guaranteeing the success of this machine-maxim. (Anders, 2003, p. 71)

The innovative element of the Andersian critique is not in refuting the human adaptation because this idea damages the 'metaphysical concept' of human:

> It is not the alteration as such that we deem 'vile'. Anyone who hears in our argument a hidden, 'metaphysically conservative' voice would misunderstand its meaning. Nothing is further from my mind than assuming the position of a 'metaphysical moralist' who regards the existent as 'good'. I am not an ethicist who puts the morality of humans into the framework of what 'is as it is and must so be'. Nor am I someone who infers what is allowed and forbidden from the given order of things. (Anders, 2003, p. 77)

It is not the proclamation of an unmodifiable mode of being of humanity that Anders assumes as the meaning of 'being human', but the suspicion that the *techne* is trying to oppose human indeterminacy, its openness to freedom, by binding the former to the latter's *dictat*.

> No, the alteration of our body is not fundamentally new and vile because we are abandoning our 'morphological destiny' or transcending the assigned natural limitation of our capabilities. It is despicable, rather, because we are undergoing this transformation of the self for the sake of machines and because we employ these as blueprints and models for our own modification. We hence relinquish ourselves as humans and with this gesture we either restrict or give up our freedom. (Anders, 2003, p. 78)

For Anders such human behaviour is arrogant self-degradation and hubristic humility because "to the injury from above, to hardship, illness, ageing and death, humanity now masochistically adds a further one: self-reification" (Anders, 2003, p. 79). The object of this process of adaptation to the machine is mainly the body which is the essential reason of inferiority, in so far as it is faulty, rigid, obtuse, and "too emphatically defined to keep up with the daily changing world of machines; a world, which makes a mockery of all self-determination" (Anders, 2003, p. 67). If, the human is changeable from the point of view of social institution, then, this is not the case for

[16] In *Kafka, Pro e Contro* Anders (1951) writes as "nature becomes 'still nature' the next person becomes a mere 'thing', what seems 'inhuman' is not because of an 'animalistic' nature but because it has regressed to the function of a thing" (p. 25).

the singular individual: "my own self will stay behind unreplaced and unreplaceable" (Anders, 2003, p. 85).

To obviate the first deficiency, i.e., the lack of adaptation, humans undertake strenuous physical and spiritual exercises as well as transform their body through genetic engineering and surgery. They are "the initiation rites of the robotic age" (Anders, 2003, p. 73)[17]. A method to escape from the second shortcoming – which is at the same time an irrefutable proof of its existence – is the obsession of images, the 'icon-mania', with which humanity tries to overcome its individual unity through the reproducibility of the human image (be it by photo, video, or any other media). Images realise the link between the serial-world of the products and humanity which, through the production of icons, corrects its unbearable unicity. The growing usage of 'visualisation', in both culture and society, generates in Anders the need for an iconoclastic dialectic, of a critique as fecund as it is precarious, of the visual experience in the form of a refusal of a mass culture of images.

Among the many views on visual culture, Anders' perspective seems apparently pessimistic since it would recognise todays' global flow of images as a form of post-literary illiteracy. In Anders' view, images function as instruments of systematic stupefaction – the more they show to humanity the less they tell. Too many images exist in the world, so many that they even begin to live a strange and peculiar existence which mocks and rules their original counterpart. The media that generate such images are treated as a cognitive-emotional *a priori*. The media produce the consumeristic idiot who conforms himself to the system, the mass hermit alienated from the world, a general bourgeoise domestication, and a passive behaviour leading to an infantilisation of thought. Thus, the world would become ontologically ambiguous and one-dimensional, a phantom and a matrix. In this manner the media create the perfect illusion – the 'iper-realism of simulation' – where thoughts and actions are already preformed and scripted. Without such infinite number of images there would be nothing. Is there a way out?

III

We can picture Anders' image of humanity as clamped between technological determined defeatism and a-logical luddism. The situation is thus enclosed within a negative and hopeless picture frame where to be free one must be able to act outside the technological determinism but, for acting in such manner, one should be free. This dilemma portrayed by Anders' philosophy seems to lead to a vicious and desperate circle which offers no way out, in so far as one considers the soft totalitarianism of technology a *fait accompli*. According to this perspective even the consciousness of seeing the inevitability of technological determinism and its consequent un-freedom is already a disheartened form of privilege. It is difficult to tell whether we can solve such impasse or not, but we surely can attempt to hypothetically turn this malicious cycle

[17] As an example of this self-reification Anders mentions the use of make-up through which people renounce their organic life for the impression of looking 'industrially' made. 'Today is not the undressed body that is considered naked but rather the one that is not 'made'' (Anders, 2003, p. 64). Yet, *contra* Anders, the antiquity of such practise seems to disprove Anders' argument.

into a virtuous one by drawing some conclusions from Anders' discussion. The option of a burst of action such as a luddite destruction of machines is untenable for, unlike the luddites, we are not enraged merely because what we used to produce by hand is now made by machines. We oppose the *techne* because of the determinism entailed by the *techne* itself. If the path of action is maybe impractical, and I say maybe, then, we can consider a different option based on another fact: that is, our being still here. Considering that we, as a species, are still alive, and this is our datum, we could try to oppose the technological determinism by re-framing the object of our responsibility to an attempt to preserve and re-think the possibility of free action for as long as the Anthropocene lasts. Let us try to critically re-evaluate our dilemma by utilising a hypothesis. If we want to be responsible and freed from *techne*'s determinism, and we do, then we must postulate that what we are aiming for is somehow possible, at least inasmuch as it is possible to advocate for its possibility, because its alternative would be pure defeatism. Since the brute action is, as we said, ineffective, then, we can postulate that a dialectic opposition could be fruitful; otherwise we would remain optionless and nullify our own premise concerning the possibility of our hypothesis. Thus, we must hypothesise that there is still a residual space free from technological determinism which is inseparable from that of a logical and fruitful usage of *logos* which, however small, will have to suffice. Therefore, if we have such space, and according to our hypothesis we do, then we can admit that in such confined free space it is possible to juxtapose a theoretical possibility with a practical counterpart.

To conclude, is it still possible to call a human action a free action under techne's determinism? What insight do we gain from our description of the three crises and Anders' Promethean shame? The answers to these two questions are: 1) Yes, but not in a conventional manner. 2) A possibility – a possibility of a space in which humanity holds on to freedom before technology, a space which should not be considered defective because of its hypothetical nature, on the contrary, should be regarded as a valuable insight in so far as it tells us that there are still places in which *techne* and its determinism cannot, and maybe will never be able to, penetrate. In this sense, we can agree with Hölderlin (1990) and say that "where danger threatens that which saves from it also grows (p. 257).

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Research article

Biotechnological Agencies in our Information Society: The Emergence of Biocitizenship and Genetic Language

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Abstract

It is not uncommon to consider deoxyribonucleic acid, most commonly called DNA, as the expression of the genesis and mutation of living species. This molecule is composed of a double helix that carries genetic instructions for all known organisms and several viruses. However, in the Molecular Age, this metaphoric landmark is moved and stretched as we discover and study new structures that impact the genome. Important work is done nowadays in order to understand the consequences and causal relations that intertwine this language and the environment, in many fields such as genetic engineering, bioinformatics and genomic medicine. By giving new access to the architecture that constitutes living beings, technological artefacts and activities translate into a biological shift that opened our lives to new susceptibilities and risks, but also new rationalities and values revolving around DNA. All those technological discoveries inevitably led to a new framework in the Information Society; the Molecular Age. This paper focuses on the new agencies that are constituted in our Molecular Age. From the technology and researches revolving around DNA emerge specific modalities of action in our biosociality. Since genomic-related technologies and researches have constituted DNA as a meaningful structure of signs and symbols we are confronted with the traditional view according to which genomics is the new determinism of the 21st century. On the contrary, however, this paper shows the constitution of new forms of active empowerment based on DNA-related issues and researches. Thereby biological agencies and subjectivities arise from the constitution of a genetic biosociality that provides biocitizens and biocommunities with a discursive, ethical and technical self-understanding, and enables them to gather around the technological and informational meanings that this new knowledge has opened.

Keywords: Biosociality; Biocitizenship; Biocommunities; Postgenomic knowledge; Optimization of life; Ethical agencies

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Научная статья

Биотехнологические факторы в информационном обществе: Появление биогражданства и генетического языка

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Аннотация
Нередко дезоксирибонуклеиновая кислота (ДНК) рассматривается как проявление генезиса и мутации живых существ. Эта молекула состоит из двойной спирали, несущей генетические инструкции для всех известных организмов и нескольких вирусов. Однако в молекулярную эпоху этот метафорический ориентир перемещается и растягивается, поскольку мы открываем и изучаем новые структуры, влияющие на геном. В настоящее время проводится важная работа для понимания последствий и причинно-следственных закономерностей, которые связывают этот язык и окружающую среду во многих областях, таких как генная инженерия, биоинформатика и геномная медицина. Предоставляя новый доступ к архитектуре, из которой состоят живые существа, технологические артефакты и виды деятельности превращаются в биологический сдвиг, открывающий нашу жизнь новым уязвимостям и рискам, а также новым рациональностям и ценностям, вращающимся вокруг ДНК. Все эти технологические открытия неизбежно привели к созданию новой структуры информационного общества – Молекулярному веку. В этой статье основное внимание уделяется новым факторам, которые сформировались в наш молекулярный век: из технологий и исследований, вращающихся вокруг ДНК, возникают определенные способы действия в нашей биосоциальности. Поскольку геномные технологии и исследования представили ДНК как значимую структуру знаков и символов, мы сталкиваемся с традиционным взглядом, согласно которому геномика является новым детерминизмом 21 века. Напротив, эта статья показывает создание новых форм активного расширения прав и возможностей, основанных на проблемах, связанных с ДНК, и исследованиях. Таким образом, биологические факторы и субъективности возникают из конституции генетической биосоциальности, которая обеспечивает биоцианам и биосообществам дискурсивное, этическое и техническое самопонимание и позволяет им собираться вокруг технологических и информационных смыслов, которые открыли это новое знание.

Ключевые слова: Биосоциальность; Биогражданство; Биосообщества; Постгеномные знания; Оптимизация жизни; Этические факторы

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INTRODUCTION

> By revealing to us the absolute mechanism of all action, and so freeing us from the self-imposed and trammelling burden of moral responsibility, the scientific principle of Heredity has become, as it were, the warrant for the contemplative life. It has shown us that we are never less free than when we try to act. […] It is Nemesis without her mask. It is the last of the Fates, and the most terrible. It is the only one of the Gods whose real name we know.
>
> Wilde (1891/1905)

In what is currently called Genomic era or Molecular age[18], advances in molecular biology, genomics and biochemistry have been studied in conjunction with shifts in governance and agency. The theoretical base of those works is that changes in the conception of the biological body had and still have repercussions on the political way in which appears and acts the social body and the individual agent.

The concept of *biosociality* was coined upon the notion of biopower of the French philosopher Michel Foucault, by Paul Rabinow, who is well-known for introducing the work of Foucault in the USA (Dreyfus & Rabinow, 1982; Rabinow, 1984). Biopower is defined by Foucault as "what brought life and its mechanism into the realm of explicit calculations and made knowledge-power an agent of transformation of human life." (Foucault, 1978, p. 139)

As a result, biosociality refers to the political moment and place where biology includes itself in the social field, as a source of expertise and new practices. With the increasing weight of DNA, it sheds light on the central role of biomedical knowledge in constructing genetic identities and producing (and reproducing) social relationships. Accordingly, it does not only describe our current social framework; Rabinow coined "biosociality" in order to go beyond the banalization of the word "sociobiology", conceived as a biological metaphor for modern societies. His own concept embodies a form of new social interactions that "will become instead a circulation network of identity terms and restriction loci, around which and through which a truly new type of autoproduction will emerge, which I call biosociality." (Rabinow, 2010, p. 29)

Our paper acknowledges this paradigm, but focuses on highlighting how this technological agency led to a biosocial knowledge, where the political power of citizens in liberal democracies is being shaped by the rise of DNA-related researchers and practices.

It is not uncommon to consider deoxyribonucleic acid, most commonly called DNA, as the expression of the genesis and mutation of living species. This molecule is composed of a double helix that carries genetic instructions for all known organisms and several viruses. It is only logical that this expression of mutation and growth, this same coded instruction of development, was properly translated on an alphabetical

[18] This Genomic era (sometimes directly called Postgenomic era) refers to the time period from after the completion of the Human Genome Project (April 2003) to the present day. Molecular Age can also be found: it includes more broadly the rise of the knowledge and practices revolving around genetics, due to the discovery of DNA, and the beginning of biomedicine and of gene editing.

language, based on four nitrogen-containing nucleobases (cytosine [C], guanine [G], adenine [A] and thymine [T]; plus uracil [U] for the RNA). This translation is the starting point to a linguistic metaphor that shows DNA as an alphabet that can be translated through technology.

However, in the Molecular Age, this metaphoric landmark is moved and stretched as we discover and study new structures that impact the genome. Important work is done nowadays in order to understand the consequences and causal relations that intertwine this language and the environment, in many fields such as genetic engineering, bioinformatics and genomic medicine. By giving a new access to the architecture that constitutes living beings, technological artefacts and activities translate a biological shift, opening our societies to new susceptibilities and risks, but also new rationalities and values revolving around DNA. All those technological discoveries inevitably led to a new framework in the Information Society; a (genetic) biosocial knowledge in what is called the Molecular Age.

Consequently, our paper is based on philosophy of technology and medicine, to confront traditional views according to which genomics is the new determinism of the 21st century. On the contrary, it focuses on new structures that are constituted in our Molecular Age, when the technology and researches revolving around DNA roots the emergence of specific modalities of action in our biosociality. As genomic-related technologies and researches have constituted DNA as a very meaningful carrier of signs and symbols, we show the constitution of new forms of active empowerment based on DNA-related issues and researches. Thereby, we claim that biological agencies and subjectivities rise from the constitution of a genetic biosociality that provides biocitizens and biocommunities with a discursive and technical self-understanding, and enables them to gather around the technological and informational meanings that this new structure has opened. We show that this multiform biosociality comes with the emergence of dedicated systems where economics, ethics and politics intertwine.

To this end, we first make clearer the characteristics of the Molecular Age by explaining which political knowledge emerges from genetic advances and what genomic medicine is. In this medical framework, we detail the consequences of the inclusion of a third term between the normal and the pathological: namely susceptibility. We show how susceptibility impacts the paradigm of heredity, hence the individual's actions linked to his own lineage, by introducing the notion of "genetic risk".

As the individual is part of a political process where the knowledge of genetic defects leads to an ethical responsibility that affects the very notion of family descent and the management of risk, we demonstrate how contemporary insights into genetics foster the emergence of a new political referee; a "biocitizen", which acts as a decision-making agent in the technical environment that shapes him.

As a result, this biological citizenship is part of a new form of "vital politics", which re-explores Foucault's sanitary-related biopolitics in the light of genetic advances. This new paradigm sets up a web of previously unheard-of institutions and engages the biocitizen in new social and political actions. In this regard, technology is a new means to communicate around a shared language, DNA, that grounds the emergence of new

biocommunities and platforms and leads to unprecedented forms of active ethical rationalities.

THE BIOLOGICAL SHIFT: HOW DID TECHNOLOGY CHANGE DNA IN A MEANINGFUL STRUCTURE?

The Biovalue of our DNA

There is a whole new consumerism based on the information that can be extracted from our genetic code. We observe the emergence of new private actors that are constituted by very diverse institutions, such as biotech companies, pharmaceutical corporations, data banks, sequencing enterprises… Those new economic structures have opened circuits of capital and investments related to what is called the production of *biovalue* (Waldby, 2000).

But the value of health is not only a biological one, it is also an economic one: health is something affordable (or not), and health services are to be paid for even in the countries where social security is guaranteed. The direct-to-consumer (DTC) genetic testing industry is a good example of the biotechnological value that comes from those institutions. Through DTC genetic testing, "individuals are able to purchase [online] personal genome tests directly from companies supplying both sequence data and interpretation of health risks." (Kelly et al., 2018, p. 32) We can see here that the consumerism revolving around DNA information drives today's biosociality precisely because of the importance of the citizen, seen as an active subject willing to take individual decisions on his health, to gather in biocommunities and to judge his condition partly-independently from traditional health institutions.

The Molecular Body of Genomic Medicine

The industry revolving around biovalue is mostly based on the emergence of genomic medicine, for which are developed many DNA-related tasks, such as screening, analysing, stocking, developing and marketing genetic data, tests and targeted therapies. But this genomic medicine is still quite new and ongoing. Historically, it appeared after a biological shift in the understanding of the body, based on the fact that the somatic body and the genetic body are conceived on totally different scales.

20th century medicine inherited from the 19th century a somatic conception of the body: it was seen as a living organism that encloses interconnected organs, tissues, feedbacks, controls, and so on. Michel Foucault highlighted the fact that, in the 18th and 19th centuries, European authorities were preoccupied by illness as it can develop in a social body, and set up strategies to intervene upon them on local spheres, *i.e.* towns, health institutions or families[19]. However, the 20th (and 21st) century show the construction of more complex and hybrid technologies for the management of illnesses

[19] Naturally, the management of social health by the government in charge goes back before the 18th century; we can think of the political answers that were given in the Middle-Age to the plague (surveillance) and the leprosy (exclusion) (Foucault, 1976).

and reproductive activities, where "technologies" is to be understood both as practices (or techniques, as diverse as sterilization or prenatal diagnosis), and as instruments (such as new vaccines, gene engineering tools or even institutions e.g. data banks).

This biological shift was grounded in the progress of a research field, genomics, that led to visualize life phenomena at the sub-microscopic scale. The perception of life itself became molecularized, with the idea that DNA was the language that contains our digital instructions. As such, technology began to translate this structure, and dilemmas about what we are, what we can do or hope took a "molecular form". Life was considered as a sub-cellular process, controlled by a genome – whose symbolical and concrete determinism we are only beginning to refute.

Thereby, several scientific facts need to be mentioned briefly to underline the importance of this renewal in human knowledge and genetic understanding, which constitutes genomic medicine and biomedicalization (Clarke et al., 2003).

The Constitution of Genomic Medicine:

As one of the main discoveries, it was understood that the genome of each individual differs, even for twins, and 90 percent of human DNA is "junk"[20] – which was unexpected. But one of the more recent, and still-under-study, aspects of this expertise is our growing understanding of epigenetics. Epigenetics is the science of the natural mechanisms that can modify gene expression in a reversible, transmissible and adaptive manner without changing DNA sequence. For instance, the very same turtle egg can give a male or a female depending only on the environmental temperature; in this case, sex determination depends on an epigenetic phenomenon, which will determine the use of genes coding for male or for female, without any internal modification of DNA.

As a result, the development of genomic medicine led to new questions and outcomes. The Human Genome Project (1990-2003), an international scientific research project that intended to index the base pairs that make up human DNA, and to identify and *map* all of the genes of the human genome, is the framework in which genomic medicine found its impetus.

Genomic medicine stands for the reorganization of many illnesses and pathologies along a genetic axis, where DNA is seen as the new force-form of our last decades, which composes an infinite diversity in infinite combinations. "The best example of this "unlimited-finite" is DNA: an infinity of beings can and has arisen from the four bases out of which DNA is constituted[21]." (Rabinow, 2005, p. 181) It has 3 main aspects: (1) Predictive medicine: it envisions a probabilistic future health history for each individual. (2) Preventive medicine: it places the defective genes in the context of their

[20] The molecular biologist Sydney Brenner insists that junk is not garbage. Garbage is worthless and thrown away, when junk is something one store for some unspecified future use. Rabinow concurs; "it seems highly unlikely that 90 percent of our DNA is evolutionarily irrelevant, but what its precise relevance could be remains unknown." (Rabinow, 2005, p. 183) Another interesting perspective on our genomic "junk" is to rethink, in this specific matter, the notion of function and utility. (Brzovic & Šustar, 2020)

[21] Theorized by Deleuze, "unlimited-finite" ("fini-illimité") refers to the third force-form ("formes de forces"); in which something *finished* gives way to a never-ending play of forces and forms. (Deleuze, 1986, p. 140)

impact and learns how to circumvent them. (3) Personalized medicine: it treats each individual with their unique sets of genetic predispositions.

In this area, genomics-related researches, as the source of an increase of biological knowledge, are strengthened by new tools and systems. Genome editing tools, for instance, enable us to encode, recode and decode biological materials, like translating "wet" DNA (physical samples) into "dry" DNA (information). DNA-related systems, for their part, are mainly linked to computer-engineering and bio-engineering, like AI-aided medical procedures, genomic platforms, databases, bioinformatics and biobanks. Biobanks for the storage of biological samples; genomics platforms for generating genetic data from biological samples; databases for the storage of genetic data; bioinformatics platforms for the production of clinical information from genetic data (and other raw data). As a consequence, "the "transformation" of scientific research areas, such as genetics, bioinformatics and biostatistics, into clinical specialties has led to the emergence of a new vision of care." (Stoeklé et al., 2018, p. 311)

Genomic medicine marks a renewal in medicine per se and reorganizes medicine along a genetic axis, by considering the body as a cluster of cells and DNA, *i.e.* as a molecular body.

The Establishment of Our Genetic Susceptibility:

By considering the body on a molecular scale, genomic medicine entails a new way to relate to care that implies to treat people before the (genetic) condition even appears on a phenotypical scale, or to try to prevent this appearance22. Therefore, genomic medicine looks for the susceptibility of being affected, i.e. looks for a genetic condition that makes a person susceptible to a disease – including in the case of epigenetics (Happe, 2018).

Susceptibility can be thus considered as the third element between the "normal" and the "pathological", and as the moment where predictive medicine intervenes to calculate the probability of the proto-disease's development. Although predictive medicine is nothing new in itself, the means of gathering genetic information through the study of DNA was logically unseen before the development of genomic medicine. Until its eruption into real illness, we mostly ignored symptomless proto-diseases. However, genomic medicine reverses this disregard and makes these hints of future troubles central to its diagnostic and therapeutic hopes; as such, it expands the notion of economy of hope (Novas, 2001).

As a consequence, the development of genomic medicine has created a new agent, the patient of a disease which is not here and may never be. Before the pathological state and during the normal state, it permits "to define and diagnose a state of potential disease, or protodisease, and in doing so, to render the person a "pre-patient"." (Rose, 2007, p. 85) We observe here the emergence of a new form of active citizenship,

[22] The identification of a genetic disease may be: (1) Precise, where genetic screening is able to identify the variation of DNA on one's genotype. The precise identification of a genetic condition does not necessarily lead to the development of a disease, since several other triggering factors may not be expressed. (2) Probabilistic, depending on the identification of genetic markers associated with increased likelihood of being affected, or on the identification through family histories and heredity.

concerned with his *statistical* health, where individuals can gather information on their DNA instructions to prevent the onset of a disease, and monitor the malleable *risk* of contracting it.

Thereby, genomic medicine does not erase the fact that we are also subjective agents. On the contrary, genomic medicine helped to deepen our biosocial vocabulary and to create technological subjectivities and agencies, by fostering the emergence of a new citizenship. This unique citizenship must not be understood as something theoretical. It is deeply endorsed by practical factors and theories of action that lead to adapted individual behaviours and unprecedented socio-political forms of commitment. Moreover, this citizenship rarely focuses only on ideas or convictions, but on a previously unheard-of range of genetic discoveries; the main one being the genetic (hence statistical) susceptibility of having a disease, leading to a new agency based on genetic risks.

THE RISE OF BIOSOCIALITY: WHAT NEW TECHNOLOGICAL AGENCIES ENTAIL BIOLOGICAL KNOWLEDGE?

The Computability of Our Genetic Risk

One of the main aspects of this new agency is that individuals are susceptible to be labelled *genetically at risk* for a particular condition, prior to any symptoms appearing. This sends us back to a form of determinism. Indeed, it is sometimes considered that we are facing "the whole-scale geneticization of identity with the consequent reduction of the human subject to a mere expression of their genetic complement[23]." (Rose, 2007, p. 109) This geneticization argument is strongly rooted in the idea of determinism and fatality, since to ascribe genetic identity to individuals and groups would allegedly reify them. To suffer a genetic predisposition for a disease could be "as if the individual's nature and destiny was "marked" by this genetic flaw." (Rose, 2007, p. 197) It could be a total cut in the potentiality to act as freely as possible for an individual.

However, this paper strongly supports that the opposite argument should be examined to understand why this shift in the understanding of our biological knowledge does not only create new (bio) patients, but an entirely new biocitizenship and, consequently, new theories of action regarding the management of our life. But how could a susceptibility to a disease open some technological agencies?

Because it is a statistical risk, only a certain percentage of individuals will suffer the disease on a phenotypical scale, and the timing of onset and severity of most disorder are unpredictable. Therefore, the generation of predictions and their analysis entails a new "biological control", which strengthen the links between knowing and choosing; feasibility and responsibility to act.

This new responsibility rests mostly on the social significance of any genetic disease. Social is to be understood here as related to one's family core, mainly but not

[23] Nikolas Rose does not share this conviction, but he echoes here major technocritic views (Kass, 2004; Lippman, 1991).

only on account of heredity. For instance, an individual genetically at risk could want to avoid transmitting unsafe genes to his children. The individual who is responsible for his health sees at the same time his body through the lens of "genetic inheritance", which is to be managed wisely. New genetic responsibilities will organize the life action plans of the individual (genetically at risk or not) and of his family. It is a new description of the management of life, where the genetic coloration of life strategies creates new ethical responsibilities, expressed in an increasing obligation to act in the present in relation to the potential futures that come into view. By making pre-patients (patients that have "only" a statistical probability of being ill), genomic medicine allows subjects to anticipate, and give genetic risk a new *computability*, after which to act.

For this reason, genetic images and imaginations, as long with their values and fears, get entangled within the language of self-description and self-judgment that is usually called the "regime of the self". Individuals are said to increasingly recognize the "self" as the bearer of a genetic risk, around which daily routines and future plans must be organized with prudence. Active responsibility now implicates both corporeal and genetic responsibility: "one has long been responsible for the health and illness of the body, but now "somatic individuals" must also know and manage the implications of one's own genome." (Rose, 2007, p. 134) Embodiment itself becomes a place of association concurred by a common understanding of risks, rooted in a new socio-political age of "biological control". "This means that we can no longer assume that the biological "itself" will impose limits on human ambitions. As a result, humans must accept much greater responsibility toward the realm of the biological, which has, in a sense, become a wholly contingent condition." (Franklin, 2003, p. 100)

Here, a whole new theory of actions is meet through technology, considered as the medium through which DNA instructions, risks, susceptibilities and agencies are translated. As the genetic knowledge inscribes itself into the heart of corporeal existence and reshapes self-description, it creates new ways of conceiving and acting upon bodies and, consequently, in the field of biopolitics, upon social and political bodies. Therefore, the molecularization of life and the individualization of risk have given rise to a new form of agency and sociality around their management; namely *biocitizenship* (Happe et al., 2018; Rose, 2007).

As such, we will show that the new possibilities that DNA-related researches have opened, for biocitizens to manage their genetic risks or to simply understand it, created a new technological agency around the optimization of life itself, based on a biological knowledge.

The Optimisation of Active Biocitizens' Lives:

The optimisation of life is not an idea born after the discovery of DNA, but we focus on how it was strengthened by the new modalities of agencies that arose in the last century, and followed both by governmental policies and individual health measures.

In 1950, Thomas Marshall theorized an historical evolution of citizenship. According to him, the civil rights of the 18th century called the emergence of a political citizenship in the 19th century, which led to a social citizenship in the 20th century

(Marshall, 1950). This evolution brings about the notion of "citizenship project"; the construction of citizenship by the authorities through the perception of some (but not all) individuals as citizens, and their specific actions upon them.

For instance; defining those who are entitled to vote, or to adopt children; imposing a national currency, or a single national language, etc. Nowadays, we fully understand that biological theories of actions are and always were deeply inscribed in a political way, as part of any (biological) citizenship projects; e.g. the ideas of race, species, blood line, DNA pool; or the policies around women, motherhood, and family; the controversies about homosexuality, adoption, and reproduction; or the socio-political weight of the notions of heredity, and demography. Numerous citizenship projects were framed in biological terms and this "biological citizenship" can only get strengthen by the current framework that sees the development of a new branch of knowledge revolving around the understanding of genomic instructions and causal relations. But the intensification, in the last centuries, of biological citizenship-related policies necessarily entails the rise of a new subject, the biocitizen.

If indeed there are state-supported public health measures that indicate that biocitizenship remains an issue within the (national) political rationalities, liberal democracies are nonetheless said to promote an emerging "regime of the self." In this regard, the empowerment of *the* citizen, independently of national citizenship projects, appears clearly of paramount importance. *Biocitizenship* describes a condition where "each individual is engaged as a prudent yet enterprising individual, actively shaping his or her life course through acts of choice, activities that extend to the search for health in the face of the fear of illness, and the management of the risks – now the genetic susceptibilities – of disease[24]" (Rose, 2007, p. 154). While citizenship has long had a biological dimension, new kinds of biocitizens – with new subjectivities, new politics and new ethics – are forming around the biological understanding that genomic medicine and genetic researches provide.

Naturally, this does not concur with the decline of citizenship projects themselves, nor this signifies the complete erasure of sovereign power in favour of pervasive forms of pastoral power. The attempts to "empower" the recipients of medical care are also representative of a global shift: a biocitizenship itself is fostered by national and international policies, as exemplify the notions of "responsible consumption" (Giesler & Veresiu, 2014) and of "active citizenship[25]."

[24] Rose specifies that "biological citizenship is a more general version of what Deborah Heath, Rayna Rapp, and Karen-Sue Taussig have termed "genetic citizenship": a way of understanding human differences, especially those related to health, in terms of genetic influences" (Heath et al., 2004; Rose, 2007, p. 136). We acknowledge this distinction, but we strongly believe that biocitizenship is all the more so relevant today because of the transposition of the soma *into* the gene. This *biological* shift is the starting point of a previously unheard-of range of socio-political practices and measures. The main example of a major democratic investment towards a disease which is not directly linked to DNA could be the biocitizen fight against the HIV/AIDS (Girard et al., 2019).

[25] "Active citizenship" is a notion where organizations, enterprises, governments or educational institutions advocate that each and every citizen have roles and responsibilities towards its society and the environment. It is generally used to stimulate the people's involvement in their communities even when they possess little decision-making power.

An active and responsible biological citizen is required to be in life-long training, to perform, to improve himself (especially through consumption), to monitor and manage his health (e.g. with the modulation of his behaviour through sport, diet, lifestyle, and drug regime). This behaviour constitutes what is sometimes called a "good" (Lee, 2020) biocitizenship. Through genetic counselling, for instance, individuals are placed under the guidance of counselling authorities and encouraged to reflect upon their inherited constitution, with the explicit aim of affecting their daily behaviour. Pat O'Malley labelled "genetic prudence" (O'Malley, 1996) this new field of practices and discourses that introduces distinctions between right (and wrong) ethical choices regarding biological susceptibility. Those socio-political processes inscribe themselves in a specific space of competition worldwide. That is the reason why it can be considered that biopolitics today is less oriented towards health and illness, procreation and capital stock, than it is towards the (bio) *optimization of life itself*, where politics arise strongly and governments cannot be evacuated.

This bio-optimization of life is not just an idea to reduce genetic susceptibility. The main form of DNA-related biocitizenship follows concrete damages that the biological body, understood as molecularized, suffered or could have suffered.

An interesting example of strong biocitizenship endorsed by a government was studied by Adriana Petryna on her work of post-Chernobyl Ukraine. The independent Ukraine based its right to govern on the explicit will of its citizens, who claimed that they were entitled to health services and social support after the nuclear explosion *in the name of their damaged biological bodies*. Petryna (2002) explains that "the very idea of citizenship is now charged with the superadded burden of survival… a large and largely impoverished segment of the population has learned to negotiate the terms of its economic and social inclusion using the very constituent matter of life" (p. 5). Biological citizenship can thus embody a demand for particular protections, and an access to special resources or to a form of social welfare based on medical, scientific, and legal criteria that both acknowledge biological injury and compensate for it. This also shows that responsible biocitizenship, or true agency in genetic decision-making, are better exercised from a place or group of cultural inclusion, where the stakes are locally understood (Reuter, 2016).

As a counterpoint, some voices are raised to promote a "bad" biocitizenship, to counter what they call a "coloniality of good biocitizenship" (Kolopenuk, 2020); as such, they underline how the optimization of life results both from a specific culture or government and from a group of subjects.

Furthermore, those aforementioned examples typically clarify a unique characteristic of biocitizenship: each case claims on political authorities and corporate entities are being made *by those who have suffered biological damage*, in terms of their "vital" rights as citizens[26]. The rise of biocitizenship is enlightened by the fact that

[26] This mention does not imply that only biocitizens genetically at risk feel concerned by the genetic optimization of life itself, but underline a general trend. Neither does it try to erase important reflections on biopedagogies and rescue missions, that demonstrate that an health imperative to save "bio-others" (Rail & Jette, 2015) can be promoted by private and public institutions and organizations in neoliberal societies.

mostly prejudiced people are likely to undertake any fight against genetic conditions; even if susceptibility to genetic risk, given their number, is universal and diverse.

The Biocitizenship in Our Information Society:

As a consequence, our information society is one of the spearheads of biocitizenship. It expands the place where responsible biocitizenship is a "local" issue by expanding the places where to exchange and gather. This major element echoes our current postmodern paradigm, where the "right to know" is seen as intrinsically linked to the enlightened exercise of active citizenship. Although this right is usually fostered by mass-media, biocitizenship also involves the collation of specialized scientific and medical sources; usual forms of activism such as campaigning for better treatment, or for the education of the population regarding a genetic condition.

It also shows the emergence of a "digital biocitizenship" (Petrakaki et al., 2021) that uses the Internet for sharing experience and making kin. With the help of contemporary information and communications technologies, biosocial dynamics are spread through online gathering platforms or social media, helped by new digital tracking devices and apps, and analyzed through quantification and agent-based models (Costa, 2021; Dyer, 2016; Sharon, 2017). Under the current circumstances of the COVID-19 pandemic, we see a demonstration of this digital biocitizenship that was promoted both by governments or citizens, for instance with the use of contact tracing apps and geolocation apps, and the creation of long covid support groups or post-covid syndrome groups (Convertino & Pileggi, 2021; Tadić & Melnik, 2020).

Those forms of democratic participation incidentally blur the boundaries between public and private interests by promoting a horizontal formation and distribution of knowledge. As a consequence, biocitizens are not "alone, required to cope with their fate only with their own family, accompanied by the advice of experts, the solitary reading of informative material. […] It is not the fate of the citizen genetically at risk to be an isolated atom" (Rose, 2007, p. 144).

Nowadays, communication technologies and the aforementioned access to information make new forms of sociality possible, which led Frédéric Keck to make this interesting comparison: "No doubt the genetic maps of the individual body (linkage, physical, and sequence) […] have replaced the totemic maps of the collective territory […]. But the map is still the form of knowledge that enables us to find our bearings together in an unknown area: it provides landmarks, grips, shared markers." (Rabinow, 2010, p. 41) It is in this mention of shared markers that lies the basis of how any technological structure addresses theories of action; through the communication between agencies and the creation of new active structures. As biocitizenship is a proper modality of action, mostly restricted in size to prejudiced people and their families, there is a special need for active gathering through biocommunities.

A SYSTEMIC BIOSOCIALITY: HOW DID THE EMERGENCE OF NEW ACTORS REACH OUT TO NEW ETHICAL RATIONALITIES?

The Emergence of Biocommunities as Structured, Operative and Discursive Agents

As a shared map, sociality is by definition intrinsically linked to the formation of groups or communities. As we said, Rabinow proposed the concept of "biosociality" to characterize these forms of collectivization organized around the commonality of a shared somatic or genetic status. Biosociality embodies not only a new paradigm, testifying of the implication of DNA both as a symbol and as matter in the lives of individuals. It gathers also group members united by a common (and somewhat new) "relationship" with their DNA. Where we had national "biological citizenship projects", we now see the emergence of "biological citizenship communities" (*i.e.* biocommunities), whose concern about biology (and mainly genetics) is more grounded in one's socio-political life. Those biosocial communities of active biocitizens have key roles in the structuration and the translation of genomic knowledge in the 21st century.

Biocommunities are forming through physical meetings, but also on the Web. As such, information technology itself is the language that translates another entangled structure, DNA, for different agents to understand it. Generally speaking, the Internet has been a vital tool for the development of biosociality; be it for the online availability of DNA-related information and products, or for forging those translocal biocommunities gathering individuals willing to engage in the process of biomedical self-shaping. These new de-territorialized "body-geographies" challenge local cultures of health and traditional aetiologies of disease. "A key feature of the Internet is that it does not only give access to material disseminated by professionals, it also links an individual to self-narratives written by other patients or carers." (Rose, 2007, p. 142)

The aims and reasons to gather in biocommunities are diverse: pre-patients who share a genetic condition or a high probability to trigger it; support groups for the families… Yet, they all function with the common feeling that an active biomedical citizenship is to be raised and voiced around "technoscientific illness identities" (Sulik, 2011; Wehling, 2011). For instance, during the parent-led conferences organised in the UK between 2007 and 2010 *around the 22q11 deletion syndrome*[27]. This can seem too precise a genetic condition to be believable, but this example shows the kind of groups that are constituted on the basis of technologies that efficiently shed light on a few numbers of genes.

At the beginning of the nineties, Rabinow noted that "there already is, for example, neurofibromatosis groups who meet to share their experiences, lobby for their disease, educate their children, redo their home environment, and so on" (Rabinow, 2005, p. 188). He also suggested, as the aforementioned example rightly confirms, that

[27] This specific example was described, observed and reported as part of a multi-sited ethnography in the article *What Binds Biosociality?*, which allows it to be easily accessible (Dimond et al., 2015).

"it [was] not hard to imagine groups formed around the chromosome 17, locus 16,256, site 654,376 allele variant with a guanine substitution." (Rabinow, 2005, p. 188)

Biocommunities gather information and expert knowledge by themselves (doing DNA sequencing, studying the reports of medical trials, sharing and voicing other citizens' experiences of the same condition, and so forth), rather than referring only to traditional medical instances, *i.e*. doctors, hospitals. The role of patient communities in civic societies have been well documented in raising awareness of little-known medical conditions, explaining to the public medical terms and categorizations inherent to the genetic vocabulary and knowledge; and campaigning for access to research funding and healthcare resources (Allsop et al., 2004; Swan, 2012). As another example, we also see the emergence of theories of (genetic) victimization, which try to revitalize biocitizenship and empower biocommunities by studying how genetic influences might be related to the odds of being victimized (Beaver & Joyner, 2021).

DNA is seen as a code giving very diverse instructions and advices about the structuration of one's life. As such, individuals are empowered through the formation of translocal communities, engendering a sense of kinship, where protection and support are offered, differences normalised and values reproduced.

The Ethical Rationalities of the Biological Power:

Within those new forms of genetic citizenship, individuals and groups have made their biological existence a matter of ethical concern and a basis for political action. Between all those actors, some new ethical rationalities[28] must be discussed.

Rose called the biocommunities "ethical pioneers" (Rose, 2007, p. 146), as they open a way through the still unknown land of genetic citizenship, and enters exactly in the sub-governmentality[29] that was theorized as "technologies of the self". Technologies of the self, of which the ethics of biocitizens and biocommunities pertain, refer to practices and strategies by which individuals demonstrate their own ethical self-understanding. And indeed, the actions of biocommunities do not aim at a general ethical moratorium but at the daily management of a condition (or a pre-condition), and at the freedom of decision-making processes. Mitchell Dean (1999), who considers that neoliberal governmentality rests upon the production of a particular kind of subject who understands himself in terms of making (wise) choices, and thus in terms of individual responsibility, noticed that we are now compelled to "make choices" about our health. As such, the categories of susceptibility, risk and genetic disease have become vehicles for the self-production and exercise of agencies endowed with the faculties of choice and will.

Hence, the ethics of those "pioneers" forms a counterbalance to the ethics of official health-related systems, such as national bioethics committees[30]. This situation

[28] By "ethical rationalities" or "ethopolitics", we do not mean to discuss the evolutionary perspective on morality, such as the development of altruism and empathy. (Riley, 2021)

[29] "Governmentality" is a concept invented by Foucault in his lectures at the Collège de France to describe the organized practices (mentalities, rationalities, and techniques) through which subjects are governed.

[30] Bruce Braun notes that bioethics is "a professional field which always seems to arrive too late, after biomedicine, biotechnology and finance capital have ushered in the future, and thus can act only to incorporate new biotechnological realities within law" (Braun, 2007, p. 13). However, we do not disregard the importance of official

may be compared to the ethical management of the Internet; where isolated citizens (users, tweeters, hackers, hacktivists…), groups of citizens (Anonymous, WikiLeaks…), and multinational companies (Google, Facebook, Amazon, Apple…) indisputably replace national governmentalities.

According to Nikolas Rose, this situation implicates a shift from a biopolitics of populations to an ethopolitics characterized by the individual management of the biological self. "I have suggested that we are living in an ethopolitical age, where issues as diverse as crime control and political apathy are *problematized in terms of ethics*. No longer posed in the languages of justice, welfare, or equity, ethopolitics here is about the value of different forms of life, styles of life, ways of living, and how these should be judged and governed." (Rose, 2007, p. 97) As a direct consequence, the molecularized body has become the site of different political rationalities, gathered around the concept of "(bio) security".

On this question, the perspective of Bruce Braun raises interesting questions. Braun considers that the current situation overtakes the concept of ethopolitics, because the management of life is intimately related *to the exercise and extension of sovereign power* (Braun, 2007). We can infer from it the rise of an independent exercise of choice-making process – independent even from ethics. Bruce Braun projects this situation on a very global scale, which includes the environment. He reminds us that Bernard Vallat, Director General of the World Organization for Animal Health (OIE), considers that we are now immersed in the "great biological cauldron" of the 21st century, where biology is virtuality (the opposite of determinism), and where the future is less about "care of the self" than it is about imminent catastrophe to manage.

This is the reason why several major ethical works turn towards the sociology of risks (Castel, 1981/2011; Chateauraynaud & Torny, 1999; Collier & Lakoff, 2004, 2008b, 2008a), as "the apparatuses that inform on the perception of environmental threats and set off collective forms of rallying." (Rabinow, 2010, p. 44)

The length of this article prevents us from making an expeditious analysis of the balance between ethopolitics and sovereignty – if we are to understand sovereignty as the full right and power of a governing body over itself. However, if we are to understand sovereignty as the exercise of power by a state (as it is the case in international law), we already explained that governmental biocitizen projects are an important part of the biopolitical management of lives. But we also demonstrated that biosecurity itself was implemented not only by official authorities but first and foremost by biocitizens and biocommunities. As such, we can conclude here on a shift on health "cultural authority" (Epstein & Timmermans, 2021), from the social authority of physicians to the proliferation of new forms of agency, information and ethopolitics regarding health-related issues.

bioethics committees, which are becoming a necessary supplement to the imperatives of political decision making concerning the biological and social life (Wahlberg et al., 2013). They intend to fill the gap between economic imperatives and ambitions, clinical demands and citizens' claims to treatment and rights to health "under conditions of moral uncertainty and lack of consensus." (Rose, 2007, p. 97)

Therefore, we strongly believe that the balance between ethopolitics and state governmentality also depends on the position of private corporations and companies that strengthen the consumerism around this new biovalue that DNA embodies.

As the fertile ground for new ethical rationalities, DNA-related information and technologies meet theories of action and agency because genomics is a totally new field for ethical self-problematization. Genes themselves have been constituted as a language, which does not mean as an alphabet, but as an "ethical substance […] working in relation to the self (genetic identity, reproduction, health) and in relation to others (siblings, kin, marriage, children)." (Rose, 2007, p. 125) Nevertheless, not just anyone can participate in building this ethical and informational web, since the growing availability of medical information on the Internet and the activism of biocommunities does not compensate for sometimes expensive scientific testing, like diagnosis or gene sequencing.

CONCLUSION

The growing knowledge we gathered on our genome those last decades impacted us in what it means to belong to our societies and act in them. The "discovery" of our DNA and of its complexity has made us genetic individuals, pertaining to new forms of democratic agencies and ethics, and created in response the rising field of biosociality. Genomic-related technologies meet theories of action because genetics is a totally new field of communication, action, consumption and values, where DNA is a proper language. Not only an alphabetical language with four nucleobases as letters, but also the support of very meaningful signs and symbols, for societies to build biosocial knowledge and power, for agents to communicate and act on, for governments to make jurisdiction on, and for more structured communities to emerge on. Here, we see the roots of the etymological meaning of "symbol", as the Greek *symbolon* first designated a "sign of recognition".

Since we showed that this biological shift has socio-political consequences for the ways in which individuals are governed, and the ways in which they govern themselves, we believe that criticisms posed in terms of genetic determinism may fail to recognize a significant change that occurs in the conception of life itself. In tracing out, experimenting with, and contesting the new relations between ethics, power, and economics, "active biological citizens are redefining what it means to be human today." (Rose, 2007, p. 154) This human agency rests on the overcoming of deterministic biological structures, led by an emerging form of power that modern knowledge and researches about postgenomics entail. The active biocitizenship is not only based on the possibility to anticipate known genetic diseases and to gather in biocommunities, but on the framework of biological ownership and self-understanding – even of our genetic risks. The aforementioned changes that are now at stake in our politics are indeed reflecting ontological modifications in the understanding of mankind. Moreover, this evolution is encrusted in the development of hitherto unheard-of technoscientific tools. As an interesting starting-point for metaphysical debates, we can suggest with Nikolas

Rose that, in this process, "the human becomes not less biological, but *all the more* biological." (Rose, 2007, p. 20)

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Research article

Virtual Communication Technologies in Modern Drama for Teenagers

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Abstract

This article is devoted to the study of the reception and image of virtual communication technologies in modern drama for teenagers. It is obvious that digital technologies in plays aimed at young audiences are becoming a marker of modernity and a characteristic detail of a technogenic civilization that generates conflict situations. The portrayal of young heroes and heroines – the same age as the prospective viewer – is impossible without recreating the realities of modern virtual communication. It will be shown in this article that the appeal of modern playwrights to these problems entails a transformation of the dramatic language, caused by the need to take into account the social and psychological characteristics of the addressee. This research studies plays that were included in the short lists of 12+ of the "Little Remark" award for the period of its existence (2018-2021). Statistical and comparative methods were used, as well as the method of immanent analysis of the work. In total, 31 plays were considered, of these, 19 were relevant. The languages of virtual communication are presented in these plays as: 1) a way to identify one's era and, as a result, oneself in heroic characters; 2) a metaphor for building a hero's identity; 3) symbol of a reality that differs from the empirically given world; 4) a method of modeling a dramatic picture using the signs of modernity and a new type of communication with the viewer. Technologies can be perceived as a source of conflict situations, but also as a means of resolving these conflicts. Despite the contradictory attitude of the authors of the plays to the depicted phenomenon, it can be stated that the appeal to new technologies of dialogue that do not correspond to the traditional dialogical forms of drama can become the basis for a further development of the dramatic language as a whole.

Keywords: Modern drama for teenagers; Digital technologies; "Little remark"; Transformation of dramatic language

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Научная статья

Технологии виртуального общения в современной драматургии для подростков

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Аннотация
Предлагаемая статья посвящена исследованию рецепции и изображения технологий виртуального общения в современной драме для подростков. Очевидно, что диджитал-технологии в ориентированных на молодую аудиторию пьесах становятся маркером современности и характерной для техногенной цивилизации деталью, порождающей конфликтные ситуации. Изображение молодых героев – ровесников предполагаемого зрителя – невозможно без воссоздания реалий современного виртуального общения. Однако авторы статьи ставят перед собой цель доказать, что обращение современных драматургов к указанной проблематике влечет за собой и трансформацию драматического языка, вызванную необходимостью учитывать социально-психологические особенности адресата. Материалом исследования стали пьесы, вошедшие в шорт-листы 12+ премии “Маленькая ремарка” за период ее существования (2018-2021 годы). Использовались статистический и сравнительный методы, а также метод имманентного анализа произведения. Всего рассмотрена 31 пьеса, в этой выборке в той или иной мере репрезентативными оказались 19. Языки виртуального общения представлены в этих пьесах как: 1) способ опознать свою эпоху и – в результате – себя в героях; 2) метафора для построения идентичности героя; 3) символ реальности, альтернативной эмпирической; 4) способ моделирования драматической картины с использованием знаков современности и новый тип коммуникации со зрителем. Технологии могут восприниматься как источник конфликтных ситуаций, но и как средство разрешения этих конфликтов. Несмотря на противоречивое отношение авторов пьес к изображаемому явлению, можно констатировать, что обращение к новым технологиям диалога, которые не соответствуют традиционным диалогическим формам драмы, могут стать основанием развития драматического языка в целом.

Ключевые слова: Современная драма для подростков; Диджитал-технологии; “Маленькая ремарка”; Трансформация драматического языка.

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ВВЕДЕНИЕ

Современный российский театр возник во многом благодаря идее, появившейся у русских литераторов в начале XIX века. Стремящийся к созданию новых драматических форм, А. С. Пушкин заметил, что между зрительным залом и сценой нет диалога. Пришедшие в театр не видят перед собой героев, существующих в том же типологическом времени и пространстве, в котором находятся сами. Они не могут представить себя входящими в мир театральной истории, встающими рядом с действующими лицами. Между залом и сценой существует граница, преодолеть которую, оставаясь самим собой, зритель не может.

Но благодаря произведениям А. С. Пушкина, Н. В. Гоголя, И. С. Тургенева и других драматургов XIX столетия в театре появились образы, которые пригласили зрителя к диалогу. Сцена стала зеркалом, в котором отразилась современность. Недаром Гоголь использовал в своем “Ревизоре” эпиграф: “Неча на зеркало пенять, коли рожа крива”.

Современный театр во многом продолжает эту тенденцию (Тютелова, 2018; A chronology of New Russian Drama, 2019; Vasiliev, 2019; Доманский, 2020; Шуников, 2020). Не остается в стороне от нее и театр, ориентированный на молодого зрителя, однако здесь можно отметить особые черты. Связаны они с тем, что на историческом материале говорить о настоящем, как правило, возможно лишь с читателем/зрителем, имеющим определенный эстетический опыт, с тем же, кто только приобщается к миру театра, лучше использовать картины современности. Поэтому драма для подростков отражает нашу реальность, дает возможность увидеть существующие в ней противоречия, порожденные, в том числе, вхождением новых технологий в повседневное существование.

Заметим, что изображение взаимодействия человека с новыми технологиями, виртуальной реальностью можно рассмотреть в двух аспектах. С одной стороны, налицо художественная рефлексия данных явлений, и здесь драматургия стоит наряду с научной рефлексией психологов, социологов. Примечательно в этом плане совпадение тематики научных исследований (Erickson et al., 2016; Ледовая и др., 2017; Барашкина и Масленкова, 2018; Солдатова и Погорелов, 2018; Белинская и Прилуцкая, 2019; Дунас, 2020; Tal & Prebor, 2020; Рубцова и др., 2021) с тематикой пьес, которые будут рассмотрены в данной статье. С другой стороны, на новом этапе развития драмы авторы обращаются к этой тематике для того, чтобы установить эффективную художественную коммуникацию с “новым зрителем” – и на этом мы остановимся подробно.

ПОСТАНОВКА ПРОБЛЕМЫ

Пути развития современного театра-зеркала, создающего условия для диалога сцены и зрительного зала, связаны с несколькими факторами: с развитием

личностного сознания и возникновением новых коммуникационных технологий, позволяющих адекватно выразить это сознание и организовать художественную коммуникацию, основным результатом которой является понимание Я и Другого.

Современный коммуникационный процесс строится по историческим моделям. Они возникли последовательно и соответствуют современной дискурсной формации – исторически сложившейся системе коммуникационных правил и представлений о том, “кто” “кому” “о чем” и “как” может сказать (Тюпа, 2018). Современная дискурсная формация характеризуется поиском форм самовыражения как креатора, так и адресата, поскольку участников коммуникационных процессов отличает автономное личностное сознание. Оно утверждает себя на первом этапе развития формации, что приводит к возникновению новых типов высказываний как монологических. Позже Я открывает для себя позицию Другого как такую же личностную, автономную позицию. И появляется проблема организации диалога между Я и Другим.

Для организации диалога креатор должен учитывать особенности сознания адресата (Tyutelova et al., 2018). Как отмечают психологи, “подросток творит современную реальность отношений в информационном пространстве, при этом выступая одновременно и субъектом, и объектом создаваемой виртуальной реальности. В процессе освоения социальной среды, реализации собственных идей и проектов взаимодействия с социальными структурами может происходить формирование центрального новообразования подросткового возраста – практического сознания. Внимательный анализ поведения современных подростков показывает, что главное психологическое содержание этого возрастного периода – не самоутверждение, а проявление самостоятельности (Авдеев, 2012). В то же время, с философской точки зрения детство и юность всегда имеют специфический статус, который требует особого отношения. Так, философ А. А. Грякалов акцентирует внимание именно на неповторимости “опыта детства”: “Детство – всегда настоящее. В этом смысле детство одного поколения так же уникально и не воспроизводимо как и индивидуальное существование одного ребенка. Прошлое влияет опытом традиции и инерции, будущее воздействует как проект, но осуществляется детство всегда именно как настоящее” (Грякалов, 2003).

То есть, в силу своих **социо-психологических особенностей**, адресат драмы для подростков не готов слепо следовать за креатором, требует уважения собственной позиции, соблюдения привычных для него коммуникационных правил. В современной коммуникационной ситуации эти правила, продиктованные развитием диджитал-технологий – чатов, мессенджеров, сервисов видеосвязи и социальных сетей, влияют на способы представлять себя и взаимодействовать с другими (Campbell, 2019; Qin & Lei, 2019). Но для драмы привычными оказываются технологии, пришедшие в литературу еще в XIX столетии. Это технология последовательной смены “повествовательных” картин. Формат картин задан геометрией сцены-коробки, имеющей так называемую четвертую стену, через которую зритель должен рассматривать происходящее, а герой должен существовать на этой сцене так, будто подглядывающих за ним

зрителей нет. С другой стороны, зритель, мысленно перемещающий себя в пространства, где его не ждут, становится не только свидетелем, но и участником, сопоставляющим себя с героем и обнаруживающим свою автономную причастность к драматической истории и готовность к диалогу с Другим: как героем картины, так и ее автором-создателем. Собственно, поэтому и картина становится “повествовательной”, рассказывающей историю героев. Динамика истории задается сменой картин, более того, картины могут быть разномасштабными и разновременными, а потому драматическим становится не просто случай, произошедший в судьбе отдельного субъекта, а сама жизнь. Так появляется “новая драма”.

В традициях ее языка диджитал-технологии, вероятно, могут стать лишь приметой быта или символической деталью, указывающей на тот или иной уровень существования героя или переводящей на особый уровень, альтернативный реальному. Причем, можно предположить, это будет развитие языка новой драмы, в которой этот уровень был или уровнем внутреннего существования человека (см. реалистические пьесы), или миром пребывания сущностей, определяющих жизнь человека, но не выраженных в его эмпирической картине мира (см. модернистские пьесы).

В случае новых технологий создается новая реальность, альтернативная существующей, и их отношения порождают кризисные ситуации в жизни современного человека.

Также важно, что новые технологии – это не только технологии, творящие альтернативную эмпирической реальность, но и технологии диалога, которые не соответствуют традиционным диалогическим формам драмы и могут стать основанием развития драматического языка в целом. Этим вопросам и посвящено данное исследование.

ЦЕЛИ ИССЛЕДОВАНИЯ

Целью исследования является доказательство того, что диджитал-технологии, в частности, технологии общения в виртуальном пространстве, являются бытовыми деталями драмы для подростков и становятся не только приметой современной цивилизации, порождающей конфликтные ситуации, но и влияют на язык драмы, развивая ее формы.

МЕТОДОЛОГИЯ

В рамках исследования предпринят анализ пьес, вошедших в шорт-лист премии “Маленькая ремарка”. Исследователь М.А. Черняк в своей статье “Новая драма для новых тинейджеров: к вопросу о типологических чертах современной драматургии” отмечает, что этот конкурс, наряду с такими, как “Маленькая премьера”, Всероссийский конкурс драматургии для детской, подростковой и молодежной аудитории “ASYL”, сыграл важную роль в кристаллизации новой драматургии (Черняк, 2020). Была рассмотрена 31 пьеса с начала существования

премии (2018 год) и по 2020 год. Для анализа частотности обращения к рассматриваемой проблематике использован статистический метод. При помощи сравнительного анализа рассматривалось, как современный язык театра трансформируется в попытке изобразить новые технологии общения в виртуальной среде и отрефлексировать, какие ограничения накладывают эти технологии на человеческое взаимодействие. Для анализа каждой пьесы в отдельности использовался также метод имманентного анализа.

РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ

Рассмотрена 31 пьеса, включенная в шорт-листы в категории 12+. Исключение составили пьесы 2017/18 года, где не установлены возрастные рамки, что обуславливает меньшее количество репрезентативного для исследования материала в эти годы. Так или иначе тема технологий как языка общения затронута более чем в половине пьес (19 из 31), что говорит о чрезвычайной ее популярности. Так, в 2017/18 гг. тема технологий виртуального общения затронута в 4 пьесах, в 2019 г. – в 6 пьесах, в 2020 – уже в 9. Однако обращение к этой теме реализовано на разных уровнях.

В ряде пьес обращение к технологиям виртуального общения – это способ **маркировать свою эпоху** и – в результате – "заставить" зрителя **опознать себя в героях**.

Достаточно часто описание новых технологий коммуникации, возникших в современную цифровую эпоху, оказывается используемым только для создания условий диалога со зрителем. Ребенку трудно ассоциировать себя с героем, крутящим диск проводного телефона и предпочитающим формы личного прямого общения со сверстниками, а картины недавних 2000-х годов кажутся сценами далекого прошлого. Даже в пьесах сказочных ("Как спасти папу, похищенного ужасным драконом" Д. Уткиной и И. Васьковской, "Настоящее неопределенное время" П. Бородиной) фигурируют гаджеты, интернет и пр. – прежде всего как знаки времени. Так, девочка Аля из пьесы П. Бородиной, попав в сказочный лес и обнаружив, что там нет связи, огорчается: "*Связь не ловит. Блинский! Как я свой челендж в инет выложу?"* (Бородина, 2019), а девочки, чьих отцов похитил дракон, прежде всего открывают гугл в поисках советов.

Использование новых гаджетов в обыденной жизни делает современную пьесу площадкой обсуждения насущных проблем. Например, в пьесе Родиона Билецкого "Спасти Мунхгаузена" первая ремарка сообщает: "*Утро. Институт иностранных языков. Аудитория. Студенты видят, как на экране открывается окно SKYPE. Связь очень плохая. Звук еще ничего, на видео полосы помех, картинка съезжает, покрывается рябью, а то и пропадает на время вовсе"* (Белецкий, 2020). Но скайп, появившийся в первой картине этой пьесы, темой которой становится путь человека, определяемый сделанным выбором, в дальнейшем не используется даже как средство связи между мнимым и подлинным. Белецкий не противопоставляет две реальности (созданную с помощью новых технологий и подлинную, традиционную), а показывает, что

понять себя нужно и в реальной жизни, и для реальной жизни. Поэтому в замок барона Мюнхаузена персонаж пьесы летит на обычном самолете, который в никакой иной мир героя не переносит: “*День. Самолет. Митя Иванов и адвокат Беккенбауэр сидит в креслах друг возле друга*” (Белецкий, 2020). Иное, по мнению драматурга, нужно искать в том, что дано природой.

В пьесе Серафимы Орловой (2018) “Аста” главная героиня говорит однокласснице о демоне: “*Просто позвони мне ночью, я ей трубку передам. У неё телефона вроде нет, так что связь через меня*”. Однако вскоре выясняется, что телефон есть даже у этого сверхъестественного существа: “*АСТА прячет телефон, который незаметно доставала раньше*” (Орлова, 2018). А страдающая от немоты героиня пьесы Марты Райцес (2018) “Я – кулак. Я А-Н-Н-А” сравнивает себя с устаревшим пейджером: “*Да, у всех телефоны, а у меня пейджер. Никто и не знает, что это. Мама считает, я устроена только на прием информации*”.

В последнем случае упоминание современных технологий общения становится **метафорой, которая позволяет сконструировать идентичность героини**.

Обращение к технологиям виртуального общения в рассматриваемых пьесах может пониматься и как **символ реальности, которая отличается от эмпирической** и тем самым оказывает влияние на существование героев, порождает конфликтные ситуации, но одновременно используется для разрешения жизненных конфликтов. (И это говорит о двойственной роли новых технологий общения не столько в развитии художественного языка, сколько в жизни подростка, представленной на сцене.).

В пьесе “Всем кого касается” Дианы Сидерос представлен альтернативный язык и способ общения: неблагополучные подростки, попавшие в коллектив элитной школы, обучают одноклассников общаться тактильно, при помощи языка жестов и прикосновений. Тот факт, что это обозначение вынесено в афишу, может трактоваться как признание, что подобные тактильные коды являются подлинной номинацией персонажа, наряду с именем “*Миша – брат Кости, он же [положить ладонь на горло, тронуть пальцами ухо]; Костя – брат Миши, он же [положить ладонь на живот, тронуть за подбородок];Семён – он же [хлопнуть по подбородку снизу]”* и т.д. (Сидерос, 2018).

Постепенная перемена в отношении героев к тактильному языку приводит к потеплению отношений в классе. “Тактильное” здесь не противопоставляется языку технологий открыто, однако символизирует принятие и понимание, в то время как общение при помощи смартфонов и соцсетей в авторских ремарках последовательно трактуется как путь к разобщению и игнорированию “чужаков”. Обстановка в классе в начале пьесы демонстрирует отработанные стратегии игнорирования: “*Гузель садится за первую парту прямо у учительского стола, утыкается в смартфон. Миша и Костя стоят. Входит Паша, с ним Валентин и Карим. Паша показывает им что-то в смартфоне, не глядя на класс, все трое проходят на свои места, садятся за соседние парты”* (Сидерос, 2018). Подобные ремарки, частотные в начале пьесы, резко контрастируют с ремарками финала:

“*Уходят в кабинет. На заднем плане дети самозабвенно хлопают друг друга по разным частям тела и орут. В коридор входят Семён и Рита, смотрят на возящихся малышей с неподдельным интересом*” (Сидерос, 2018) .

Одна из исследователей проблемы новой драмы для тинейджеров так оценивает рассматриваемую пьесу: “Дана Сидерос в пьесе “Всем кого касается”, поднимая вопрос о травле подростка в школе, выходит к метафорическим обобщениям и новому уровню правды” (Черняк, 2020). Без сомнения, рефлексия над виртуальным и тактильным модусами общения играет существенную роль в этом процессе. С другой стороны, в ряде пьес мы видим, что напряженные конфликтные ситуации, создавшиеся как следствие подмены живого общения виртуальным, разрешаются в интернет-пространстве (“Фото топлес” Н. Блок, “Девочки” К. Гузема), что усложняет поставленную проблему.

Проводимые социологами и психологами исследования показывают, что у современного подростка меняется тип восприятия (Николаева et al., 2020; Голубева, 2020; Черникова и др., 2018). Он не способен на работу с большим текстом, которым становится и сценическая “повествовательная” картина. Картинки должны мелькать, как в Инстаграм, а вместо картинок возможен и просто текст, похожий на комменты или смски, как в пьесе Олега Михайлова “#всечтотебязадевает”.

И драма для подростков, которая представлена пьесами в шорт-листах “Маленькой ремарки” последних лет, показывает, что новые технологии общения перестраивают и драматические сюжеты. Это сюжеты, интересные не только и не столько своими перипетиями, сколько той “многозадачностью”, которая соответствует современному процессу общения подростка с миром, хотя и является фактором до сих пор до конца не осознанным в рамках вопроса о новых стратегиях когнитивного ресурса в условиях стремительных технологических изменений (Солдатова и др., 2020). А потому эту “многозадачность”, требующую и переключения внимания, и его концентрации, приходится дозировать, управлять ей.

Креатор предлагает своему адресату не только традиционные картины жизни своих персонажей, но и сцены, которые не предполагают даже присутствия героев в театральном пространстве. Зритель должен лишь слышать голоса. Одним из первых такую сцену – “Прощание с Хлестаковым” – создал Гоголь в “Ревизоре”.

И собственно обычные сценические картины в новой драме для подростков также сильно сокращены. Они сохраняют свою повествовательность, но она, скорее соответствует “сторис”, нежели традиционному рассказыванию XX века.

Чтобы не утомлять зрителя длинным “повествованием”, автор может действие, происходящее в рамках нескольких сценических картин разделить на части, и показав часть действия первой картины перейти к второй картине, а потом и к третьей, затем вернуться к первой и так далее. В итоге, например, в пьесе “И мы смеемся” Екатерины Дорн зритель видит то сцену допроса школьника, который должен объяснить причины агрессии своего одноклассника, то сцену родительского собрания, где ищут виновного школьной трагедии, то

короткие сценки общения одноклассников, спровоцировавших своим поведением отчаянный поступок героя пьесы. Интересно, что сам поступок не показан. Похожим образом в пьесе Полины Коротыч и Маши Всё-Таки “Говорение” перемежаются картины школьной жизни, выдержки из родительского чата, записи в ЖЖ молодой учительницы.

В пьесе “Фото топлес” Натальи Блок изображение ситуаций обыденного общения подростков, их встреч и диалогов чередуется с демонстрацией постов в соцсетях и реплик в мессенджерах: “*Подростки делают перепосты в социальной сети фразы “Киры больше нет. Вы, сволочи, ее довели”. Ставят статусы “Мне так жаль”, “Я в шоке”, “Я сам не хочу теперь жить”, “Зачем она это сделала”, “Она просто идиотка”, “Ну нельзя же так из-за такой ерунды”, “ Что теперь делать?”, “Я не верю просто в это, она не могла это сделать”, “Когда похороны?”. На экране их мониторов возникают сообщения, картинки с цветами, грустными смайлами, аватарки заменяются черными квадратами*” (Блок, 2018). Параллельно с картинами виртуального общения может изображаться диалог двух подростков, держащих в руках телефоны, и пространство их общения с другими героями, находящимися “по ту сторону” экрана. Так возникают два плана коммуникации, которые накладываются друг на друга, причем один обуславливает другой.

Собранные вместе фрагменты позволяют зрителю открыть для себя множество не совпадающих между собой точек зрения и соотнести их между собой. Он не может долго сосредотачиваться на одной позиции, автор быстро предлагает ему другую, причем часто диаметрально противоположную. И зритель оказывается перед необходимостью их соотносить и выбирать ту, которая кажется ближе и убедительней.

ВЫВОДЫ И ДИСКУССИЯ

Можно заключить, что стремление драмы для подростков говорить на языке зрителя проявляется не только и не столько в использовании особенностей речевой стилистики современных молодых людей, но и в **моделировании драматической картины с использованием знаков современности** – основных примет современного технологичного мира, мира диджитал-технологий.

Авторы могут занимать противоположные позиции в оценках роли новых технологий в жизни современного человека и предупреждать о ситуациях, когда технологии начинают менять человека, подчиняя его себе. В свое время еще Горький утверждал, что созданное человеком поработило его: “*Они ничтожны по сравнению с окружающими их железными колоссами, грудами товаров, гремящими вагонами и всем, что они создали. Созданное ими поработило и обезличило их*” (Горький, 1969, с. 7-8).

Но, несмотря на предупредительный модус современной драмы для подростков, она вынуждена менять свой язык общения с адресатом. Новые технологии становятся технологиями создания драматического сюжета. Его

структура соответствует тем формам самоидентификации личности, которые названы современными психологами.

И благодаря использованию новых коммуникативных технологий происходит развитие новодрамовской формы. Действие современной пьесы для подростков осуществляется в нескольких реальностях, часто автономных друг другу, но заставляющих личность существовать в точке их пересечений, делать свой выбор вопреки инерции жизни.

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The Concept, Types and Rules of the Use of Technical Means in Criminal Proceedings

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Abstract

This article examines the concept of ”technical means” in the framework of criminal proceedings, both in science and at the legislative level, as well as the types of technical means used in criminal proceedings (search tools, fixation devices, research methods, auxiliary methods, etc.), as well as the general and special conditions and rules of application of these means. The works of prominent specialists in the field of criminal procedure and forensic science on this topic were studied. The study examines the norms of criminal procedure legislation related to the use of technical means, including the Russian Federation's Code of Criminal Procedure and other federal laws. The methodological basis of the article is the general scientific and especially the complex of reasoning-related methods, including such methods as synthesis, analysis, deduction, induction, analogy, formal-legal method, method of interpretation of legal norms and other methods of research activity. As a result of their work, the authors conclude that there is no commonly accepted definition of ”technical means” in Russian criminal procedure studies. Each author's definition has its own differences and peculiarities in defining what constitutes a technical means. At the same time, they proceed from the differences related to the purpose of such means and the conditions of their application. At the legislative level, there is no definition of technical means at all. The standing orders that regulate the rules and conditions for the use of these tools are ”scattered” throughout the criminal procedure legislation and are not fully coordinated with each other, which is a problem. The types of technical means are also not defined by law, but the issue has been sufficiently developed in academic circles and researched in forensic science. Based on the foregoing, the author considers it appropriate to introduce a unified norm governing the institution of ”technical means” into the criminal procedural legislation, which will contain a list of subjects entitled to use these technical means, rules and conditions for their use and other provisions.

Keywords: Criminal procedure; Criminalistics; Technical means; Application of technical means

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Научная статья

Понятие, виды и правила применения технических средств в уголовном процессе

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Аннотация
В данной статье исследуется понятие “технические средства” в рамках уголовного процесса как на научном, так и на законодательном уровне, виды технических средств, используемых при производстве по уголовному делу (поисковые средства, средства фиксации, исследовательские, вспомогательные и др.), а также общие и частные условия и правила применения этих средств. Были изучены труды видных специалистов в области уголовного процесса и криминалистики по данной теме. Особое внимание уделяется анализу норм уголовно-процессуального законодательства, связанных с применением технических средств, в том числе УПК РФ и иных федеральных законов, что составляет основу исследования. Методологической основой статьи является общенаучные и комплекс частно-научных методов познания, в том числе такие методы, как синтез, анализ, дедукция, индукция, аналогия, формально-юридический метод, метод толкования правовых норм и другие методы научно-исследовательской деятельности. В результате проведенной работы авторы приходят к выводу, что в российской науке уголовного процесса отсутствует общепринятое определение “технические средства”. Каждое авторское определение имеет свои отличия и особенности в определении того, что является техническим средством. При этом они исходят из различий, связанных с целью применения таких средств и условий их применения. На законодательном уровне дефиниция института технических средств отсутствует вовсе. Различные положения, регулирующие правила и условия применения этих средств, “разбросаны” по всему уголовно-процессуальному законодательству и не в полной мере согласованы между собой, что является проблемой. Разновидности технических средств также не определены законом, однако в научных кругах этот вопрос достаточно разработан и исследован в криминалистической науке. На основании изложенного автор считает целесообразным ввести единую норму, регулирующую институт “технических средств” в уголовно-процессуальное законодательство, которое будет содержать в себе перечень субъектов, имеющих право на применение данных технических средств, правила и условия их использования и иные положения.

Ключевые слова: Уголовный процесс; Криминалистика; Технические средства; Применение технических средств.

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ВВЕДЕНИЕ

На сегодняшний день технологические разработки и различные устройства повсеместно применяются в обществе как на бытовом уровне, так и в ходе научной или профессиональной деятельности. Данный феномен не обошёл и уголовное судопроизводство нашего государства. Ежедневно используются различные технические устройства на всех этапах уголовного судопроизводства: следователем или специалистом для фиксации хода и содержания следственного действия или в целях обнаружения, закрепления и изъятия следов преступления, экспертом, в целях улучшения качества проводимой экспертизы, судом, для обеспечения полноты протокола судебного заседания и в других ситуациях. На сегодняшний день тема применения технических средств в условиях цифровизации судопроизводства является активно обсуждаемой в научной среде, публикуется множество работ, посвященных вопросам использования различных технических устройств, правилам их применения, цифровизации деятельности правоохранительных органов и суда, внедрение информационных систем в уголовном судопроизводстве (Александров и др., 2019, с. 199–207; Андреева и др., 2019, с. 201–212; Зуев, 2018; Латышов, 2021, с. 41-53; Борохова, 2021, с. 7-12; Овчинникова, 2018, с. 27-33; Dneprovskaya & Abramitov, 2020; Mokhorov & Mokhorova., 2021. p. 1-7).

ПОСТАНОВКА ПРОБЛЕМЫ

Нормы уголовного процессуального законодательства Российской Федерации предусматривают разнообразные возможности применения технических средств в рамках уголовного судопроизводства. УПК РФ содержит в себе более десятка норм, регулирующих вопрос о правилах использования технических средств в различных ситуациях, возникающих в ходе предварительного расследования или в ходе судебного процесса. Однако законодателем не было определено, что следует понимать под “техническим средством”. Отсутствие каких-либо критериев технического средства в уголовно-процессуальном законе РФ является поводом для возникновения вопросов следующего характера: “Что можно определять, как техническое средство, какое устройство, механизм, аппарат и почему?”, “Допустимо ли применение технического средства в той или иной ситуации?”, “Кто является лицом, имеющим право на применение технического средства, есть ли к этому лицу какие-либо требования?” и т.п.

Отдельно стоит вопрос о том, входят ли упомянутые в уголовно-процессуальном законе такие понятия как “электронные носители информации”, “аудиовизуальные, электронные и иные технические средства контроля”, “материалы фото- и киносъемки, аудио- и видеозаписи и иные носители информации” “средства аудиосвязи”, “системы видеоконференц-связи”, “специальные технические средства” и смежные с этими понятия к категории “техническое средство”. В науке уголовно-процессуального права уже были

попытки дать определение понятию “техническое средство” чтобы решить данный вопрос. Рассмотрим это подробнее.

МЕТОДОЛОГИЯ

Методологической основой статьи является общенаучные и комплекс частно-научных методов познания, в том числе такие методы, как синтез, анализ, дедукция, индукция, аналогия, формально-юридический метод, метод толкования правовых норм и другие методы научно-исследовательской деятельности.

РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ

Н. А. Селиванов (1982) техническими средствами считает такие технические устройства, которые ориентированы на приемы расследования, обнаружения, фиксации, изъятия, упаковки, изучения вещественных доказательств, подготовки сравнительных образцов для экспертизы и иные действия по их применению с целью формирования доказательств (с. 104). Е. П. Ищенко, определял технические средства как “технические устройства и материалы, научные приемы и методы, которые используются для решения задач, связанных с раскрытием, расследованием и предупреждением преступлений” (Ищенко и Топорков, 2006. с. 53). И. И. Литвин (2017) под техническими средствами понимает любые средства обнаружения, фиксации и исследования информации, используемые в ходе предварительного расследования (с. 98 – 104).

Вышеуказанные авторы определяют основную цель использования технических средств как средство производства предварительного расследования, что не совсем является точным, поскольку технические средства могут быть применены и в ходе судебного производства, что будет рассмотрено далее.

Интерес представляет определение, данное А. Е. Федюниным. Под техническими средствами, применяемыми в уголовном судопроизводстве, по мнению автора, следует понимать совокупность технических средств (приборов, устройств, приспособлений, программных продуктов), применяемых участниками уголовного процесса в целях обеспечения производства процессуальных действий в соответствии с их правомочиями, определенными уголовно-процессуальным законодательством Российской Федерации (Федюнин, 2008. с. 10). По нашему мнению, данное определение более полно раскрывает цели технических средств в уголовном судопроизводстве.

Огромное влияние на формирование института технических средств в уголовном процессе имела криминалистическая наука, в результате чего, те или иные признаки технических средств были тесно связанны со стадией досудебного производства. Р. С. Белкин (2001) понимал “технико-криминалистическое средство” как устройство, приспособление или материал, используемый для собирания и исследования доказательств или для создания условий, затрудняющих совершение преступлений (с. 232). И. А. Анищенко разделяет понятия “научно-технические средства” и “технико-криминалистические

средства”, считая, что последние носят более узкий, специализированный характер. “Технико-криминалистические средства могут применяться в уголовном, гражданском, административном процессе, в оперативно-розыскной деятельности. Сфера же применения научно-технических средств более широкая, она выходит далеко за пределы выявления и предупреждения правонарушений и борьбы с ними” (Анищенко, 2002, с. 10). Говоря о технико-криминалистических средствах, Н. А. Натура, даёт своё определение этому понятию. “Технико-криминалистические средства – это различные приборы, аппаратура, приспособления, устройства, используемые при определённых правовых основаниях в целях предупреждения или расследования преступления”– пишет Н. А. Натура (2013), выделяя, что для применения данных средств должны быть установлены правовые основания (с. 63). Н. М. Балашов использовал для описания технических средств термин “криминалистическая техника”. Так под криминалистической техникой Н. М. Балашов понимал “совокупность технических средств различного назначения (общенаучного, общетехнического, специального криминалистического), которые рекомендуется применять в практической деятельности по раскрытию и расследованию преступлений” (Балашов и др., 2002, с. 5).

На основании вышесказанного, сам критерий, определяющий, что может являться техническим средством, достаточно широк. Авторы включают в него всевозможные объекты материального мира, а также различные приёмы и методы, которые так или иначе могут использоваться для решения задач уголовного процесса. Данный перечень не является ограниченным. К примеру, некоторые современные авторы активно обсуждают вопрос, связанный с использованием собак в ходе предварительного расследования. Так, А. В. Экгардт (2018) в своей работе, описывая принцип работы одорологической экспертизы, пишет, что “собака в данном случае выступает не в качестве эксперта, а в качестве инструмента, который помогает определить и соотнести следы специфичного характера” (с. 147-149), что поддерживается другими авторами (Данилов и др., 2021, с. 82-90). Действительно, в данном случае собака будет выполнять функции технического средства – т.н. “биодетектора”, посредством которого достигается цель одорологической экспертизы. Е. П. Ищенко и О. Г. Костюченко пишут, что “специализированное ПО (программное обеспечение) позволяет провести упрощенное и быстрое извлечение информации из обширного ряда МСК (мобильные средства коммуникации…” и др. (Ищенко и Костюченко, 2021, с. 181-190). Так же, уголовно-процессуальный закон не запрещает использование различных графических программ при создании схем местности, зданий, объектов и предметов.

Статьи УПК РФ регулируют частные случаи, при которых у участников уголовного судопроизводства возникают права или обязанности по применению технических средств, условия, цели и правила их применения.

Так, при помощи технических средств, потерпевший, его представитель, обвиняемый и защитник вправе снимать копии с материалов уголовного дела, гражданский истец и ответчик вправе снимать копии с тех материалов уголовного

дела, которые касаются гражданского иска, а законный владелец документов вправе снять копии с изъятых у него документов (статьи 42, 47, 53, 54, 81.1, 217 УПК РФ). Закон не предусматривает требования к способу и форме копирования материалов уголовного дела, в связи с этим, на практике, при снятии копий материалов уголовного дела, может быть применён фотоаппарат, для получения фотоснимка данных материалов, или копировальный аппарат, для непосредственной печати копии необходимого документа. Возможно и использование сканера. Выбор технического средства является правом субъекта, которому принадлежит возможность снятия копий.

Традиционно нормативное регулирование применения технических средств более полным является для стадии предварительного расследования. Статья 164 УПК РФ регулирует порядок применения технических средств в ходе следственных действий. В обязательном порядке следователь должен предупредить участвующих в следственном действии лиц о факте применения технических средств и их характеристиках.

Законодатель не перечисляет лиц, имеющих право на применение технических средств в ходе следственного действия. Если существует необходимость, то следователь, в порядке статьи 168 УПК РФ, вправе привлечь к участию в следственном действии специалиста, который будет применять техническое средство вместо следователя или наряду с ним. Сам следователь, безусловно, вправе применять технические средства. Чаще всего он применяет средства фиксации (персональный компьютер для составления протокола следственного действия, фотоаппарат, видеокамера, диктофон и т.п.)

Кроме того, существуют случаи, когда применение технических средств относится только к исключительной компетенции специалиста. Так, при освидетельствовании, сопряженном с обнажением лица другого пола следователь не присутствует, и фотографирование, видеозапись производится врачом (ст. 179 УПК РФ). При изъятии электронных носителей информации технические средства применяются специалистом. По ходатайству законного владельца изымаемых электронных носителей информации или обладателя содержащейся на них информации специалистом, осуществляется копирование информации на другие электронные носители информации (ст. 164.1 УПК РФ). С.В. Зуев (2017) считает это положение спорным, поскольку данное действие может быть выполнено самим следователем и привлечение специалиста является излишним (с. 31-35).

Статья 166 УПК РФ устанавливает общие правила, касающиеся применения технических средств в ходе следственного действия. Так, протокол может быть написан от руки или изготовлен с помощью технических средств. Если у следователя есть возможность использовать технические средства (например, проведение следственного действия в кабинете следователя или использование передвижной криминалистической лаборатории (ПКЛ)), то, как правило, протокол заполняется в электронной форме при помощи персонального компьютера следователя, распечатывается на принтере, а после участники следственного действия знакомятся с ним и, при отсутствии возражений,

удостоверяют правильность фиксации. В протоколе должны быть указаны также технические средства, примененные при производстве следственного действия, условия и порядок их использования, объекты, к которым эти средства были применены, и полученные результаты. Наряду с этим, должно быть отмечено, что лица, участвующие в следственном действии, были заранее предупреждены о применении при производстве следственного действия технических средств. Вышеуказанные положения дублируются в ч. 3 ст. 180, ч. 6. ст. 186, п. 2 ч. 4 ст. 190 УПК РФ.

Согласно ч. 6. ст. 186 УПК РФ в случае истребования следователем полученной в ходе производства контроля и записи телефонных и иных переговоров фонограммы, она передается ему в опечатанном виде с сопроводительным письмом, в котором должны быть указаны даты и время начала и окончания записи указанных переговоров и краткие характеристики использованных при этом технических средств. Согласно 2 ч. 4 ст. 190 УПК РФ если в ходе допроса проводились фотографирование, аудио- и (или) видеозапись, киносъемка, то протокол должен также содержать сведения о технических средствах, об условиях фотографирования, аудио- и (или)видеозаписи, киносъемки и о факте приостановления аудио- и (или) видеозаписи, киносъемки, причине и длительности остановки их записи. Можно обоснованно предполагать, что законодатель под “техническими средствами” подразумевает, в случае ч. 6. ст. 186 УПК РФ, оборудование, при помощи которого проводится контроль и запись телефонных и иных переговоров, а в случае п. 2 ч. 4 ст. 190 УПК РФ под “техническими средствами” подразумевается средства фиксации хода следственного действия (фотоаппарат, видеокамера, диктофон и иные средства фиксации).

В современном российском уголовно-процессуальном законодательстве имеется интересная связь технических средств с институтом понятых. Так, в случае, если следователь посчитает участие понятых в следственном действии ненужным, за исключением случаев, предусмотренных ч. 1 ст. 170 УПК РФ, или в случае, если следственное действие проводится в труднодоступной местности, при отсутствии надлежащих средств сообщения, а также если участие в следственном действии связано с опасностью для жизни и здоровья, то обязательным является применение технических средств. В указанных ситуациях технические средства будут необходимы для фиксации хода и содержания следственного действия. Технические средства будут “дублировать” деятельность понятых, а именно удостоверение хода и результатов следственного действия. Относительно этих положений ведутся споры. К примеру, В. В. Яровенко (2018) при выборе способа фиксации хода следственного действия отдаёт предпочтение понятым, поскольку использование технических средств допускает возможность искажения результатов видео- фотосъемки (с. 56-65). В другой своей работе В. В. Яровенко (2016) пишет, что замена понятых техническими средствами должна носить мотивированный характер, поскольку иное будет свидетельствовать о нарушении требований уголовно-процессуального закона (с. 746-763). С другой стороны, С. А. Морозов (2021)

отмечает положительное влияние этих положений на ход предварительного расследования, поскольку они позволяют следователю не тратить силы на долгий поиск граждан, желающих принять роль понятого, и оперативно приступить к следственному действию (с. 18-22).

На стадии судебного разбирательства термин “техническое средство” упоминается в статьях 259 и 303 УПК РФ. Согласно статье 259 УПК РФ для обеспечения полноты протокола судебного заседания при его ведении могут быть использованы технические средства. Статья 303 УПК РФ предусматривает возможность изготовления приговора при помощи технических средств одним из судей. Те же самые функции технические средства выполняют на стадии предварительного расследования, а именно фиксация хода и содержания следственного действия, а также изготовление протокола следственного действия.

Немаловажное место в системе технических средств занимает система видео-конференц связи, которая регламентируется как нормами УПК РФ (ст.ст. 35, 240, 241, 278.1, 293, 389,12 УПК РФ) так и Приказом Судебного департамента при Верховном Суде РФ. Данная система позволяет лицам посредством устройств аудиовизуальной передачи принять участие в судебном заседании в случае, если непосредственное участие для них не является возможным или затруднено по ряду причин. Практика применения данной системы является относительно новой, но в то же время достаточно распространенной. Тем не менее, она вызывает различные споры. Так, М. А. Юркевич (2021), в своей работе, ставит под сомнение возможность полноценного участия в судебном заседании посредством данной системы (с. 12-21). А. А. Дмитриева и Д. С. Иванов выделяют проблему реализации прав осужденного и защитника в судебном заседании посредством систем видеоконференц-связи (Дмитриева и Иванов, 2019, с. 14-18). Другие же авторы и вовсе рассматривают вопрос о возможности применении данной системы в досудебном производстве (Шагеева, 2020, с. 67–76). Ряд вопросов относительно эффективности данной процедуры, вскоре после введения данной нормы, рассматривал и один из авторов настоящей статьи (Иванов, 2011, с. 25-27).

Статья 6 федерального закона РФ ”Об оперативно-розыскной деятельности” предусматривает возможность использования в ходе оперативно-розыскных мероприятий информационных систем, видео- и аудиозапись, кино- и фотосъемку, а также другие технические и иные средства. Критериями допустимости таких технических или иных средств является отсутствие ущерба жизни и здоровью людей и вреда окружающей среде при их использовании. При проведении предварительного расследования немаловажное значение имеют и результаты применения технических средств в ходе оперативно-розыскных мероприятий. С. В. Зуев (2017) считает, что применение такой электронной информации допустимо в процессе доказывания, однако к ней должны предъявляться такие же требования уголовно-процессуального законодательства, как и к другим результатам оперативно-розыскной деятельности, требование допустимости должно относиться не к самой информации, а к ее носителю, способам получения и закрепления (с. 24-29).

Федеральный закон РФ ”О полиции” также регулирует деятельность по использованию технических средств, а именно цели использования таких средств. Так, в статье 11 ФЗ “О полиции” сказано, что полиция использует технические средства, включая средства аудио-, фото и видеофиксации, при документировании обстоятельств совершения преступлений, административных правонарушений, обстоятельств происшествий, в том числе в общественных местах, а также для фиксирования действий сотрудников полиции, выполняющих возложенные на них обязанности. Статья 13 федерального закона допускает применение технических средств в случае, если: существует необходимость противодействия беспилотным воздушным судам в предусмотренных законом случаях; существует необходимость обеспечивать безопасность и антитеррористическую защищенность. Полиция вправе использовать в своей деятельности информационные системы, видео- и аудиотехнику, кино и фотоаппаратуру, а также другие технические и специальные средства, не причиняющие вреда жизни и здоровью граждан, а также окружающей среде. Данные нормы нельзя обойти вниманием, поскольку нередко результаты ОРД или административных процедур, проводимых в рамках закона “О полиции”, в т.ч. и результаты применения технических средств, используются в доказывании по уголовным делам.

Исходя из вышесказанного, технические средства можно классифицировать по нескольким основаниям.

По допустимости технические средства делятся:

- общедопустимые;
- допустимые в определенных ситуациях.

По субъектам уголовного процесса технические средства делятся:

- технические средства, используемые судом;
- используемые следователем и иными сотрудниками правоохранительных органов;
- технические средства, используемые частными лицами (потерпевший, его представитель, обвиняемый защитник и гражданский истец);
- технические средства, используемые лицами содействующими производству по делу (эксперт, специалист).

Говоря о субъектах, применяющих технические средства, стоит отметить, что для должностных лиц, в зависимости от ситуации, это может быть как правом субъекта, так и обязанностью (например, видеосъемка следственного действия в отсутствие понятых, аудиопротоколирование судебного заседания). Частные лица, применяющие технические средства, в целях защиты своих интересов (обвиняемый и его защитник, потерпевший и его представитель), не могут иметь такой обязанности. А. И. Гаевой (2020) обосновывает такое положение в отношении подозреваемого и обвиняемого их правом на защиту, позволяющих им самим выбирать способ эффективной защиты своих прав и интересов (с. 47-50). В отношении иных частных лиц это право продиктовано общими нормами о защите и обеспечении прав участников уголовного судопроизводства

Закон предусматривает открытый перечень случаев, при которых возможно применение технических средств: необходимость фиксации хода и содержания следственного действия (судебного заседания) в целях удостоверения хода и результатов следственного действия (судебного заседания); изготовление протокола следственного действия (судебного заседания); необходимость обнаружения, закрепления и изъятия предметов и документов;- проведение следственного действия (контроля и записи телефонных и иных переговоров); проведение оперативно-розыскных мероприятий; снятие копий с материала уголовного дела; иные случаи, предусмотренные уголовно-процессуальным законодательством.

Для того, чтобы применение технических средств можно было считать допустимым, необходимо соблюдение ряда условий, в частности:

- в случае применения технических средств в ходе следственного действия следователь должен предупредить лиц, участвующих в следственном действии, о применении технических средств;

- обязательное отображение сведений в протоколе следственного действия о используемых технических средствах, их кратких характеристик, об условиях фотографирования, аудио- и (или)видеозаписи, киносъемки;

- применение технических средств допускается сотрудниками полиции в случае, если: существует необходимость противодействия беспилотным воздушным судам; существует необходимость обеспечить безопасность и антитеррористическую защищенность общества;

- при производстве оперативно-розыскной деятельности информационные системы, видео- и аудиозаписи, кино- и фотосъемка, а также другие технические и иные средства не должны наносить ущерб жизни и здоровью людей и причинять вред окружающей среде.

ВЫВОДЫ

В результате изучения научной литературы можно сделать вывод о том, что каждый автор по-своему определяет понятие “технические средство”. Каждое авторское определение имеет положение о том, что является техническим средством, однако возникают различия, связанные с целью применения таких средств, условий их применения или же такие признаки вовсе отсутствуют, что делает такие определения не совсем полными. На основании исследования современного законодательства можно сделать вывод о том, что институт технических средств в современном российском уголовном процессе не является единым. Нормативные положения, связанные с кругом лиц, которые управомочены на использование технических средств, условия их применения, а также цели, которые они должны выполнять, “разбросаны” по всему уголовно-процессуальному законодательству. Это обуславливает необходимость тщательного выбора как конкретных технических средств, так и определение субъектов и условий их применения в конкретном процессуальном действии.

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Research article

Teaching English as a Language for Mechanical Engineering

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Abstract
Engineering education usually includes the acquisition of a foreign language for a transnational professional discourse. Engineering education also involves the acquisition of competencies to compose functional technical systems from component parts. This paper provides a conceptual and empirical exploration of a synergistic effect between these two learning processes. It proposes that engineering education draw upon and incorporates this synergy. A pilot training course confirms that this leads to a faster development of the overall engineering knowledge system. This training course implements the conceptual finding according to which the process can be integrated on the model of language learning: to learn mechanics. i.e. kinematics, is like learning English as a foreign language. The grammar of sentence formation and the grammar for the effective technical placement of things teach engineers about symbolic and conceptual order, what the language of mechanics is and how it differs from the language of electronics, and how, for example, this difference needs to be accommodated in the field of mechatronics.

Keywords: Philosophy of engineering education; Foreign languages; Language of kinematics; Integration

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Научная статья

Преподавание английского как языка машиностроения

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Аннотация
Инженерное образование включает обучение иностранному языку для освоения транснационального профессионального дискурса. Обучение инженеров также предполагает приобретение навыков синтеза технических систем из составляющих их элементов. В статье предлагается концептуальный и эмпирический анализ синергического эффекта, возникающего при взаимосвязанной реализации этих двух процессов обучения. Инженерное образование может плодотворно использовать этот синергизм. Реализация экспериментального учебного курса, подтверждает, что взаимосвязанное обучение способствует более быстрому формированию у обучающихся системы общетехнических знаний. В основе курса лежит концепция, согласно которой изучение механики, в частности кинематики, имеет сходные черты с изучением английского языка как иностранного. Сравнение грамматики построения предложений и «грамматики» эффективного соединения частей технических систем способствует научению будущих инженеров символическому и концептуальному порядку, специфическому языку механики, а также показывает как он отличается от языка электроники, и как эта разница должна быть учтена, например, в области мехатроники.

Ключевые слова: Философия инженерного образования; Иностранные языки; Язык кинематики; Интеграция

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BACKGROUND: ONE PROFESSIONAL LANGUAGE AMONG OTHERS

Foreign language as an academic subject is present in the curricula of many technical universities around the world. Unlike the General English course which is studied at school, higher education courses are mostly related to business English, language for special purposes, professional or academic communication. In the case of General English, students have a particularly strong interest in linguistic facts and a motivation to learn through them the language of culture, the way of thinking and the way of life of native English speakers. At the university, the motivation of students in the course of their professional development shifts to more practical motives. A foreign language becomes a tool for obtaining professional knowledge and a tool for self-expression in a specialty. We are no longer talking exclusively about the culture of native speakers; language comes to the fore as a means of mediation and socialization in the international professional community.

Very often poor English becomes a big problem. According to Rudolf Jaenisch (2010) from the Massachusetts Institute of Technology, “some papers from Asia are so badly written that they are difficult to assess.” Therefore, “poor language quality which cannot be understood by readers” is one of the main editorial reasons for the rejection of research papers (Phani Kumar & Rao, 2018). Moreover, as noted by Adrian Wallwork (2011), “native referees tend to be more interested in how the paper flows and how easy it is to read. Non-native referees seem to focus more on grammatical and vocabulary mistakes, so very accurate English is important”. A number of frequent and typical grammatical, logical and conceptual errors that non-native English writers make indicate the need for improving general English skills (Wallwork, 2011). A large number of recommendations on various aspects of composition and of writing English-language texts have been published (Kallestinova, 2011; Bhakar & Tarika, 2014).

In order to write correctly, one needs to read a lot and comprehend, extracting relevant information. One can improve English considerably by reading lots of papers and books in the field of interest. That will help revealing the typical phrases to express various language functions (e.g. outlining the aims, reviewing the literature, highlighting one‘s findings) (Wallwork, 2011). In fact, foreign-language reading of professional literature (domain-specific texts) performs a much more important function than just identifying service language concepts. It is inextricably connected with writing and speaking and represents a complex activity that is carried out by the mental operations of selection, categorization, analysis, generalization, synthesis. As a result of these operations, the reader comes to comprehend what has been written, recreating semantic connections (Serova, & Sabitova, 2020).

Informative reading contributes greatly to forming a professional discourse and a professional lexicon as a means of capturing the elementary units of discourse. The problem of lexico-grammatical features of domain-specific discourses requires consideration of the relationship between vocabulary and semantics (C. Orna-Montesinos), vocabulary and syntax (N. Zhinkin, T. Serova). In addition to syntax and semantics, academic discourse as applied to the English language as the lingua franca is

studied in other aspects; the examples are the rhetorical structure of research articles, and hedging and cohesion in academic discourse across cultures (Lakić et al., 2015). A whole area of teaching is developing – discourse-based teaching.

There is no doubt that English-language written and oral engineering texts, and more broadly English-language engineering discourse, have specific features at the levels of paradigmatics (genus – species, whole – part), at the syntagmatic level (subjective, objective, temporal, spatial relationships, relations of quality and others), as well as at the levels of rhetoric and cohesion. The success of professional communication, both written and oral, is also significantly influenced by knowledge and the ability to actively use the system of professional concepts, terms, acronyms accepted in the international community – everything that can be included in the thesaurus of the scientific field.

In a broader sense, the languages of the individual sciences are sometimes discussed. The beginning of this tradition was probably laid by Galileo, who believed that mathematics was the language in which the book of nature was written. In the case of the engineering sciences, the description of the properties, states, movements of objects is possible using the combination of words, diagrams, numbers, graphs, and equations. In particular, the concept of the language of kinematics is known (Bodo et al., 2000), which includes the concepts necessary to describe the motion of objects. Consideration of the phenomenon of the language of kinematics (it is also called the language of mechanics) as a special case of a specialized language allows us to clarify two issues that are important from a pedagogical point of view.

The first one concerns the relation between the language of kinematics (as a synthetic means of accumulation, knowledge transfer, and communication) and a natural language, in particular English as the lingua franca of engineering education.

The second question is whether teaching the language of kinematics can be integrated with teaching a foreign language within one pedagogical system.

THE LANGUAGE OF KINEMATICS IN ENGINEERING EDUCATION

Formal engineering education has existed for more than 200 years; its foundation is associated with the opening by Napoleon in 1794 of the Grande Ecole Polytechnique (Barbieri & Fitzgibbon, 2009). Pretty soon, the training of future mechanical engineers moved from an apprenticeship on the shop floor to a combination of the acquisition of practical skills with the acquisition of solid knowledge in mathematics and physics (classrooms on scientific theory or mathematical analysis), as well as theoretical knowledge in area of the device and functioning of mechanisms and machines. The process of rapid accumulation of a huge amount of knowledge in this area required comprehension and generalization.

Efforts to classify mechanisms were undertaken throughout the 19th century and were based on tables and abstract symbolic notations (Moon, 2003), just as was done in biology and chemistry. Based on the analysis of the composition and purpose of machines, the designations of their typical parts appeared (F. Reuleaux, R. Willis, others).

Franz Reuleaux introduced in the last decades of the 19th century the concept of kinematic pairs into the kinematics of a rigid body. He did so by considering the mechanism as a part of a machine and thus a movable system of bodies that are connected in a special way, with each body imposing restrictions on the movements of others. Reuleaux classified kinematic pairs and proposed symbolic designations. For example, the symbol '*C*' was used to denote a cylindrical kinematic pair, '*P*' was used for a prismatic kinematic pair, and '*S*' was used for a screw pair. The features of parts of the mechanism (parallel to the axes, fixed link, teeth in gear wheels), and even the working medium (λ – liquid, γ – gas) were specially designated. Reuleaux created a whole collection of mechanisms in which all types of kinematic pairs were materialized.

This made it possible to designate simple mechanisms with a combination of letters and numbers, in particular, the crank-slider mechanism, in which the '*d*' link was fixedly designated as $(C_3'' P^T)^d$. This designation indicates that the links of the mechanism are connected by three cylindrical pairs, the axes of which are parallel, in addition, the mechanism includes one translational pair; link 'd' (one of the four links '*abcd*') is fixed.

The importance of the problem of designating and classifying mechanisms, and the degree of success with which it was possible to solve it, gave reason to say that Reuleaux created a kind of "symbolic language ... to classify a machine, a syntax for kinematic devices which he proposed as a tool to address the problem of synthesis, a language for machine invention" (Moon, 2003). Indeed, using symbolic notation and the concept of kinematic chains, Reuleaux was able to identify six ways of synthesis of mechanisms: inversions, expansion of elements, redefining from plane to conic chains, reduction of kinematic chain elements, augmentation of kinematic chains, generation of compound chains. And it really resembles syntax in linguistics, like the synthesis of various sentences from a set of words. Moreover, the language of kinematics actually anticipated topology, a branch of mathematics that only appeared in the 20th century. Currently, the kinematic topology of mechanisms is widely used in the science of mechanisms (Amirinezhad & Donelan, 2019; Mueller, 2015) including such methods of organizing connections of elements as graphs.

In the second half of the 19th century and in the 20th century, work on the analysis and synthesis of mechanisms based on symbolic designations was continued by Pafnuty Chebyshev, Leonid Assur, Franz Grashof, Ivan Artobolevsky, Jacques Denavit, Richard Hartenberg and other scientists. It is not finished even today, the issues of analysis and synthesis of structures of mechanisms from a set of elements is of significant theoretical and applied interest and continues to attract scientists (Pozhbelko, 2019).

Recognizing the importance of the problem of designating and classifying mechanisms, Reuleaux had created a "scientific symbolic language of kinematics (*wissenschaftliche Zeichensprache der Kinematik*)" (Reuleaux, 1875). He was careful to ensure that his kinematic language could be usefully integrated with the ordinary languages of culture. Just as one can use chemical notation to write chemical reactions, so he develops a syntax and semantics for "writing mechanisms (*Schreibung einfacher*

Mechanismen).” And just like the language of logic, his symbolic notation could enable engineers to become aware of equivalences, allowing them to see that two seemingly different mechanisms are really the same (Nordmann, 2002). Since the language allows engineers to conceive hitherto unrealized compositions from the alphabet of machine elements, his is also “a language for machine invention” (Moon, 2003).

The powerful idea of a language of kinematics as an alphabet and syntax of moving devices, the multivariance of the resulting structures and the dependence of the meaning of the parts on their place and role in the mechanism, influenced philosophy. Since one physical state of a machine deductively implies the next, Ernst Kapp (1877) drew on Reuleaux when he interpreted machines as material projections of the human brain (Kapp, 1877/1978). Lewis Mumford (1970) used Reuleaux’s definition of a machine for his theory of non-material socially organized “mega-machines.” When Ernst Cassirer (1985) argued for technology as culture, he followed Reuleaux who showed that natural motion becomes civilized and organized by the mechanical movement of a machine. Most importantly for the present discussion, however, is Reuleaux’s influence on Ludwig Wittgenstein’s *Tractatus Logico-Philosophicus*, Wittgenstein’s engineering education in Berlin was shaped by Reuleaux. As Kelly Hamilton (2001) has pointed out, Wittgenstein’s conception of a proposition is modeled on Reuleaux’s notion of machine elements that can be combined only in specific ways to form a mechanism. Wittgenstein says that the ontological structure of the world is reflected in the logical structure of language – and vice versa (Wittgenstein, 1922; Talalaeva, 2018). The key idea of the philosopher is to understand the structure of sentences as the "logical scaffolding" of the world (Wittgenstein, 1922, 3.42; Borisov et al., 2010), that is, in order to establish the real state of affairs in the world, it is enough to consider the structure of sentences, which together make up language. To know the object *X* means to know which sentences with the name "*X*" are meaningful, and which are meaningless (Wittgenstein, 1922, 2.01231, 3.311; Borisov et al., 2010).

In Wittgenstein's logic, two types of knowledge about an object are distinguished. Semantic – knowledge of the meaning of a name, which does not imply empirical knowledge, this is knowledge about the possibility of facts, the structure of which is a given object. Factual – knowledge about the actual facts that include a given object.

Contextuality is also a characteristic feature of the language of kinematics. For example, if I know the meaning of the object (phrase) rotational kinematic pair R, then I also know that the fact "*a link included in a rotational kinematic pair is capable of turning*" is possible, and a fact “*a link included in a rotational kinematic pair, can translate* " – is impossible. However, the object (name) ‘*R*’ acquires full meaning only in the context of the sentence (in this case, the mechanism). If the mechanism is flat, it can include an unlimited number of objects *R*, about the internal properties of which we have complete a priori information. At the same time, in the case of a three-dimensional spatial mechanism, the presence of even one rotational pair *R* (restricting translational motion along its axis) gives a new quality to the others, since the limitation of translational motion is no longer relevant, it is unnecessary. Therefore, all other kinematic pairs impose excessive constraints (redundant constraints) on motion links, that is, they lose their former internal properties. The way out of this situation is that

rotational pairs *R* (except for one) should be replaced by cylindrical *C*,
which in the semantic sense is equivalent to making a sentence based on other objects.

As for teaching and learning kinematics as a professionally oriented foreign language, it is necessary to find out to what extent the presence of a specific notation system, the logical construction of scientific theses and thematic educational material affect the teaching of the language as a means of professional communication. In other words, is the language of kinematics something unique, or are there general patterns in the formation of languages of professional communication?

Generally speaking, engineering education presupposes fluency in the language of the specialty, some generalized technological language necessary to obtain, accumulate and generate information of a professional nature, expressed both by means of verbal and non-linguistic signs (formulas, pictures, graphs, diagrams, pictograms and other symbols). An important component of such a language, which develops on the basis of the native natural language, is the transnational component, which captures in a symbolic form the experience accumulated by the (global/international) scientific community in the process of studying nature and objects of the technosphere. In addition, in the technological language of professional communication, a synthesis of the native natural language and the language of logic takes place, in which the basic rules for including objects into structures that have semantic and factual meaning are formulated.

In our opinion, the language of kinematics should be considered as a system of communication and fixation of information, which has specific formal and material properties, develops in conditions of social interaction, is characterized by a close connection of speech activity with thinking, has a special system of signs. This language is formed by means of native and foreign languages simultaneously. Thus, it becomes possible to think about the phenomena of mechanics and other branches of engineering science as a foreign language in which to formulate meaningful technological propositions.

It seems that the most important functions of the language of specialty are *naming* and *predication*. In the context of this research, *naming* refers to the methods of generalized description of the component composition, material performance, principles of operation, limits of applicability, characteristics of various types – for devices, machines, mechanisms, structures and other objects of the technosphere. A generalized description is understood as a method of generating information in a form most suitable for its use both in the individual thought process and in the exchange of information between the subjects of engineering labor in the process of face-to-face or space and time-separated communication. *Predication* includes generalized methods of operation, performing actions with objects of the technosphere.

Obviously, the number of languages of professional communication, due to their generalized nature, cannot be infinitely large. The set of these languages corresponds to the enlarged list of specialties, excluding specializations. So, obviously, there is a professional language of a mechanical engineer, electrical engineer, electronic engineer, programmer, etc. At the intersection of specialties, technological languages interact, as,

for example, the language of mechatronics integrates the languages of mechanics and electronics.

TOWARDS THE INTEGRATION OF ENGINEERING AND LINGUISTIC TEACHING

In the process of studying at the university, students become familiar with various aspects of objects of professional interest, while due to the differentiation of scientific knowledge, each academic discipline offers its own ways of learning. Objective factors accompanying the formation and content of training courses in combination with inevitable subjective factors lead to a variety of ways to describe objects of the technosphere. The latter fact, combined with the complexity of such objects, as well as the well-known difficulties that junior students experience in the process of adapting to an academic situation that is fundamentally different from the way of acquiring knowledge in school, leads to difficulties in the formation of an engineering picture of the world that would allow for the productive integration of new information with existing knowledge, and create an information base for engineering creativity (Krylov et al., 2016).

The integration of teaching foreign languages and teaching the language of a specialty has a pronounced synergistic effect (Khalyapina, Almazova et al., 2017; Khalyapina, Popova et al., 2017). Today, there are a large number of definitions of integrated learning. According to some researchers, there are at least forty of them. David Marsh gives the following definition of content and language integrate learning (CLIL), which was later adopted and supplemented by other authors: “content-language integrated learning refers to any educational context focused on two subjects, in which an additional language, i.e. not the main language, in which the entire course of study is conducted, is used as a means of teaching a non-linguistic subject” (Marsh et al., 2001). That is, introducing the acronym "CLIL" into scientific circulation, Marsh implies situations when a foreign language is used in teaching certain disciplines or thematic sections within their framework, pursuing the simultaneous study of the content of the discipline and the foreign language (Marsh et al., 2010). Subsequently, Do Coyle also gives an amended definition of CLIL: “CLIL is an educational approach in which disciplines or their separate sections are taught in a foreign language, thus pursuing a dual purpose: the study of the content of the discipline and the simultaneous study of a foreign language” (Coyle et al., 2010).

The European Commission is considering this approach more broadly, with a view to the use of language as a teaching tool. However, from the point of view of the results of the research carried out by the European agency "Eurydice," it is possible to talk about CLIL when “the dual purpose requires the development of a special, more comprehensive approach, within which a professional discipline is not just taught in a foreign language, but through and through a foreign language" (Eurydice, 2006).

The formation of concepts, categories related to professional activity is effective and personally significant only if there are multiple sources of information about these concepts and categories, as well as multiple ways of updating this information in the

process of educational, quasi-professional and professional activities.
Comparative analysis of information presented in native and foreign languages objectively contributes to a multiple increase in the efficiency of the noted processes. Here, this kind of informational reinforcement comes from learning on the one hand that any language provides rules for the composition of sentences from words, and learning on the other hand that kinematic provides rules for the composition of devices from component parts. Secondly, multilingual education creates conditions for a strong mastery of students in foreign languages: the professional orientation of training significantly enhances communicative interest and motivation for learning, this training is expected to be much more effective than training in professional discourse within the framework of traditional models of teaching a business foreign language in universities.

Integration is an amalgamation of previously disparate parts which leads to the creation of a new entity that is greater than the sum of its constituent parts. In the context of this research, we can talk about three types (threads) of pedagogical integration: between two academic subjects and within each of them.

Interdisciplinary integration of a foreign language as an academic subject in a technical university and an engineering discipline is possible on the basis of a common subject content, didactic principles and methodological approaches that underlie the respective educational processes. This process creates the conditions for overcoming the subject-centered teaching system and for strengthening its humanistic orientation.

Interdisciplinary integration is represented:

- in relation to the object considered by engineers, which contains thought, information, and which is a unit of consciousness, thinking and at the same time a unit of language and speech;

- in the ways of comprehending reality: theoretical and practical activity-based ways, or semantic (a priori) and factual ways;

- in the direction of comprehending reality: from simple to complex, comprehension of the whole through the study of parts that are in a dialectical connection with each other. It is possible to understand the principle of functioning of a part of the system only if the general plan of the system is clear; dependence of the meaning of the name on the meaning of the sentence; the title should be translated after reading the entire article; the exact meaning of the term becomes clear from the context when the term is included in the denotational structure;

- in the focus on the implementation of various methods of mental activity in the process of solving an educational problem, which leads to the expansion and deepening of professionally significant concepts;

- in the formation of "centers of crystallization" in the professional consciousness, around which, following the logic of training, the growth of the conceptual field occurs;

- in relation to motives (emotional-volitional, motivational-value spheres), which are reinforced by the extreme urgency of the task, which creates tension, which can lead to a synergistic effect.

Integration within the academic discipline "foreign language" is determined by the multidimensionality of the process of teaching a foreign language and is expressed in the integration of:

- units of the external linguistic structure and units of the internal deep semantic structure of texts;

- interrelated development of skills of four types of speech activity – listening, speaking, reading and writing. Various types of speech activity can act as both a goal and a means of learning. So, the teaching of oral speech related to the scientific and professional style is based on written forms of communication, that is, on the analysis of texts. On the other hand, if there is a theme-rhematic interaction between the teacher and the student, the teaching of oral speech can be associated with listening and subsequent dialogical communication. On the basis of dialogical and monologic speech activity, it is possible to generate written texts;

- the process of introducing and activating new vocabulary, starting with listening and reading, and continuing with speaking and writing;

- organization of the learning process including the following stages: joint planning, implementation, assessment and correction;

- the formation of a discourse, including linguistic, non-verbal (pictures, diagrams, formulas), background components.

Integration within engineering disciplines occurs along several threads of integration:

- succession of engineering disciplines, partial intersection of their thesaurus fields, the presence of " genes of information " (Polishchuk, 1993), common to several disciplines;

- the allocation of invariant concepts in the structure of engineering disciplines: mathematics (operations to obtain a numerical result), physics (reflection of objective physical reality in the phenomena, rules, laws under study), philosophy (“how we think”, the choice of methods and organization of the solution of the problem) (Polishchuk, 1993);

- when constructing syllabus of educational engineering disciplines, thesauri of which are organized on the basis of the selection of basic concepts, derived concepts, principles, laws, formulas (Semin, 2001). Thus, the concepts of space, time, force, work, energy are common to many, if not all, engineering disciplines;

- in the generality of methods for solving problems (analysis of data, initial / boundary conditions, analysis of dimensions, conversion of units of measurement, construction of a mathematical model, solution of mathematical equations, analysis of the results obtained, planning an experiment, use of methods of the theory of solving inventive problems, etc.), which are common for different disciplines. The language means learned in the framework of the study of one engineering discipline will be transferred, with the necessary correction, to the field of another discipline;

- information message (channel), expressed in the interaction of linguistic and non-linguistic (pictures, diagrams, graphs, formulas) means of communication.

The realization of all the noted opportunities presents significant potential, but at the same time a great challenge for all parties involved in the educational process. Awareness of existing threads of integration and adherence to at least some of them will allow planning and implementing specific pedagogy – integrative teaching / learning. Such pedagogy should provide students with tools for generating and exchanging

information necessary for active creative activity in a profession understood in a broad sociocultural sense with all possible connections. The natural basis for the integration of teaching a foreign language and the language of a specialty is the theory of activity (Aleksei Leontiev, Sergei Rubinstein, Lev Vygotsky). Thus, the second question posed in the introduction, concerning integration, should be answered in the affirmative.

RESULT

In the 2018-2019 academic year at a large public technical university in the European part of Russia, a project was carried out on integrative teaching of a foreign language for the specialty of second-year undergraduate students. The experimental group consisted of 13 students in the field of training related to mechanics. The control group included 15 students of the same specialty.

The one-year English course was largely integrated with the course of Theory of Mechanics, the purpose of the training was to form a system of language competencies in students in a wide area (technology) and in a narrow area (theoretical mechanics). The sequence of study courses is shown in Table 1.

Table 1. Time order of study courses

Semester II	Semester III	Semester IV
Theory of Mechanics (part I – Statics, Kinematics), in Russian	Theory of Mechanics (part II – Dynamics), **in Russian**	
No	English (part I)	English (part II)

Before the start of training in both groups, an attempt was made to test foreign language knowledge in the subject area of statics. The test material offered a variety of activities: multiple choice questions, open-ended questions, gap filling exercising, reasoning questions. By this time, students successfully studied the statics section, that is, they had formed a system of relevant subject knowledge in their native language. However, testing revealed an almost zero level of perception of the same subject information in English, which is why we are talking about *an attempt of testing*.

The design of the pilot training course was based on two principles noted above:

1) teaching methods of generalized description of technosphere objects and methods of describing actions with them;

2) reliance on mathematics (operations to obtain a numerical result), physics (reflection of objective physical reality in the studied phenomena, rules, laws) and engineering philosophy.

The training was organized in the form of thematic units, see Table. 2. The study of the material of the blocks was not linear, sequential, but was accompanied by repeated returns.

Table 2. Educational blocks

Unit I	Unit II	Unit III	Unit IV	Unit V	Unit VI
Numbers	Objects	Data interpretation	Technology	Elements of Theory of Mechanics	How to read engineering research papers

Unit I: students worked on the skills of foreign language reading, writing and interpreting numbers, fractions, mathematical notations and symbols, formulas, expressions, units of measurement of physical quantities. The content of Unit I corresponded to the structure of the math branches, the knowledge of which is required to a sophomore student. These included algebra, trigonometry, elementary and analytic geometry, elements of statistics, mathematical analysis, and linear algebra. In addition, knowledge of the rules of reading the letters of the Greek alphabet was necessary for the successful use of the numerical material included in the unit. As shown above, the symbolic component is very strong in the language of the specialty, hence the importance of this unit.

The essential factuality of engineering requires knowledge of the ways in which objects enter into facts according to Wittgenstein, that is, the external properties of objects. External properties are dialectically connected with internal properties, which provide the basis for a priori logical constructions and for creativity. That is why the Unit II thematic block for nomination and predication of objects of both physical and mathematical nature is important.

Unit III was devoted to methods of extracting information from pictorial sources. Processing of statistical data is logically connected with reading diagrams, graphs, drawings. Engineering work, like any research that has numerically expressed results, is closely related to the analysis and interpretation (handling, analysis and interpretation) of data, so this block is necessary in the course.

The first three blocks were compiled on the basis of a large collection of authentic materials in accordance with the author's methodology (Krylov, 2020a).

Creative work requires a certain horizon, therefore, in Unit IV, built on the material of the well-known textbooks Oxford English for Electrical and Mechanical Engineering (Glendinning, & Glendinning, 1995) and Professional English in Use. Engineering (Ibbotson, 2009), the principles and features of the functioning of various mechanisms, machines, devices, devices, structures were discussed; lexical-grammatical and syntactic, semantic analysis skills were improved.

Unit V was needed to test the feasibility and usefulness of the interconnected study of a foreign language and engineering disciplines. The material of specially designed lessons (Krylov, 2020b) made it possible to deepen subject knowledge by discussing thematic material in various formats.

Finally, following the notion of the need to prepare students for life-long education and the formation of a culture of extracting relevant information from scientific articles and other sources, Unit VI implemented the methodology of problematic research questions.

Upon completion of training, the students of the experimental and control groups were offered a complex test, consisting of 5 parts: Numbers, Shapes, Data Interpretation, Technology, Statics (Theory of Mechanics = Professional Knowledge). The test results in fractions of 100 are shown in Figure 1.

It can be seen that for all five positions in the experimental group, significantly better results were achieved than in the control group. However, according to the test results, one more important conclusion can be drawn: the growth of foreign language professional knowledge (Statics = Professional Knowledge), which testifies to a relatively deep understanding of the subject area, is much slower than the formation of other knowledge systems presented in Figure 1. However, compared to the near zero entry level, the progress is impressive. Thus, interconnected teaching of a foreign language and special disciplines demonstrates significant potential if certain conditions are satisfied, one of the key is the duration of study, which cannot be less than two semesters.

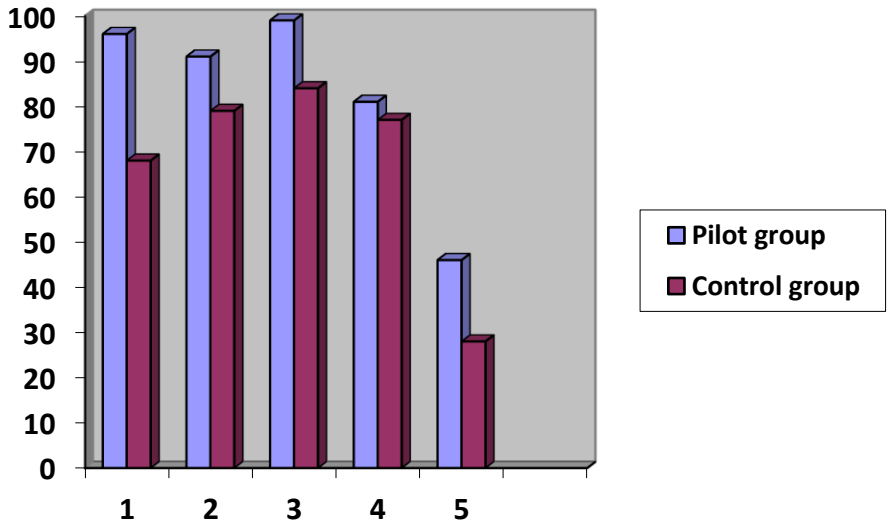

Figure 1 Results of the final testing in the pilot and control groups:1- Numbers, 2 – Shapes, 3 – Data Interpretation, 4 – Technology, 5 – Statics (Theory of Mechanics = Professional Knowledge)

During the project, a survey of students of the pilot group was conducted in September 2018 before the start of training and in May 2019, at the final stage. Table 3 shows the results of survey before and after training.

Table 3. Self-assessment of students in the pilot group

Student	Estimate your ability to carry out written communi-cation (read-ing and writing) in a foreign language,%		Estimate your ability to carry out oral communi-cation (under-standing and speaking) in a foreign language,%		Are you ready to carry out written and oral communi-cation in a foreign language, if necessary,%		Estimate the likelihood that a foreign language may be needed when performing professional duties or in life situations,%	
	before	after	before	after	before	after	before	after
A	30	60	30	60	40	70	100	100
B	65	70	50	50	60	80	80	90
C	40	40	60	60	40	80	99	99
D	40	50	30	50	40	50	90	100
E	40	40	45	50	60	60	80	100
F	70	60	60	60	70	80	70	80
G	20	35	25	40	80	35	100	100
H	30	50	30	59	80	80	100	99
I	51	60	51	50	100	50	90	100
J	50	60	50	60	60	60	100	75
K	40	40	30	30	50	20	100	99
L	40	70	50	60	100	100	100	100
M	85	90	80	90	100	100	100	100

It is noteworthy that in many cases the ability and readiness to carry out foreign language communication show significant positive dynamics. Coupled with an increase in the frequency of using foreign-language internet resources, this can testify to the achievement of personally significant results by students, which may have an impact on their professional trajectory. The reverse dynamics in some cases testifies, in our opinion, to the correction of overestimated self-esteem: training has shown that results can be achieved only in the process of hard work with the expenditure of intellectual and time resources. Not all students are ready for this.

CONCLUSIONS

In the modern world, engineers are looking for local solutions in a globalized world, while engineering problems are solved both in their native language and in the languages of international communication, most often English. For engineers in general and for mechanical engineers, in particular, learning foreign languages is most effective if it occurs simultaneously with their professional education, the development of

conceptual thinking. This makes it possible to choose the shortest, most accurate, least redundant and most effective linguistic expression of professional thought, forming what we call the language of mechanics. Hence, the study of the patterns of formation of the language of specialty in the systems of native and foreign languages will be of great importance for increasing the efficiency and effectiveness of engineering education.

Based on the foregoing, it can be concluded that the technology of content-language integrated learning contributes to the activation of the process of mastering foreign competencies based on the active integration of a foreign language with the process of teaching professionally relevant disciplines. For students who have already had an idea of the basic concepts of the subject, since it is part of the curriculum, it is easier to perceive it in a foreign language. This reduces the uncertainty in the use of foreign language resources for the delivery of content and professional opinion. To form the communicative competence of students of non-linguistic specialties and to join together the process of learning of two languages – the language of mechanics (as the language of a specialty) and a foreign language, it is important to give them the opportunity to think in a foreign language, to solve any problems that generate thoughts in a foreign language, which acts in its direct function of forming and formulating these thoughts. The application of the content-language integrated learning approach is advisable in training students in technical and engineering areas, since for them the study of a foreign language is often not a priority. "The purpose of reading for students of non-linguistic specialties is not so much linguistic material, as information contained in them" (Khalyapina, Almazova et al., 2017). That is why the use of the format of the content-language integrated learning of students of non-linguistic directions is one of the factors that increase their motivation and stimulate educational and cognitive activity.

In this way, our study proved the idea that content-language integrated learning at the systematic use contributes greatly to the main mechanism for activating the learning process of foreign language students of non-linguistic specialties of universities, because their attention is inadvertently held at an interesting, new and meaningful language material. They develop the ability to use the language of their specialty in a non-native language on the issues of their competence. This greatly increases the level of knowledge of foreign language of students at non-linguistics departments, which in turn, increases the competitiveness of the future expert in today's highly competitive job market.

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Research article

Technology and Language in Tattoos

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Abstract
This study identifies graphic features of words that are used in tattoos. Our interest in this type of name tattoos is based on the fact that words have a great significance in a person's life. The article presents the history of the origin of tattoos from ancient times, the geography of tattoos, and also describes in detail the methods of ancient tattooing techniques. It moves on to the main task of analyzing the relationship between fonts and meanings. For this, the tattoos were divided according to their meanings into the categories “emotions”, “principles of life”, and “positions”, and divided also according to the fonts used – “handwritten”, “book”, and “decorative”. The article concludes that handwritten fonts are most often used in tattoos with romantic and family themes from the “emotions” category, conveying the feelings and attitude of the owner towards other people. Book fonts predominantly express the principles of life and motivations of the owners – thereby, they make a significant contribution to the “principles” category. And finally, decorative fonts are chosen for tattoos that are supposed to challenge social stereotypes, mostly from the “positions” category.

Keywords: Body art; Body modification; Tattooing; Ink; Word; Tattoo technology; Tattoo

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Научная статья

Технологии и язык в татуировках

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Аннотация
Данное исследование определяет графические особенности слов, которые используются в татуировках. Выбор для изучения татуировок с вербальным содержимым продиктован тем, что слова имеют большое значение в жизни человека. В статье представлена история происхождения татуировок с древнейших времен, география татуировок, а также подробно описаны приемы древних техник. Главной задачей исследования является анализ взаимосвязи между шрифтами и значениями. Для этого татуировки были разделены по значению на категории “эмоции”, “принципы жизни” и “позиции”, а также по используемым шрифтам – “рукописные”, “книжные” и “декоративные”. В статье делается вывод о том, что рукописные шрифты чаще всего используются в татуировках на романтическую и семейную тематику (категория “эмоции”), передающие чувства и отношение владельца к другим людям. Книжные шрифты преимущественно выражают принципы жизни и мотивацию владельцев – тем самым вносят значительный вклад в категорию “принципы”. И, наконец, для татуировок категории “позиция”, которые бросают вызов социальным стереотипам выбираются чаще других декоративные шрифты.

Ключевые слова: Боди-арт; Модификация тела; Татуировка; Слово; Технология татуировки

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INTRODUCTION

A tattooed body is always a body that tells something about the identity of the one who bears the tattoos. The tattooed body is authentic, as authentic as the personality. Body decoration is one of the oldest manifestations of human creativity. The history of tattoos begins with the Paleolithic era. According to indirect written evidence, such ornaments were used 60 thousand years ago. The actual confirmation is the ornaments on the skin of mummies, which are about 6 thousand years old. The frozen body found in the Alps ("Ötzi the Iceman"), has 57 tattoos and this person lived approximately 3200 BC (Levin, 2008; Pesapane, 2014).

Over the centuries, the technology of tattooing has changed and improved, and it is now possible to transfer finer lines and more complex images. Tattoos had different meanings in different eras and in different countries, they were a sign of inclusion and exclusion, evocation and decoration (Kloß, 2019). Today, decorative tattoos are one of the strongest manifestations of a person's personality. As noted by Arp (2012), tattoos express thoughts, beliefs, experiences, emotions and past personality. Tattoos today can be drawings of any complexity in different techniques. However, the focus of this study is not images but words that people place on their bodies. Tattooing in the modern world is, first of all, a statement. The fact that people use such an extraordinary way to express themselves means that other ways of making statements do not seem sufficient to them.

TATTOO TECHNOLOGY

Needles and pigment reservoirs, which could be used to create tattoos, have been found since the upper Paleolithic period dating from 38,000 to 10,000 BCE (Bernstein, 2006).

The first tattoos in the history of the Indian tribes of Polynesia were made with soot, which was driven under the skin with a special hammer and a sharp stick with shark teeth. The main purpose of the drawings was to distinguish and indicate their status. Special clay stamps were used to create the drawing. There are three main techniques of tattooing. The simplest and therefore most ancient is the scratching of a drawing on the body. The pattern can be preserved by the scars of lingering wounds. This scarring is called scarification, and it is common among people with dark skin tones. Tattooing dark skin is pointless, the drawing will not be visible.

Another technique involves the use of a needle and thread. A black-colored (usually soot-colored) thread from an animal's tendon was stretched with a needle under the skin, and so the pattern was created. This technique was used in North-Eastern Siberia and by the Eskimos of North America. The third technique is the most widespread – pricking the drawing with needles. Metal needles, fish bones, pieces of sharp animal bones, chips of hardwood, fragments of shells were used. The dotted

organization of the drawing allowed for creating a tattoo of any complexity. In some cultures, different pigments were used, and the result was a multi-color drawing.

Further changes in tattoo technology were not very noticeable up until the end of the 19th century. Though the pigments that were utilized changed, the tattoo artist pierced the skin manually. Of course, the choice of dyes is significant since it is their ingredients that can cause allergic reactions and serious harm to health. In order to create blue colors mercury sulphide or cadmium selenide are needed; yellow colors may contain cadmium; for green colors chromium oxide is used (Elsner, 2020: Farley et. al., 2019).

A recipe for tattoo ink can be traced to the ancient Roman physician Aetius (527-565) containing pine bark, corroded bronze, vinegar, vitriol, leaf juice and insect eggs but more frequently used was a mixture of soot, charcoal and natural ingredients (Berchon, 1869).

Levis in Philadelphia was the first American to advocate and practise tattooing with colors. In Utrecht, Archer was the first to make an exhaustive and valuable study in 1874 of various colored pigments, carrying his research in three directions: the fixity of colors, modifications occurring in the corneal tissue and the disposition of dispersed pigment particles. Different colors derive their color from quite different substances. For example, yellow can be produced by azo dyes or cadmium sulphide, and white by lead carbonate, zinc oxide or titanium dioxide. These recipes were invented in the late 19th century, and not all of them were safe for the human body: In fact, cadmium can harm the central nervous system, kidneys, and liver. Historically, the formulation of tattoo inks was seen as an art rather than a science with inks being purchased on the reputation of those creating them (Bahrawy et al., 2015; Ziegler, 1922).

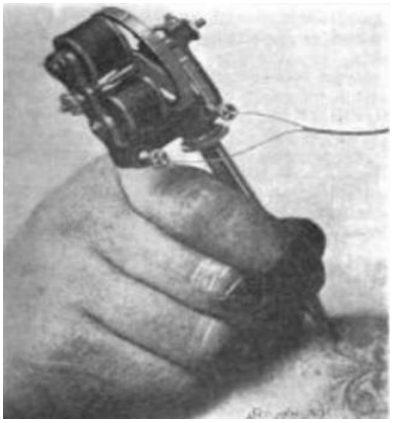
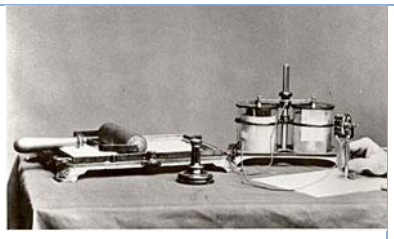
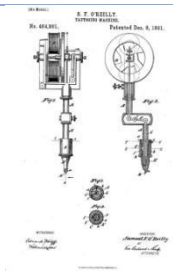
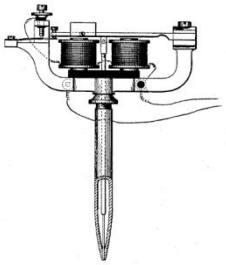
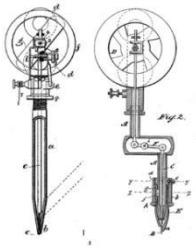
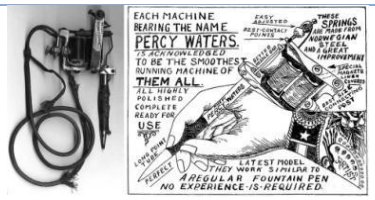
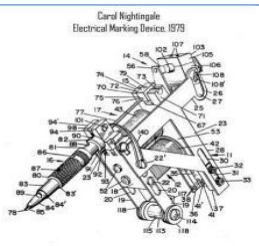


Figure 1. Electric tattoo machine

Technological progress that changed the tattoo process occurred at the end of the 19th century. Thomas Edison invented in 1876 the electric “pneumatic stencil” pen that made it possible to create a stencil by perforating paper with a needle. This was in 1891 used by Samuel O'Reilly to create an electric tattoo machine (Figure 1). The new machine, equipped with several needles and a paint tank, made several punctures per second. Over the next years, a lot of improvements and customization for different requests followed. So, Alfred Charles Sauce added two coils to the pneumatic stencil pen and changed the needle drive and ink supply (Parry, 2006). Tattoo machines made it possible to create painterly pictures in the skin, and the popularity of decorative tattoos grew.

Table 2. History of tattoo technology

1876	Thomas Edison's electric pen		
1891	Samuel O'Reilly's electric tattoo machine		
1899	Alfred Charles' machine		
1902	Getchell's tattoo machine		
1929	Percy Waters' tattoo machine		
1979	Carol Nightingale's tattoo machine		

Although it is still possible today to find masters who use manual needles rather than electric devices, most often two main types of machines are used for tattoos: 1) popular for over a century are induction (coil tattoo) machines, based on electromagnets ("coils") which set the movement of the striker to which the needle is attached, and 2) rotary machines which became widespread in the 2010s, where an eccentric disc with mismatched axes of rotation – an invention by Manfred Kohrs (Fuest, 2008)) – converts motor movement to needle movement.

Despite their slower speed of operation rotary machines are popular because they are light, make less noise and do not vibrate. Pneumatic tattoo machines are far less common (inventor Carson Hill in 2000), although they provide quality and ease of operation while being the most painless. There are special machines for drawing special types of lines, for example, the Liner tattoo machine for bright dominant lines or the Shader tattoo machine with low saturation to create a shaded surface (Alayon, 2007).

New technologies not only change the appearance of tattoos, they introduce trajectories of development that come with a redefinition of their purpose (Neef, 2006). New tattoos (NT) turn the skin into a source of dynamic and reversible lettering, possibly responding to fine-grained organic variations of the skin (Bitarello et al., 2011).

METHODOLOGY

We analyzed the tattoos of 488 people – of these 158 were known through personal contact, the remaining 330 persons found on various social media sites (mostly Instagram). All statistics are based on the tattoos featured in social networks, namely live accounts and personal dating interviews. Clinton Sanders (2009) indicates that the tattoo subculture is being brought into the mainstream via social media. Margo DeMello (2000) sees social media as a way for tattoo lovers to build community. Force Ryan (2020) shows the special place that Instagram occupies in tattoo culture. We found the 330 publications of tattoos based on words posted on personal accounts in social networks. Of these, 24% of the tattoos were created by men, 76% by women. Next, we interviewed 158 University students who have tattoos containing the words. The survey was anonymous, all participants agreed to participate and gave permission for the publication of the photos in this study. All tattoos in the study are presented anonymously and without specifying their affiliation.

DISCUSSION

Analysis of fonts used in tattoos

When a person is going to place a word or words on his or her body, then its meaning comes first, but one should not lose sight of the visual representation of the

word, which can affect the perception of the written word. Psychologists have studied the influence of typefaces on humans since the 1920s (Poffenberger & Franken, 1923) when the development of typographic technologies made it possible to diversify printing. However, reliable information about the psychological aspects of typefaces practically does not exist (Brumberger, 2003, p. 206). Only occasionally, authors have attributed certain typefaces to such qualities as “serious yet friendly” (Kostelnick & Roberts, 1998) or “very urban, with a touch of the theatrical” (Shushan & Wright, 1994).

If one of the main selection criteria for typographic options is ease of reading (Dyson & Suen, 2016), then, in the case of logo fonts, emotional perception comes to the fore (Doyle & Bottomley, 2006; Grohmann et al., 2013). On the one hand, some fonts have a long history and are associated with a particular culture. On the other hand, the art movements of the twentieth century such as the Bauhaus school of design (Germany) and VKHUTEMAS (Russia) proved that expressiveness is achieved through the dictate of the form of artistic expression by its purpose and essence (Kinross, 1992).

Figure 2. Example of a handwritten font

The perception of a letter tattoo is influenced by both the artistic expressiveness of the font and its size. These two parameters are interrelated and also depend on the place of the body where the inscription is placed. This does not mean, however, that longer text takes up more space on the body. On the contrary, some owners find it interesting to produce the text in the smallest technically possible font. What matters here is whether a person makes a tattoo first of all for him- or herself to see, whereby only persons close to the owner can see it in rare situations. Alternatively, one can place a word or messages so that “everyone can see” it. Especially in the latter case the font size will be significant

The digital fonts that exist today are extremely diverse. Some tattoo owners strive for rare “unique” fonts, others use standard well-read fonts, while yet others use fonts whose expressive power gives the word a special emotionality. In some cases, the word can dictate the font, so the inscription COVID-19 would be ridiculous if it were made in intricate italics with swirls.

The font is an important part of any design, its tone of voice and mood. Correctly selected fonts create a sense of style, completeness, and quality. With good fonts, any design looks more thoughtful, and the information becomes relevant.

While studying the fonts used in tattoos, we concluded that they can be divided into three large categories: handwritten fonts, book fonts, and decorative fonts. This is due to the fact that visually for a person who does not study fonts from a professional

point of view, there is not much difference between antique and grotesque, but there are obvious differences between a font that looks like human handwriting and one that one sees every day in books and other printed publications. Let's look at these groups in more detail. All examples of tattoos will be introduced here by writing the name of the described font in that font.

The first group is *handwritten font* (Figure 2). This is the largest group, which was used in 59.6% of the total number of tattoos we studied. The *Handwritten fonts* imitates the handwriting of a person, when creating a tattoo sketch, one can also make it look like the client's handwriting. Thus, after applying the tattoo, it seems that the owner wrote it on his or her own body. Handwritten fonts are mostly imitation, have their own rules and standardization, but people perceive them as fonts that better convey their feelings, more personal and varied. In some cases real handwriting is used when preparing a sketch. For example, one of the tattoos we studied was invented and written for the owner by her mother as a family joke. In this case, the tattoo becomes unique. Another one imitates a childish shaky handwriting: "Mom, what if I don't want to be a good girl?", implying the inner child's appeal to an adult.

Figure 3. Example of a book font

The second group, the second most popular – book font (Figure 3). It was used for 27% of the total number of fonts and includes several types of standard fonts.

First of all, there are varieties of antiqua, a font characterized by the presence of serifs on the letters. The old-style antique, which made up 1.2% of the tattoos in this group, was used only a few times in the ones we studied and conveyed instructions: "be kind", "be human." The transitional antique for writing numbers and a few phrases was used for 6.7% of tattoos, especially for writing numbers and several well-known expressions such as "right here, right now" and "Explore." New-style antiques accounted for 7.9% of the total. It is difficult to systematize the cases in which it was used, since it corresponds to a diversity of inscriptions: "Miguel," "thoughts are material," "Balance." Bar antique was used for 14.6% of the tattoos with book fonts we studied and was used most often in combination with drawings: "COVID-19," "Take care of yourself," "oltre" (which translates as "out").

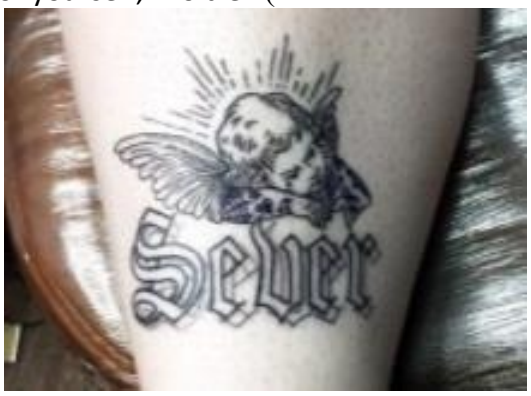


Figure 4. Example of a decorative font

Also included in the book fonts are four types of grotesque fonts, which do not use serifs. Old grotesques accounted for 10.1% and were used in laconic tattoos: " nightmare," "grounded," "sorry". In 5.6% of tattoos new grotesques were presented, which are written quotes in Portuguese: "Bem me quero" ("well, I want"), "Feita de sói e mar" ("Made of sun and sea"). Humanistic grotesques make up 19.1%,

they were found in tattoos with the texts “Future,” “I can do anything,” “pride and joy.” Geometric grotesques were the most popular: they were used in 34.8% of the examples in this category. In tattoos (“5DMC,” “Go hard, go home”), they were combined with lines and other simple geometric shapes.

As mentioned earlier, these fonts are perceived by humans as mechanically printed. They also do not look like the expression of a person's thoughts and are often used for quoting – songs, phrases, poems or just generally accepted ideas.

The last group is decorative fonts, which make up 10.6% of the total number (Figure 4). In this category, we have divided *Gothic decorative fonts* and display typefaces, since they assume a complex pattern connected with letters. It can be drawings, lines complementing the letters, attempts to make the letters look three-dimensional (Figure 4) with the help of shadows and colors. Most often, the decorations in these fonts are thematically associated with the context of the written text – the Wild West, the world of Tolkien, and so on. The *Gothic decorative font* is most often used for expressions in Latin (for example “*Aut vincere, aut mori*” – “*Victory or death*”) since it originated in the 12th century and can thus be associated with the even older, “dead” language Latin. This font was used in 74.2% of cases. Display typefaces were used in 25.8% of the examples and were also supplemented with drawings, conveying certain messages to people around them: “Breath in – breath out”, ”Spread love”.

Most often, such fonts are copyrighted, so each tattoo artist has their own style and can use such fonts repeatedly – this makes the question of the uniqueness of tattoos in this category controversial. Decorative fonts are creative, eye-catching tattoos, sometimes the words in them are difficult to make out.

Analysis of words and meanings in tattoos

Most tattoos are short, consisting of several or even of just one word. They need to maximize meaning in the small space set aside for the tattoo. One short word can be written large enough and read well. The longer the text, the smaller the font size will be, the text will be hard to read even at close range. Long text for tattoos is usually superfluous, nevertheless an interesting example of a very long text is the recipe: “ ‘kartofelny’: – boil a thick puree with butter and an egg; add flour, make cakes, – scroll the boiled meat in a meat grinder + two boiled eggs + spices, – fry in a pan: finely chopped onions + sauces + a mixture of meat and eggs, – make pies from tortillas and the resulting filling; fry from 2 sides. ” Of course, the owner of the tattoo did this not because he lacked a notebook for writing down recipes, but in honor of the love for grandmother and her pies.

Very often, a word or sentence serves as a kind of encrypted sign referring to certain life events. Some “password words” are more common than others but the sample of the study suggests a great deal of variety. Even the strongest and most common words are not repeated so often: the words “love” (2,9% of usage), “life”

(1,22% of usage) and “never” (1,16% of usage). The word “love” can be mentioned in the context of love for yourself, for the environment, or for other people – “love yourself,” “love is,” etc. Some tattoos, as in the example on the left, where “amore” translates to English as “love”, contain only this word, obviously hinting at the importance of this emotion in the life of the person who made it.

The category “principles” (of life) has a more unambiguous interpretation and is associated with people's views on their lives and behavior. Given that tattoos are often associated with important events that people want to capture on the skin, tattoos can reflect the views and principles of their owners, as well as the lessons that they might learn from what happened. In addition, the word “life” often appears in well-known cultural expressions, for example, “La vita e bella, ” which means “life is beautiful. ”

The word “never” is associated with the promises that people make to themselves and others. These promises are then transferred to the skin to be a reminder for life: for example, “never say never” or “never give up.”

But the spread of words’ variety and usability is visibly huge, so all tattoos were divided into 3 main groups to make consideration and processing simpler: emotions, principles (of life) and positions (figure 5).

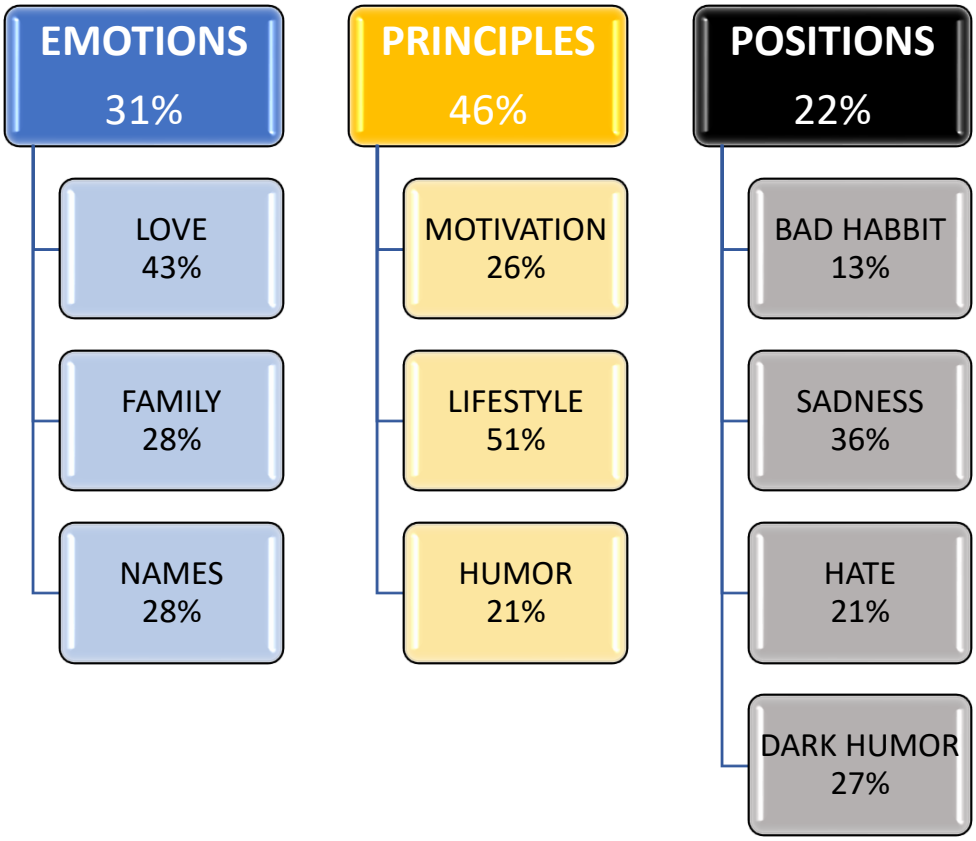


Figure 5. Percentage distribution by concept categories

In the first group, which includes our feelings towards other people, art and beautifulness, and even ourselves, there are 103 phrases in total. This is 31% of the total number of tattoos we considered. To sum up the received information, the group was separated. In conclusion, there are these subgroups: love, family, names (Table 2).

Table 2. Statistics by category "Emotions"

Emotions		**31 %**	
№	Category	Percentages	Examples
1.1	Love	44%	 "Love"
1.2	Family	28%	 "When I stop breathing, my children's hearts will continue to beat"
1.3	Names	28%	 "Helen"

Mass culture used to define the word “love” as a romantic emotion or relationship, and because of our esteem of romance this topic in the current subgroup is the most used; 58% tattoos from the “love” subcategory are describing this kind of love.

However, some people prefer to use for their tattoos phraseological units and well-established expressions which are usually exchanged between lovers: “Ángel mío, estate conmigo, tú ve delante de mí y yo te seguiré” (“My angel, you go ahead, and I will follow you”) – a well-known Spanish aphorism. Other expressions of love are “Forever yours,” as well as confessions (“You electrify my life”) and nicknames typical for people in relationships (“Baby”).

Second in terms of popularity is love as a feeling in general, and it accounts for 29%. Almost all of these instances include exactly the word “love” or modifications of it to show appreciation of this emotion or the significance of love.

Figure 6. Example for the "Love" category with text “Love”

In such tattoos, there is rarely a context that hints at which of the meanings of the word “love” is used. The owners of such tattoos consider love as an important part of their lives and want to preserve it. “Just love,” hearts or just the word “love” – such tattoos are concise and at the same time quite clearly reflect the position of the person (Figure 6).

There are also tattoos that combine the words “love” and “hate” as two strong emotions, often echoing each other in literature and cinema.

Two least used topics are friendship and self-love. They contain 13% on the whole.

Self-love is expressed on tattoos through appeals not to forget to love and take care of ourselves no less than of the people we love. It is not just about self-esteem but also about satisfaction of physical needs, taking care of yourself, accepting your shortcomings, and so on. Tattoos with those appeals are similar to each other: “Love yourself,” “Do not forget to love yourself,” this can also include “Believe in yourself” and “Be yourself.”

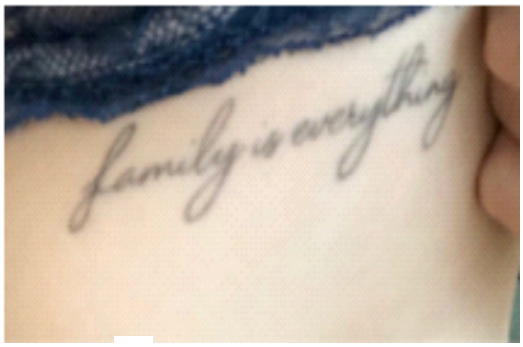


Figure 7 Example for the "Family" category

The second subcategory, platonic love, is the expression of support through a tattoo such as “I'm for you” or “Stay strong.”

Another heart-warming topic is family which amounts to 28% from the "emotions" category. 69% of those tattoos were related to parents with words "Mom and Dad" or contained words about how important parents and family are on the whole for the owner, as in "Family is everything" (Figure 7).

And 3% of these tattoos were related to sisters. We do not know for sure if these refer to actual sisters, since young women sometimes consider themselves sisters. Strong family ties can provoke a person to imprint the names of their parents or their children on their skin for life.

In addition, many have a beloved one's name on their bodies. 28% from the "emotions" category involve names.

These can be presented, for example, as two names in the same ring or eternity circle or decorated by indicating the year of birth or other drawings, but the essence remains the same: to memorialize the name of a dear person. There are even people who create tattoos with the names of their pets.

The second overall category concerns values that matter to life on people's bodies. 47% of the total number belongs to this group, and as in the previous group were structured into subgroups: motivation, lifestyle, humor (Table 3).

Table 3. Statistics by category "principles (of life)"

Principles (of life)		**46.67%**	
№	Category	Percentages	Examples
2.1	Motivation	26%	 "Never give up"
2.2	Lifestyle	51%	

			“Space inside”
2.3	Humor	21%	 “Go to the south” (but the word “south” is written as it pronouncing to make it similar to the swear word in Russian backwards)

Firstly, a person's desire to see motivational quotes is definitely huge and strong, because in our research at all this subgroup is second by popularity of using. 69% of phrases and quotes were divided into this theme, and that means the worth and significance of humans staying motivated through their lifetime. An example of the most frequently used motivational phrase “everything is in your hands” (Figure 8).

Figure 8. Example for the “Motivation” category with text “Everything is in your hands”

Many inspiring and motivating phrases have come to modern speech from antiquity, and many tattoo owners choose common expressions in Latin as inscriptions, such as “Per aspera ad astra”. (“Through the thorns to the stars”), “Aut vincere aut mori” (“Either victory or death”),” “Vivere militare est” (To live is to fight), and so on.

Figure 9. Example for the “Lifestyle” category

In addition, people put tattoos on their skin with author's inscriptions and popular slogans, such as ”Never give up, because good things take time,“ ”Follow your heart,“ ”Be kind, be human”, “Everything is possible” (figure 9).

Secondly, the subgroup “lifestyle” is the most mentioned, and it includes 52% of tattoos in this category. Here, happiness is the most used theme (73% of phrases).

As with the word “love”, the word “happiness” has many meanings and it is used in tattoos as a word that does not need additional explanations, since its particular meaning is a personal matter of the owner.

Figure 10. Example for the "Bad habits" category

Religion and lifestyle-preferences are quite on par since 15% of tattoos in this category pertain to the first and 13% to the second.

Putting words of prayers and appeals to God on household items and memorabilia for religious people is a long-standing practice. With the help of a tattoo, a person can also demonstrate their attitude to life (with faith in the Almighty) and at the same time leave parts of prayers on their skin, such as “Save and Preserve”.

Tattoos related to preferences are mostly based on hobbies: “My life is music” and “Rock'n'roll”, as well as tattoos with images of your favorite basketball teams (for example, the Lakers).

The last of this group’s subgroup is humor. This topic is quite small compared to others, because it has only 3% of tattoos in it. This refers to people wanting to cheer themselves up or just having fun doing a tattoo.

Those tattoos are built on self-irony and sarcasm, the ability to laugh at their own characteristics and shortcomings (for example “Do not wait for a miracle, do one yourself”, which is a funny pun). The third major group reveals dark themed tattoos, from gloomy thoughts to depressing sides of one’s mind. Subgroups (dark humor, hate, sadness, bad habits and curses) include 22% of phrases overall (Table 4).

Consider the subgroup “sadness”, which is the biggest in this category and which includes 37% of phrases. With the help of the examples below, one can see that this category of tattoos is mainly associated with disappointment in love or in people. In these tattoos, people express their pessimistic views on life and the belief that the world is not as colorful as they see it.

This takes us to the least subscribed theme overall, namely “bad habits” which includes 14% of tattoos in the positions category. Tattoos from this category include negatively colored words (for example, “Alcohol is a dream killer” (Figure 10)), as well as pictures that underpin them. For example, bottles, cigarettes, syringes. This indicates the desire of the owners of such tattoos to oppose public stereotypes that condemn such habits.

Figure 11 Example for the "Hate" category

The “position” category contains 22% of tattoos. Their meaning is not a valid expression of hatred, although some statements may seem to be a manifestation of misanthropy. Most often, tattoos of this category people try to convey their cynical attitude to the world and the people around them. In addition to the example, there are tattoos with the following inscriptions: “I want everyone to get behind everyone”, “I hate people” and “Toxic” (Figure 11).

The next category is “Black Humor”, in this category we have identified 27% of tattoos. Judging by the results that we received, many tattoos in this category were supplemented with a pattern, which made them more indicative, like the tattoo in the example on the right. There are also inscriptions “Existence is painless if you are dead”, “I will grow up – I will die” and so on”, “My world of bullshit”.

Table 4. Statistics by category “Position”

Position		**22 %**	
№	Category	Percentages	Examples
3.1	Bad habits	13%	 Alcohol is a dream killer
3.2	Sadness	36%	 “In the range between happiness and hope”
3.3	Hate	21%	 “Revenge”

3.4	Dark	27%	 "Never trust humans"

Another interesting detail is the frequency of the usage of quotes, phrases from books, films, TV-series or even from songs. 46 from all of tattoos are refer to popular quotes, such as "carpe diem", which is about 14,99% of all results

It is interesting to note that the verbal expressions presented on the body are sometimes difficult to interpret, or the meaning implied by the author will not coincide with the most obvious one. The most obvious way to "hide the meaning" is to use little-known languages, which will be for most Russians everything except Russian and English, but it is especially difficult to perceive hieroglyphs as a verbal message. However, artificial languages can also be used, most often from works of fiction (Elvish from Tolkien's books, the language of the Star Wars universe, the Valyrian language created for the Game of Thrones series, etc.). There are several examples of inscriptions in a language that is not at all identifiable, in which case the message is known only to a few initiates. Special terms, jargon, names, or other words that are unknown outside of certain groups may be used. For example, 5RDMS | A is a data server. Sometimes comprehension of the meaning can be hampered by the contradiction between the image and the words, for example, the word "love" is written using the coiling of a snake. In other cases, although the understanding of the inscription is not difficult, the owner of the tattoo implies something not obvious – as in the case of a quote that has a special meaning for those who are familiar with the cited work.

Table 5. Variants of "hiding the meaning" in words

Category	Examples	Meaning
Unknown language		Hidden

Artificial language		Owner's name written in Daedric language (the language of Daedra and dunmers first appeared in the game "An Elder Scrolls Legend: Battlespire")
Using of non-linguistic sign systems		Infinity is not the limit
Little known language		Samurai
Little known words		Zugzwang (from German) – "Forcing to move" for example in chess. When the player stands under pressure to act even detrimentally.

Contradiction between verbal and visual language		The owner of the tattoo believes that the tattoo demonstrates her hot temper and impulsiveness, combined with reliability

CONCLUSION

In this article, we explored the meaning and significance of tattoos on the human body. In a world where writing has existed for more than six thousand years, where we constantly see the words expressed in the text, it is easy to see that not only the meaning of what is written is important, but also the form in which it is conveyed. The meaning of the words on the tattoos and the fonts used in them are inextricably linked, since the choice of font is based on personal preferences and attitude to what will be written. As such, the font is an important technological dimensions of tattooing as a technique of communicating and self-expression.

The language of texts created on one's own body is a special phenomenon. Tattoo creation includes a technical and a creative side. Forced conciseness forces us to achieve maximum verbal and font expressiveness. This does not mean, however, that the inscriptions will be understandable, sometimes the meaning of the embedded message is hidden and accessible only to a certain group.

The implied longevity of tattoos which will accompany persons for a long time – probably all their life – forces them to approach the creation of the inscription thoughtfully and seriously. This study shows the relationship between the meanings of the inscriptions and the writing used, however, there are many other factors that remain to be investigated, for example, the placement of the tattoo, the relationship with the drawings, and so on.

Handwritten fonts were most often used in tattoos from the “emotions” category (54% of the number of tattoos in this group), in the “principles of life” category they were found in 47%, and 46% in the “positions” category.

This can be explained by the fact that the category of “emotions” includes tattoos associated with romantic themes, family love and the names of people dear to the owners. It has already been mentioned that the imitation of handwriting makes these fonts unique. Emotions are very personal, so everything connected with them should stand out and at the same time express sincerity. It also turned out that in this category, by percentage, handwritten font was most often used in the subcategory “family” – 62%. However, according to the absolute number of examples, it was used most often in the subcategory “love”.

In general, in the “principles” category, handwriting was also popular, particularly in the “motivation” subgroup, which is similarly personal as emotions. Usually, people project on such tattoos the words that help them not to give up and continue to fight. In such matters, the words of personally connected people play a big role, thus many tattoos of the subcategory “motivation” are written in handwritten font.

In addition to the positive side, the handwritten font can also express the secret fears or tragedies of a person, which are also a personal matter. Therefore, you can see that it is often found in the subcategories “sadness” (56%) and “bad habits” (60%). In the other subcategories of the “positions” group, handwritten font is rare, since it is not associated in the human mind with hatred or black humor.

Book fonts are most often found in the “lifestyle” category – there they make up 30% of tattoos. As it has already been found out, many examples from this group are quotes from books, songs, well-known catch-phrases that we often see in books and as slogans, so they are associated with printed text and standard fonts. In the sub-category “humor,” the book font is popular, as it is used in 36% of tattoos in this sub-category. Here, the joke resides not only in the meaning of the tattoo but also in the form of its expression.

In second place for book fonts is the category “positions”, in which book fonts accounted for 29%. Most often they are found in the subcategory “black humor” – a lot of tattoos belonging to this group show jokes already invented by someone from the Internet or books, that is, they are quotes or already established constructions, and therefore they are naturally transmitted in standard fonts. It is noticeable that the romance of the handwritten font seems inappropriate when you want to convey someone's words that have been spoken many times by different people, and the decorative font makes it difficult to read the tattoo which would prevent jokes to produce the desired effect.

In the “emotions” category, the book font was used the least often. It was said above that the dissimilarity of the handwritten font to all others – which can make a tattoo special and personal – is fitting for emotions and makes it so popular in this category. Obviously, the book font does not have such characteristics, so tattoo owners are less likely to choose it to express words of love or the names of dear people.

During our research, we found that decorative fonts are mainly used in the "positions" category. These fonts are quite specific and can convey the peculiarities of the thinking of tattoo owners, since their design depends on the skills and imagination of the master, as well as the style of the owner. Decorative fonts are most frequently found in the "hate" subcategory and account for 44% of the samples in this group. The tattoos that we have identified in this category are mostly unusually designed quotes from movies and TV series, as well as author's sketches, in which the use of an accidental or ancient Gothic font allows you to better reveal the meaning of words. Unlike handwritten fonts, decorative fonts are mostly not romantic and seem strange and frightening to some people – they express aggression and are expressive enough to convey hatred and black humor but are not suitable for use in tattoos of the subcategories "sadness" and "bad habits."

Less often decorative fonts were used in the "principles" category: only 23%, with the largest share in the subcategory "lifestyle" (30%). This is twice as much as in the "motivation" subcategory and more than the 18% in the "humor" subcategory, which can be explained by two conclusions from the previously described studies. First, it has already been mentioned that decorative fonts convey the characteristics of tattoo owners. Secondly, in the "lifestyle" group, people try to express their opinions and attitudes to life.

In the "emotions" group, decorative fonts occupy only 20%. Despite the possibility of getting a unique tattoo, decorative fonts do not look gentle and smooth enough to be used often in the subcategories "love" and "family", where they occupy 15% and 21%, respectively. However, they can convey the character of people whose names people want to write on tattoos, so in the "names" subcategory, decorative fonts make up 27%.

Based on all the above, the following conclusions can be drawn.

It is important to approach the creation of a tattoo sketch with special care: choose the right words and choose the design – the font. Since the tattoo carries a lot of meaning and something important for its owner, he will try to convey his attitude to what is written as accurately as he can, which is possible only with the use of the correct font. People who imprint a bitter joke on their bodies about the injustice of life will not use the handwritten style associated with romance and feelings. On the example of tattoos, one can practically investigate how the semantic meaning of fonts is understood.

Handwritten fonts are used by tattoo wearers to express their feelings – love, sadness, longing, friendship. All of this is directed at other people or represents their thinking as it becomes applied to the body. As a result, tattoos that utilize handwritten fonts are often associated with specific loved ones. Book fonts are more like thoughts that can be read in a book or heard in a movie. Words written in book fonts no longer come from specific people, they are left on the body to remember. Such tattoos are created to motivate and remind us of what is most important, and this is not limited to interpersonal concerns regarding someone else. Decorative fonts also do not have a specific audience; however, they are most often used for tattoos which are created to challenge society and stereotypes in general. Their owners will always remember their favorite bad habits or that the world is a cruel place. What they leave on their bodies is rather a reminder to everyone as to who and what kind of person the bearer of these tattoos is. Words written in decorative fonts are always striking, and new acquaintances can immediately understand who they are talking to.

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Research article

Politics of Usernames

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Abstract

We interact with usernames every day to communicate on the Internet. We are so familiar with this practice that it seems banal and we therefore fail to see the political implications associated with it. This article aims to help uncover this political dimension of the username. At first, the article follows the argumentation of two texts by Jacques Derrida, from where I establish a connection between the phenomena of proper names and usernames. Derrida deconstructed the founding act of American Independence to work out the role of the signature of proper names. He does the same with Friedrich Nietzsche's proper name to show that proper names play a far greater role in political processes than we might expect. In this context, the modern state is disclosed as an archive and administrator of proper names, while the new phenomenon of the username evades this state power and itself has the institutional potential to become powerful. Because access by the state through verification of names fails with the username, people are more difficult to identify in digital space. The state archive therefore can't exercise political power over usernames. At the same time, the lack of verification of a username creates the potential for new institutional forces which leads to a conflict with the modern state. This topic is illustrated using the username Q and the politically explosive QAnon movement. Lastly the article points to the conclusion that the phenomenon of usernames is shifting our institutional structures and questioning our beliefs about the modern state, identity and truth.

Keywords: Username; Politics; Signature; Jacques Derrida; Verification; QAnon; Institution

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Научная статья

Политика имен пользователей

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Abstract

Мы взаимодействуем с именами пользователей каждый день, чтобы общаться в Интернете. Мы настолько знакомы с этой практикой, что она кажется банальной, и поэтому мы не видим связанных с ней политических последствий. Данная статья призвана помочь раскрыть политический аспект имени пользователя. Вначале статья следует за аргументацией двух текстов Жака Дерриды, где устанавливается связь между феноменом имен собственных и имен пользователей. Деррида деконструировал основополагающий акт американской независимости, чтобы выяснить роль подписи собственных имен.. Он делает то же самое с собственным именем Фридриха Ницше, чтобы показать, что собственные имена играют гораздо большую роль в политических процессах, чем мы могли бы ожидать. В этом контексте современное государство раскрывается как архив и администратор имен собственных, в то время как новое явление имени пользователя уклоняется от этой государственной власти и само имеет институциональный потенциал, чтобы стать силой. Поскольку государство не выполняет проверку соответствия имен пользователей, людей труднее идентифицировать в цифровом пространстве. Следовательно, государственный архив не может осуществлять политическую власть над именами пользователей. В то же время отсутствие проверки имени пользователя создает потенциал для новых институциональных сил, что приводит к конфликту с современным государством. Эта тема проиллюстрирована с использованием имени пользователя Q и политически опасного движения QAnon. Наконец, в статье делается вывод о том, что феномен имен пользователей меняет наши институциональные структуры и ставит под сомнение наши представления о современном состоянии, идентичности и истине.

Keywords: Имя пользователя; Политика; Подпись; Жак Деррида; Верификация; QAnon

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BANALITY OF PRACTICE

Communication in the 21st century is increasingly shifting to the digital space of the Internet. Whether social media platforms or email accounts, countless texts are produced and messages are exchanged every day, including a large part of public forms of communication. The base of technology for the Internet poses a problem for these forms of exchange. How can it be ensured that behind the discourse of participants, there is a binding identity?

The answer to that so far seems to be: the username. This is a name that shows from which user the communication originates and to whom it is to be assigned. The best example of this form of name is the email address which is mostly used in private conversations. Other usernames appear in connection with forums, boards and social media platforms such as Twitter and Facebook.[31] On these websites, you are asked to identify yourself in a very rudimentary form in order to create a name with which all further actions on the respective platforms are linked and identified. The practice of the username seems very familiar to us now, we use it every day in various forms. We are increasingly creating new names and discarding old ones. Our dealings with them have become so common that we use these names to make statements or publish parts of our private lives. Can we now say that the username is just a technical solution to a practical problem? Or is something deeper changing here? Are we even shifting basic conceptions of our political institutions? This sounds like a broad claim for such a banal phenomenon of our everyday life. But we are increasingly coming across the effects of usernames. These are effects with a political dimension with thousands of people networking on the Internet, founding movements and carrying out political fights. If you only assign a technical function to the username, you fail to recognize its power. Although we have already known it, we have been using a form of a name for a very long time that makes it apparent how usernames can be understood – these are proper or given names.

All these questions about usernames are not new, they originated with the beginning of human communication. Regarding acts of speech or physical acts, it is implied that someone is addressed. Especially, when people are strangers to each other or when common goals have to be pursued. Without a basis of trust, without being able to address something to someone and without being aware of an identity, the complex forms of communication and general exchange between humans cannot work. Therefore, the proper name plays an exceptional role in all of these processes. When someone expresses oneself publicly, one is always accompanied by his or her personal name as an expression of one's identity. My name Matthias Heß accompanies this article and assigns the content to myself. I enter a discourse with this name and through that name part of my identity is revealed. Proper names are so closely linked to personality that we sometimes forget how we interact with them when we speak them or write them down. Similar to the username we are mostly unaware of how we use it and which dimensions are affected by it. The aim of this article is to show that the

[31] For other aspects and further reading about the relationship between social media and politics: (Bailey, 2021; Calderaro, 2018).

username, nowadays, plays a similar role as that of the proper name in the pre-digital age. Both phenomena have a great effect on how the username initiates profound changes in dealing with institutions and the evolution of states. To illustrate my points, I relate to the thoughts of Jacques Derrida (1930-2004), from two of his famous writings, *Otobiographies* and *Declarations of Independence*.

PARADOX OF SIGNATURES

Derrida's papers deal with American Independence, and the authorship of Friedrich Nietzsche (1844–1900). With the help of these cases, it will become clear why proper names, like usernames, should not be overlooked as banalities. Let's start with the phenomenon of the proper name, the name given to children by their parents, the one recorded in a passport but also the name states registered in their laws. First, I would like to point out that all these proper names can be categorized and are therefore just words (Derrida & Kittler, 2000, p. 67). So, if Derrida addresses the proper name, he notes that it is only a word like any other, but when written down it develops a power that has to be deciphered. This power carries a political dimension, which Derrida explains using the example of the American Declaration of Independence. Here, proper names in the form of signatures become essential to the self-empowering act of the signing people. Thus, raising the question of: "How is a State made or founded, how does a State make or found itself? And independence? And the autonomy of one which both gives itself, and signs, its own law? Who signs all these authorizations to sign?" (Derrida, 1986, p. 13)

Considering this example, the founding fathers signed a declaration that proclaims a new state and breaks away from an old one, but on what basis? The signatures on the Declaration of Independence seem almost inconspicuous, as a side note to the events which follow it. But Derrida turns his attention to this very moment, the moment of signing, the exact moment everything started. The course of history seems to have something to do with the signature and its unnoticeable power. Of course, this independence was also physically fought for and a chain of actions confirmed this act. Still, no one denies that the official independence began with the signing of the declaration, with proper names written down. The question which then rises is, how is something like autonomy created through the act of a signature? For Derrida, this leads to a paradoxical process:

> But this people does not exist. They do not exist as an entity, it does not exist, before this declaration, not as such. If it gives birth to itself, as free and independent subject, as possible signer, this can hold only in the act of the signature. The signature invents the signer. This signer can only authorize him- or herself to sign once he or she has come to the end [parvenu au vout], if one can say this, of his or her own signature, in a sort of fabulous retroactivity. That first signature authorizes him or her to sign. (Derrida, 1986, p. 10)

Here, people are signing on behalf of a nation, which officially did not exist prior to the act of that signing. Thus, the act of founding is based on a paradox. The signature

creates a subject that did not exist in this form before it was signed. At the same time, the subject authorizes oneself through the signature and declares oneself to be autonomous. The question of autonomy is not easy to answer. Since the same subject did not exist before the signature, on which it is based. However, it cannot be stated that a signature alone has autonomy without there being a subject for which it is responsible for. “This obscurity, this undecidability between, let's say, a performative structure and a constative structure, is required in order to produce the sought-after effect” (Derrida, 1986, p. 9).

Derrida clearly shows how this seemingly simple act leads to an aporia. The American people could not exist as such, without the signature on the declaration. The signature in return would be meaningless without the subject of the American people. The aporia arises from the fact that both the signature and the subject indicate the same autonomy. The first impulse is, therefore, to break down the whole act chronologically and find a solution. One could say that the signature produces the subject who then proclaims autonomy. But from what does the signature get the autonomy of signing? Concluding that the chronological approach does not lead to a single origin, Derrida pursues a different explanation of the relations: “In short, there are only countersignatures in this process. There is a differential process here because there is a countersignature, but everything should concentrate itself in the simulacrum of the instant” (Derrida, 1986, p. 11). With “countersignatures” Derrida describes nothing different then the mutual conditionality without autonomy would not exist. The co-dependencies meet at the moment of signing. In the case of the Declaration of Independence, would the American people exist without the signatures? It would be a subject but not the same because the signature creates an entity that is outside the subject, that in disregard to time proclaims that the subject exists. The signatures create a base for mutual reference, so that autonomy can develop from this relation. The autonomy is the mutual conditionality between subject and signature. This paradox cannot be resolved by looking at it one way but by the interplay of the two.

The interplay between subject and signature can be put into another light, so that the autonomy can be identified more precisely. To this end, Derrida turns to a new example. The signing of the Declaration of Independence, to which we will come back later, is replaced by Friedrich Nietzsche's personal name in the form of his signature underneath his texts. The mechanics between subject and signature remain the same. What happens between subject and signature is described in this context by Derrida with the metaphor in from of a debt[32]: “[…] yes, yes, I approve, I sign, I subscribe to this acknowledgment of the debt incurred toward 'myself', 'my-life' – and I want it to return” (Derrida, 1985, p. 14). The signature as such vouches for the signatory which contains a debt for the signed. The Founding Fathers pledged a debt on behalf of the American people, and there signatures are evidence of that debt. Just as Friedrich

[32] The word “debt” translated into German means “Schuld”. Interestingly, the German word has two meanings. Which are linked to one another in a surprising sense. “Schuld” can mean “debt” in an economic sense as well as “guilt” in a moral one. Both meanings resonate. For clarity, I will use “debt” in a more economic sense and “moral debt” as the ethical equivalent.

Nietzsche's signature put a debt on his person, which in return is connected to everything he wrote.

How does autonomy fit into this example? After all, a debt acts as something binding and at the first glance it may not promote autonomy, but this is where the secret of the interplay between the signature and the signer lies. The signature forms a new entity that refers to the subject and ties it to its context. The signature now exists independently from the signer. This bond outlasts the lifetime of the signer and it never loses its tie to the 'debt' because the signature is in the form of a proper name. Autonomy in this sense means the ability of a subject to inscribe oneself in a new context, to escape his or her corporeality and to create something that lies outside oneself. With the proper name, the signature guarantees the existence of the signer long after his death. The ambiguity of this debt lies in the fact that it creates equal condition for debtors and creditors. As a result, granting oneself autonomy means binding oneself. One's independence lies in the ability to make oneself debtor and creditor. This is how autonomy is to be understood in the case of Nietzsche's signature. This analysis seems irrelevant at first, but the signature is part of our everyday life as a piece of banality. Let us now refer back to the act of the Declaration of Independence and Friedrich Nietzsche's signature, in order to understand its deeper meaning.

To accomplish this, one has to understand the context in which signatures are placed. If an intellectual work is signed by Friedrich Nietzsche, we can assign it directly to him and a specific historical time because the signature is his proper name. The entire work of Friedrich Nietzsche only becomes his, when the texts and contexts are linked to his persona through the signature. The proper name of the American people can be said to have a similar effect. Which people is one referring to? The people who used this term for themselves in 1776 or the people who still call themselves this people's nation today? It now becomes clear, what Derrida meant, when he is alluding to the politics of the proper name. The proper name gains a political dimension through the autonomy of the act of signing. It is a fixed point, which is able to connect different contexts with one another. Therefore, Derrida sees practical consequences:

> The signature of every American citizen today depends, in fact and by right, on this indispensable confusion. The constitution and the laws of your country somehow guarantee the signature, as they guarantee your passport and the circulation of subjects and of seals foreign to this country, of letters, of promises, of marriages, of checks – all of which may be given occasion or asylum or right. (Derrida 1986, p. 11)

Political acts can be carried out in the proper name of the American people, since the moment the declaration was signed. This proper name has influenced the fate of people living in its country. In 1776 signatories created something that, regardless of them and the context of their time, has endured for centuries and continues to exert immense political influence. The debt that Derrida speaks of continues to today because it still binds the citizens to the institution of state. If one could argue that a proper name cannot have such a power, one would only have to think of the existence of the American people. However, it is important to note that this is a special case. The

signatures under the Declaration of Independence have a genuine political character. However, this does not mean that the autonomy of the signatures is irrelevant, it only makes it clear that it fell on fertile ground. Using Friedrich Nietzsche as an example, Derrida makes it even clearer how under other circumstances, proper names develop a political dimension. He writes in regards to Nietzsche:

> He never knows in the present, with present knowledge or even in the present of Ecce Homo, whether anyone will ever honor the inordinate credit that he extends to himself in his name, but also necessarily in the name of another. The consequences of this are not difficult to foresee: if the life that he lives and tells to himself ('autobiography,' they call it) cannot be his life in the first place except as the effect of a secret contract, an indebtedness, an alliance or annulus, then as long as the contract has not been honored –- and it cannot be honored except by another, for example, by you – Nietzsche can write that his life is perhaps a mere prejudice […]. (Derrida, 1985, p. 9)

Here, the role of the creditor plays an important role. Nietzsche's work puts him in debt, his personal name stands for the content of his texts and thus burdens him with the extent of his thoughts. Whether this credit can be paid is no longer up to him, his texts stand for themselves with his signature. His personal name comes into the public eye through his texts, and thus they gain a political dimension. What the subject Friedrich Nietzsche really thought is thus detached from himself without losing the reference to him. From this point on it can still be said that Friedrich Nietzsche wrote the text, but the whole mechanism develops a dynamic of its own, that goes beyond the subject. Derrida draws a far-reaching conclusion from this: "[…] the effects or structure of a text are not reducible to its 'truth,' to the intended meaning of its presumed author, or even its supposedly unique and identifiable signatory" (Derrida, 1985, p. 29).

The text with the signature has become detached from the author, the proper name indicates a bond, but simultaneously creates the autonomy of the text. The significance of this can hardly be better discussed with any other author than Nietzsche. Derrida remarks somewhat cynically, that Nietzsche died before his name and gained a certain fame. Therefore, it is sufficient enough to consider the context in which his texts were placed after his death (Derrida, 2000, p. 51). Whether it was National-Socialism or other ideologies, Nietzsche's words were placed in many contexts and used as the basis for various worldviews. The question of the truth of the text does not arise, as Derrida remarks, it is more a question of what was made of these texts and how the proper name Friedrich Nietzsche has been adopted to each different context. What does this say about Nietzsche's debt, about the credit he is burdening himself with? He could have never known whether or not his thoughts would be honored the way he originally intended them to be, or who would honor them, because that was beyond his power of influence. His personal name will always be linked to the debt of his work, the debt that he placed on himself. One must not misunderstand debt here, it is not the moral debt of his work towards other people, it is the debt towards oneself that serves as the potential for other interpretations. It therefore remains open, who will pay off this debt and honor Nietzsche in their own way. But what makes Nietzsche's writings and signatures so

special is that he did not sign any genuine political texts. Nietzsche was not in the same position as the founding fathers; he did not sign any declarations. Nevertheless, his writings developed a political dimension, which seems all the more surprising the closer you look at it. The same could be said of all historical figures and generally of all proper names, that appear as signatures. It is the outstanding feature of the proper name as a signature, of one's autonomy towards one's signer. This makes it possible to place the signature and their linked documents in new contexts, in order to develop new dynamics.

THE SECRET OF VERIFICATION

The phenomenon of the proper name has thus been dealt with in the form of the signature and how a political dimension can grow from it. Let us now take a look at the username, for which my thesis states, that it works similarly to the proper name. Both phenomena are indications of entities and at the same time are fixed points of communication. Proper names and usernames bind statements to entities. But to differentiate the phenomenon of the username from that of the proper name, one has to work out their clearest difference: the verification. For this, it is necessary to understand who or what is verifying? This is where the institution comes into play. Institutions, such as the modern state vouch for the names of their residents. State authorities issue passports, marked with proper names and people prove their identity with government documents. The institution state, thus ensures that a person has a proper name, that statements are not only assigned to an anonymous entity, but to a person who is able to sign. Verified by the same institution, which was founded by signatures. Here, one can be amazed when taking a look at the genealogy of these mutual connections, in Derrida's (1986) words:

> Although inprinciple an institution–in its history and in its tradition, in its offices [permanence] and thus in its very institutionality–has to render itself independent of the empirical individuals who have taken part in its production, although it has in a certain way to mourn them or resign itself to their loss [faire son deuil], even and especially if it commemorates them, it turns out, precisely by reason of the structure of instituting language, that the founding act of an institution–the act as archive as well as the act as performance–has to maintain within itself the signature. (p. 8)

In modern states, the signature is institutionally verified, and like I mentioned the state itself is based on the act of signatures. Derrida mentions the archive, which in its way can be understood as the collection and preservation of the signatures. It seems as if the state as an archive is locking away this concatenation of signatures and thus obscuring the economy of names. At the same time, however, the founding act is reactivated again and again in the form of a signature. It was mentioned earlier that the signatures of American citizens depend by law on this founding act. Justice is still spoken on behalf of the American people (Derrida, 1986, p. 11). The identity of these

citizens, the verification of their names is fed by this economy, whose quintessential start will always be the signing of the Declaration of Independence.

But what happens when this institution falls apart? Proper names are documented and established; this does not apply to usernames. The state, as an archive of names, has no access to usernames. They can control, administer and judge proper names, but usernames do not fall into their jurisdiction. The technology of their archive is not adapted to the phenomenon of the username. This means not the end of institutions, but the end of an institution, whose founding is based on the signature of proper names. Usernames are not centrally verified by the state. They are therefore only subject to their specific institutions, where they are registered at; to their archives and their respective platforms. Which can lead to multiple uses of usernames, or the complete replacement of proper names with usernames. While the state manages to assign proper names to a person and thus verifying their identity, this can only be possible to a limited extent of usernames. It is up to the platforms to what extent a username has to be verified. There are no clear regulations. This fact alone would not pose a challenge for the state institution. Only the power of the Internet as a medium and the use of usernames can lead to conflicts with the state. Public discourses have long been taking place in online forums and on platforms that require usernames and not a proper name. Communication is thus tied to the use of a username, however that username is no longer necessarily tied to one person, as it was in the pre-digital space with proper names. The username becomes the signature in a digital space. Statements and texts are linked to usernames. Only here the big difference is, that the state loses its ability to access it for verification. A core competence of the state and its influence on the public discourse, is undermined by the username. Perhaps because of this, the phenomenon of the username reflects many conflicts that go hand in hand with the so-called postmodern era: the question of identity and the states attempt to claim power.[33]

The phenomena of the proper name and the username differ in their ability to be verified and thus, in the question of who or what verifies it. But what does verification mean? For this, I would like to consider a case that has become well-known politically around the world, especially in the United States. We are talking about the username Q and the QAnon movement[34]. The user Q first appeared on the imageboard 4chan.org, to spread statements, which can be classified as conspiracy theories. At this point, I would like to emphasize that I distance myself from this content. Nevertheless, the username Q perfectly demonstrates the entire political dimension of the phenomena and the mechanisms behind it. Who or what stands behind Q has not yet been clarified. The

[33] More insides about the relation between governance and the Internet give the following papers: (Haggart et al., 2021; Jensen, 2020; Karpf, 2020; Price, 2017).

[34] The User Q first appeared on the imageboard 4chan.org in 2017. The name “Q” refers to the “Q clearance” security classification used by the US Department of Energy. Q proclaims to have exclusive information from this government sector. Furthermore, the user claims to be a high-ranking member of the government, during the presidential legacy of Donald Trump starting in 2017. The follower movement based on Q's conspiracy theories is commonly referred to as QAnon. “Anon” stands for “anonymous”, since users do not have to identify themselves on the 4chan.org board. Q's identity has not yet been clarified with certainty, but several people and groups have been considered. Q's statements and the QAnon movement can be classified in the right extremism spectrum. For further reading and more information about QAnon: (Amarasingam & Argentino, 2020; Hannah, 2021; Papasavva et al., 2020; Richards, 2021; Zuckerman, 2019).

username only claims to be a senior government official with exclusive access to highly confidential government information. Including information on a conspiracy theory that claims that government members, as well as economic elites, maintain an international child trafficking ring, and are even planning an attempted coup to turn the American democracy into a dictatorship. No matter how absurd these statements may sound, they fit into the discourse of conspiracy theories and are finding a growing following. Based on the username Q, a movement called QAnon has formed, which follows the worldviews of Q's statements. This is becoming more and more publicly perceptible, as observed on January 6, 2021 with the storm on the American Capitol and increasingly worldwide during protests against state institutions and regulations. The danger that this creates for the state and the autonomy that the username and the statements have, go back to the core of the verification process.

SHIFTING DIMENSIONS

Verification, derived from the Latin words *veritas*, truth and *facere*, to make, means to provide evidence of the truth. To declare something true. Like the state that ties statements back to a person and verifies them. It guarantees that a proper name stands for a specific identity, which makes it possible to tie the truth of a statement to that person. But how could a state verify a statement of a username? How can someone proof that the person behind a username speaks the truth? Without any information about a person, or whatever stands behind a username, one cannot verify that a user has the knowledge or the power which is claimed by his/her statements. It is possible to check the statements of course, but not whether or not they are true for their proclaimer. Therefore, an important aspect of the verification process is omitted. Who can say that the user Q doesn't have this information if we don't even know who or what he/she/they is/are? The only option left is to remain agnostic about this path of truth-checking. One could also call this a consequence of the autonomy of the proper name, which finds its completion in the username:

> We are not, I believe, bound to decide. An interpretive decision does not have to draw a line between two intents or two political contents. Our interpretations will not be readings of a hermeneutic or exegetic sort, but rather political interventions in the political rewriting of the text and its destination. (Derrida 1985, p. 32)

The point here is no longer to verify, to check the truth of the statements or to recognize their true meaning, but to shift them into a political context.

This is one aspect that the username radicalizes. But there is a second that starts another momentum, which questions the institution of the modern state much more. One may not be able to verify “Q's” statements, but what is much more dangerous is the institutional potential of such usernames. To be aware of this potential, one only has to look at the founding act of American independence in the form of their signatures. Derrida's analysis that I have given, illustrated the paradoxical act of founding a people’s nation in their own name. I have left out one important detail: Thomas

Jefferson (1743-1826), who wrote the Declaration of Independence, used a trick to ensure independence:

> One can understand this Declaration as a vibrant act of faith, as a hypocrisy indispensable to a politico-military-economic, etc. coup of force, or, more simply, more economically, as the analytic and consequential deployment of a tautology: for this Declaration to have a meaning and an effect, there must be a last instance. God is the name, the best one, for this last instance and this ultimate signature. Not only the best one in a determined context (such and such a nation, such and such a religion, etc.), but the name of the best name in general. Now, this (best) name also ought to be a proper name. God is the best proper name, the proper name the best [Dieu est le nompropre le meilleur]. One could not replace 'God' by 'the best proper name [le meilleur nom propre]'. (Derrida, 1986, p. 12)

Jefferson needed the security of a higher authority for this authorization. He used the proper name of God for this. What is the intention of this name, what makes it "the best proper name"? First, the deep Christian roots in the culture of the settlers of that time must be pointed out. The legacy of the old continent, where the name of God has an unparalleled genealogy. Any comparison cannot withstand this history. But I would like to point out the verification of this name, which makes it so special. If one places the proper name of God opposite the names of the founding fathers, it becomes clear what makes Him stand out. The founding fathers are empirically tangible people, identities that can be verified, which gives the opportunity to question them. If Jefferson had not added the name of God to the Declaration of Independence, it would always run the risk of being contestable through its signatories. But how can one challenge God, how can one verify this name? It cannot be refuted, and as Derrida realizes, in the end it remains a question of faith. Thus, the establishment of the institution closes itself in a tautology, for those who believe in it, it proves to be true through the founding act, authorized by the unquestionable proper name of God himself. American independence is just one example of this institutional potential in whose name tribes, empires and states have been founded over millennia. The reference to the QAnon movement may not be truly comparable, but one recognizes similar approaches of institutional potential. Usernames are difficult to verify, ultimately it remains a question of faith whether you want to trust the statements of a user or not. Like the name of God, they disregard verification. The username now has the potential to disguise and authorize the act of founding new institutions, which does not imply that every username unfolds such potential. But examples like Q show that they can be the beginning of new institutional structures, to which people align themselves, in which they believe in and which questions old institutions.

Usernames are therefore, not simply a technical solution or just a banal practice of digital space, they have a structural institutional characteristic. One's understanding helps explain post-digital political shifts. The basis for this begins with the familiar phenomenon of the proper name and leads to the question of verification. The modern state, understood in this article as the archive of proper names, is faced with the

challenge of dealing with the phenomenon of the username. They face the challenge of verification, which gives them part of their state power. Because as long as usernames cannot be clearly verified, they have the potential for new institutional structures, which in turn questions the existing institutions and our understanding of identity and truth.

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Research article

Dialog, Communication, Cooperation, and Collaboration: Facets of Human-Computer Interaction

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Abstract

This study is a linguist's attempt to analyze such terms as human-computer interaction, computer-human interaction, human-machine cooperation, machine-human collaboration, and many related terms. The purpose of this analysis is to determine whether and how they represent different shades of meaning, some nuanced, some distinctive. This allows for their further systematization and the identification of terminological synonymy. The discussion shows that terminological choices might be necessary – not only between „man" and „human" or between „dialogue" and „dialog," but also between „cooperation" and „collaboration" as well as „dialog" and „communication." This still leaves a considerable number of terminological options which can be assigned to different facets of human-computer interaction.

Keywords: Human; Machine; Computer; Communication; Cooperation; Dialog; Human-Computer Interaction

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Научная статья

Диалог, общение, кооперация и сотрудничество: Грани взаимодействия человека и компьютера

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Аннотация

Данное исследование представляет собой попытку лингвиста проанализировать такие термины, как “human-computer interaction”, “computer-human interaction”, “human-machine cooperation”, “machine-human collaboration”, а также многие связанные термины. Цель этого анализа – определить, представляют ли они разные оттенки значения, нюансы отношения, отличия и каким образом. Исследование позволяет провести дальнейшую систематизацию и выявить терминологическую синонимию. Обсуждение показывает, что может потребоваться терминологический выбор не только между “man” и “human” или между “dialogue” и “dialog”, но также между “кооперацией” и “сотрудничеством”, а также между “диалогом” и “общением”. По-прежнему существует значительное количество терминологических вариантов, которые можно отнести к различным аспектам взаимодействия человека и компьютера.

Ключевые слова: Человек; Машина; Компьютер; Коммуникация; Сотрудничество; Диалог; Человеко-компьютерное взаимодействие

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INTRODUCTION

Over the centuries, human interaction with technical devices has become more complex in order to achieve certain tasks with the hope of improving living conditions and facilitating labor. Human interaction with technical devices throughout history can be divided into three types: *instrumental*, such as a shovel, axe, scythe, comb, blade, ruler; *mechanical*, such as a vehicle, manual meat grinder, clockwork; *electromechanical*, such as s today‘s coffee grinders or razors, powered by electricity; and, of course, *electronic*, namely computers and everything controlled by them. At the first stages the interaction between a human being and a technical device was carried out by physical impact on technical devices with the direct participation of a human being or sometimes an animal, for example, a donkey turning a millstone. Today, the interaction between a human being and a technical device that functions on the basis of electronic principles can be carried out without physical contact, for example, by means of a remote control, voice, human biometrics, such as using a fingerprint to unlock a cell phone, or an iris to open doors. With the advent of electronic technical devices, a new type of interaction between human and technical devices appeared – intellectual from the human side and mathematically conditioned from the machine side. This type of interaction is clearly evident in electronic games or simulators, and any device requiring a person to carry out thinking operations for the functioning of an electronic process and its performance of the tasks for which it was created. Implementation of this interaction can be carried out both nonverbally (slot machines, game consoles) and verbally (speech activated functions, automated phone operators). These forms of human-machine interaction go beyond human-machine interfaces and issues of interface-design. They have led to the appearance of such terms as:

1) *human-computer interaction* (Jaimes & Sebe, 2007)
2) *computer-human interaction* (Masoodian et al., 2004)
3) *man-computer interaction* (Nickerson, 1969; Shackel, 1981; Tainsh, 1985)
4) *human-machine interaction* (Ke et al., 2018)
5) *man-machine-interaction* (Nickerson, 1969; Miller, 1977)
6) *human-machine communication* (Bylieva, 2020; Guzman, 2018)
7) *man-machine communication* (Tadeusiewicz & Demenko, 2009)
8) *man-computer communication* (Sackman, 1968)
9) *human-computer communication* (Mikovec & Klima, 2003; Obrenovic & Starčević, 2004)
10) *man-machine cooperation* (Bouillon & Anquetil, 2014; Guo et al., 2006)
11) *human-machine cooperation* (Hoc, 2000, 2013; Millot & Boy, 2012)
12) *man-machine collaboration* (Bisbey & Martin, 1972)
13) *human-machine collaboration* (Haesevoets et al., 2021)
14) *machine-human collaboration* (Kela & Kela., 2019)
14) *man-machine dialogue* (Landragin, 2013)
15) *human-machine dialogue* (Ramachandran & Canny, 2008)
16) *man-computer dialogue* (Ambrózy, 1971)
17) *human-computer dialog* (Minker, & Bennacef, 2005; Yang & Tao, 2019)

This list suggests six types of interaction which need to be analyzed: interaction, communication, cooperation, collaboration, dialogue or dialog. The analysis needs to include the features of nomination in each of these types of interaction (Figure 1-5). Not all of these prove to be equally significant:

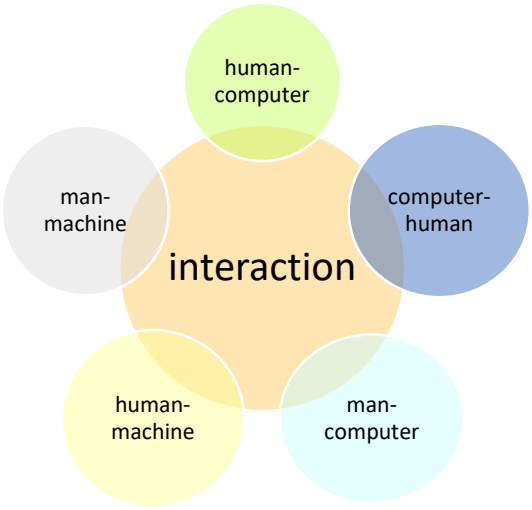


Figure 1. Combinations with the word “interaction”

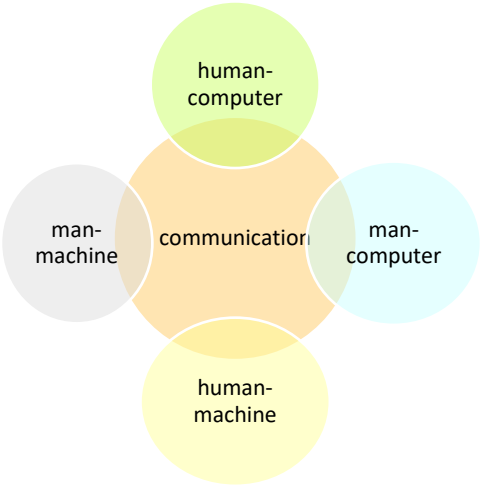


Figure 2. Combinations with the word “communication”

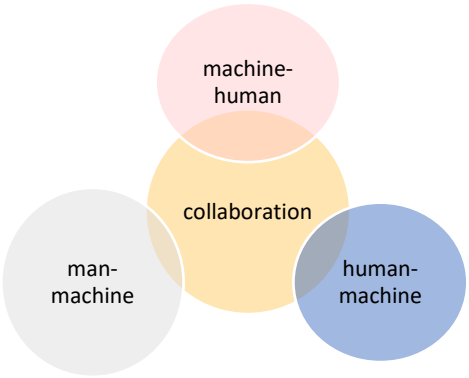


Figure 3. Combinations with the word “collaboration”

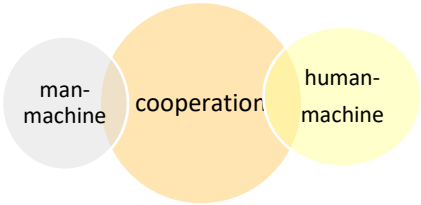
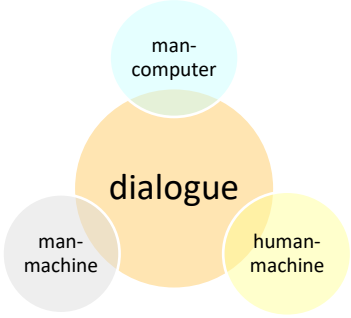


Figure 4. Combinations with the word “cooperation”



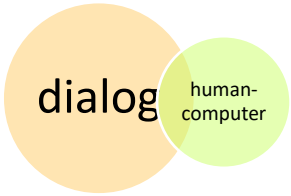


Figure 5. Combinations with the words “dialogue” and “dialog”

The proposed systematization of terms contributes to the unification of a terminological apparatus which may prevent discrepancies in concepts when creating new terms, and moreover, helps avoid terminological inaccuracies in interdisciplinary research. The results of this study can be used when placing the terms in terminological databases, for example, the ISO Concept Database, ISO/CDB[35], or Multiterm[36].

MATERIALS AND PROBLEMS

Definitions of the Terms Analyzed

An analysis of the terms necessarily begins with questions of definition in order to identify terminological synonymy and to reveal the functions they denote.

Some authors draw attention to terminological synonymy. One might consider synonymous the terms *computer human interaction*, *man-machine interaction* (Dix, 2009) and *human-machine interaction* (Nardo et al., 2020). And although all the terms that refer to „man" rather than „human," such as *man-machine interaction* can be considered obsolete, they are nevertheless still used in 21st century works (Coiffet, 2004; Gruca et al., 2014; Nardo et al., 2020).

1. ***Human-computer interaction*** (***HCI***) and its synonym ***computer-human interaction*** (***CHI***) is a field that focuses on simplifying the use of computer technology by the user (Dix, 2009; Wirtz, 2017). In German, *Human-Computer Interaction* (*HCI*) corresponds to the term *Mensch-Computer-Interaktion* (Fach, 1997), and was said to correspond in English to *man-computer interaction* (*MCI*).

2. ***Human-machine interaction*** **(*HMI*)** is a scientific field that develops interactive computer systems where these interactions broadly encompass (electronically controlled) machines and their users – including verbal as well as nonverbal signs (Esposito et al., 2008; Ke et al., 2018). Here again, this concerns a focus of Computer Science and Engineering on the development of user-friendly interfaces.[37] Specialists in ***Human-machine interaction*** (***HMI***) – sometimes still called *man-machine interaction* (*MMI*) (Nardo et al., 2020) – implement the practical application of interactive computer systems from the perspective of ease of human use by developing an interface (Ke et al., 2018).

3. The term ***Human-machine communication*** (***HMC***) refers to the creation of a machine intelligence that allows humans to communicate with computer systems that are equipped with special programs to make such communication as close as possible to natural human communication. (Suchman, 1987; Bylieva, 2020). The aim of such communication is to obtain information, as well as to communicate within the social roles assigned to computerized machines, e.g., teacher or caregiver (Patric, 2019).

4. Another definition of ***Human-machine communication*** dates back to an earlier use of the term ***Man-machine communication*** (***MMC***) which was said to aim at developing a sound interface for users with no special technical training (Sharp, 1974).

[35] http://cdb.iso.org/

[36] http://www.sdl.com/en/language-technology/sdl-openexchange/AppDetails.aspx?appid=134

[37] http://window.edu.ru/catalog/pdf2txt/736/23736/6246

5. ***Man-machine dialogue*** **(*MMD*)** (Landragin, 2013) or rather ***human-machine dialogue (HMD)*** (Minker & Bennacef, 2005) foregrounds dialogue, that is verbal and nonverbal communication between humans and the system.

6. ***Human-machine cooperation*** **(*HMC*)** involves mutual intervention in human and machine tasks based on human-engineering and cognitive approaches (Hoc, 2013, Millot, 2009). A definition of so-called ***Man-machine cooperation*** even refers to the fusion of human and machine abilities (Goßler, 2016).

7. ***Human-computer communication*** **(*HCC*)** refers to the efficient transfer of information between humans and machines (Denning et al., 1988). This definition is a further development of the earlier ***Man-computer communication*** **(*MCC*)** which was primarily concerned with the interests of users in terms of accessibility and ease of use of computers for various human tasks (Sackman, 1968).

8. ***Machine-human collaboration*** **(*MHC*)** and sometimes ***man-machine collaboration*** (***MMC***) (Webb, 1999). do not consider the machine as a tool, but conceive the mutual augmentation of human and machine capabilities (Techtarget, 2017).

Peculiarities of the Dialogue and Dialog Concepts

One of the things that strikes the eye when looking at the list of the analyzed concepts is the different spelling of *dialogue and dialog* in the same terms:

1) *Man-machine dialogue* and *man-machine dialog* (Landragin, 2013; Beroule, 1983)
2) *human-machine dialogue* and *human-machine dialog*
3) *man-computer dialogue* and *man-computer dialog*
4) *human-computer dialogue* and *human-computer dialog*

Since the purpose of this article is to unify the concepts under consideration, it makes sense to attend also to the ever-so nuanced difference between *dialog* and *dialogue*. The word *dialogue* is used in British English, as evidenced by Oxford Learner's Dictionaries (Oxford University Press, n.d.c) and Cambridge Dictionary (Cambridge University Press, n.d.d), while there is no *dialog* variant in these dictionaries. According to surveys, *dialog* is quite rare in British English (Writing explained, n.d.). In American English, *dialog* has been used in addition to *dialogue* since the 1980s and its popularity peaked in 2000 (Writing explained, n.d.). In the context of computer technology the word *dialog* is mostly used in American English , while in British English it is rarely used both in the language of everyday communication and in the field of computer technology (Writing explained, n.d.). American use would indicate that the more resonant *dialogue* is preferred in human communication and *dialog* is considered more suitable for technical communication.

Peculiarities of the Human and Man Concepts

All of the analyzed terms appear in the two variants containing *human* and *man*. In dictionaries on computer science and computer technology (Heinrich et al., 2004, p. 423, p. 797), as well as in scientific articles (Tadeusiewicz & Demenko, 2009; Suchman, 1987) *human* and *man* occur in the same meaning, despite the fact that some

authors rightly note that “man” as a synonym for “human” is outdated (Dix, 2009). The language of everyday communication is quite susceptible to changes due to various reasons. In some cases, we are talking about simplifying language constructions, in other cases, these changes reflect culturally and politically conditioned changes in people's mentality. However, such changes in the language are noticeable primarily for native speakers. In contrast, the language of Computer Science and Engineering is international and unites native speakers of different languages. The professional sphere is evidently not subject to such rapid language changes. “Man” is still actively used in computer science and programming dictionaries as a synonym for “human.” Given the trend to restrict the meaning of the word “man” to males as opposed to females, this trend will perhaps take hold in dictionaries as well. The influence of “language fashion” on terminology sometimes makes it difficult to understand scientific texts. In this study, linguistic phenomena are considered at various levels, identifying the most vulnerable places. Initially, specialists in the field of computer technology either did not pay close attention to terminology, or implied some differences that were later erased. This entails the appearance of a large number of synonymous words, which makes it difficult for both native speakers and foreigners to understand professional texts and presents difficulties for translators.

Peculiarities of the Cooperation and Collaboration Concepts

Despite similarities in meaning, *collaboration* and *cooperation* have some differences:

Collaboration is understood as working together toward a common goal in which ideas are generated by a team and tasks are set and solved together (Cambridge University Press, n.d.a; Oxford University Press, n.d.a).

Cooperation is understood as the individual work of each project participant toward a common goal (Cambridge University Press, n.d.c; Oxford University Press, n.d.b).

Peculiarities of the Interaction and Communication Concepts

On the one hand, *interaction* is broader than *communication*. *Communication* implies the transmission or exchange of information (Cambridge University Press, n.d.b), *interaction* refers to any type of interaction, including the interaction of acids in a chemical reaction. On the other hand, we should not forget that *communication* as the exchange of information is also a rather broad concept. We can assume that by interacting with a cat the moment we stroke it, information is also exchanged. The person who strokes the cat in this way expresses their love for it, and the cat’s behavior at the moment of stroking shows the person how much it is pleased.

Peculiarities of the Machine and Computer Concepts

According to the dictionary (Oxford University Press, n.d.d), *machine* is a broad term that can include the computer. *Machine* denotes:

1) Hardware with many parts working together to accomplish a specific task. The power used to run a machine can be electricity, gas, human power;

2) Computer.

The large number of academic papers and vocabulary entries on the issue under study, terminological synonymy and homonymy of the concepts under consideration, the peculiarities of the translation of terms in Russian, English, and German required this initial survey of meanings as they can be found in the literature.

RESULTS

Classification of the Analyzed Terms by Function

A literature review showed that the terms analyzed have a large number of equivalents, both synonymous and differing in the functions they perform.

Furthermore, the translation of the analyzed terms into Russian or German show the impossibility to differentiate them in many cases. For example, *man-machine cooperation* and *human-machine cooperation, human-machine collaboration, human-machine interaction* have only one variant of translation into Russian – "*человеко-машинное взаимодействие*". Likewise, when translated into German, one cannot distinguish between *man-machine cooperation* and *human-machine cooperation*, since there is only *die Mensch-Maschine-Kooperation*. To identify synonymous terms, it is necessary to classify them according to the functions they perform. In order to accomplish this task, I have chosen the faceted classification method. Based on a review and an analysis of the literature on the problem under study, I have identified four facets:

- Development of a user-friendly interface,
- Bringing machine communication closer to natural one,
- Combining the human and machine abilities,
- Exchange of information between humans and machines. The distribution of the analyzed terms by the selected facets is shown in figure 6.

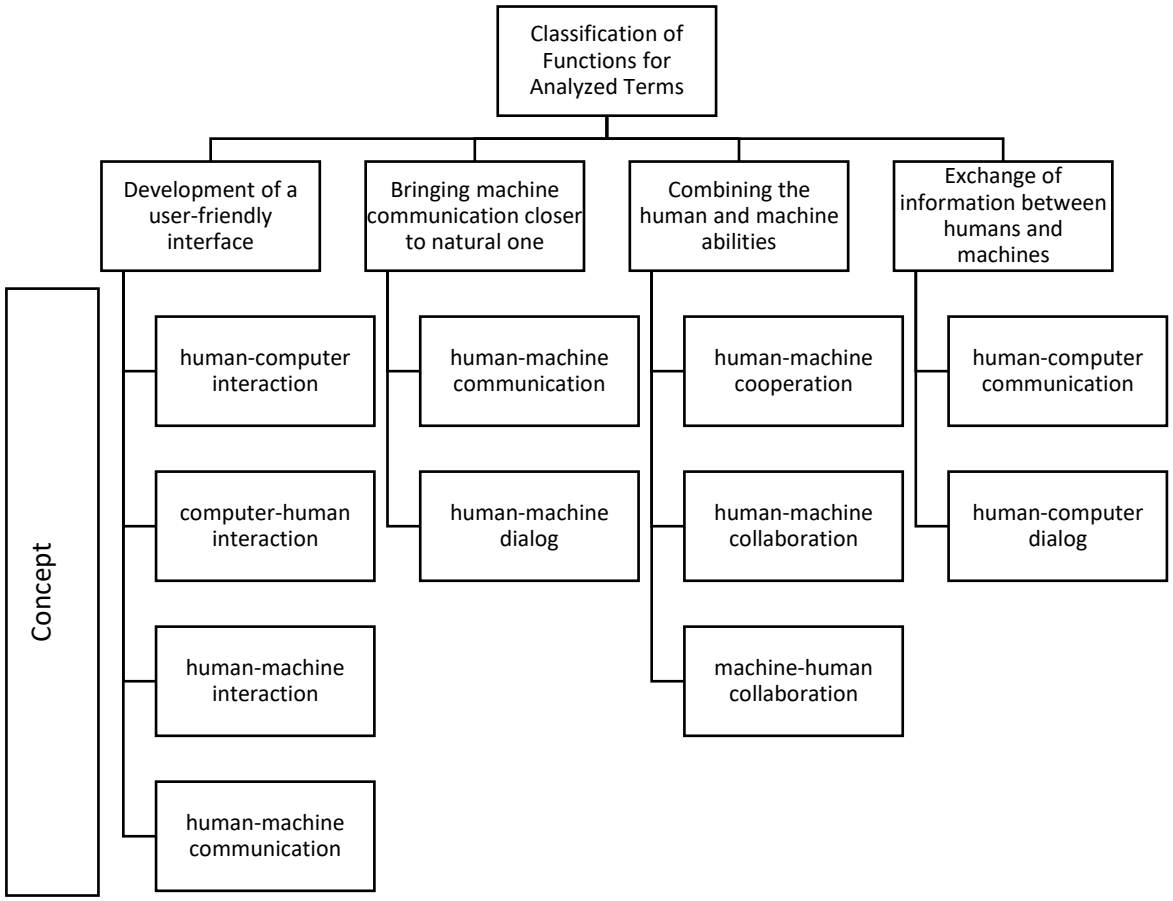


Figure 6. Classification of functions for analyzed terms

The Main Problems of the Analyzed Terms

The review of the scientific and reference literature highlighted the main problems in the use of the terms that were identified and analyzed:

1) The use of *dialogue* and *dialog* in the context of computer technology
2) The meaning of *human* and *man* in the analyzed concepts
3) The differentiation of the terminology from the points of view of human-machine interaction, communication, and dialogue.

For all of these problems suggestions are needed about how to deal with them.

Dialogue or Dialog?

Since the form *dialog* is mostly used in American English especially in the field of computer technology, and since the American version of English tends to simplify it, it would be reasonable to use the form *dialog* and, accordingly, the following terms: *man-machine dialog, human-machine dialog, man-computer dialog, human-computer*

dialog, from the point of view of the ease of its use by users, computer scientists and engineers. This choice in favor of *dialog* takes into account the fact that in American English *dialog* has a more technical use compared to *dialogue* which makes it especially suitable in the context of computer technology.

Man or Human?

A valuable feature of any term is its unambiguity, especially within the same sphere. In everyday language *man* is used in a gendered way and also in the general meaning of *human*. As an adjective, *human* is used in the meaning of *user* and denotes a person as a living being, as opposed to machines and computers. Therefore, the use of *human* as a part of computer terms is preferable to *man*: *human-computer interaction, human-machine interaction, human-machine communication.* In addition, the tradition of using the lexical unit „man“ mainly in relation to men has practically formed in English-language discourse. Based on the frequency of their use, we should choose to adopt the term „human“: *human-computer interaction, human-machine interaction, human-machine communication, human-machine dialog, human-machine cooperation, machine-human collaboration, human-computer communication, human-computer dialog*. The choice in favor of *human* takes into account not only a trend in modern language but also the fact that in computer terminology, *man* is found to mean “manual; a Unix command designed to format and output reference pages” (Multitran, n.d.b), and also the abbreviation MAN to mean city or regional network (Multitran, n.d.b). *Human* in computer terminology as an adjective means “user” (Multitran, n.d.a). In this way, as well, it is possible to avoid excessive ambiguity.

The literature search for the keyword *computer-human interaction* caused difficulties, as the predominant combination is *human-computer interaction,* and “Human-Computer Interaction” (Dix, 2009) considers these two terms as synonyms.

Machine or Computer?

Since „machine“ is a general concept, which includes the concept of „computer,“ it is in our case appropriate to use the broader term „machine“ as in *human-machine interaction, human-machine communication, human-machine dialog, human-machine cooperation, machine-human collaboration.* In this use, however, human-machine communication requires a specific type of machine, machinery or mechanical system that is controlled by electronics. This is accounted for by the analyzed uses of *human-computer communication* and *human-computer dialog*.

Cooperation or Collaboration?

Since humans and machines are not yet able to work as equals, putting forward ideas and tasks, it is at this point more likely to be a case of *cooperation*: *human-machine cooperation.*

Interaction or Communication?

Interaction with technical means, which includes machines and computers, can be carried out both with and without the transfer or exchange of information. *Interaction* is

a fairly broad concept, including the concept of *communication*. While *communication* is usually understood as the transmission or exchange of information, the pure form of *interaction* can be clearly seen in simpler technical means or tools, such as a razor blade. When a man shaves, he acts on the razor blade, the razor blade removes excess hair by acting on it. The transmission, reception and exchange of information can take place through both verbal and nonverbal signs. The more primitive the mechanism, the less information is exchanged. If we consider a mechanical meat grinder, then the exchange of information between the person and this machine is reduced to zero, there is only the transfer of information by the person: its preparation for operation, filling with meat are nonverbal signals transmitting information to this technical device. In a meat grinder with electronic elements, communication goes from one-way to two-way communication, that is, from transmitting, perceiving information, to responding to it, as electronic sensing becomes more complex. The meat grinder can work by receiving information and beginning to grind the meat as it receives the signal of its feeding. As part of two-way communication, it can also signal the degree of readiness of the minced meat. Thus, the implementation of *interaction* and *communication* depends on the complexity of the technical device. Therefore, it is advisable to use the two seemingly similar, but nevertheless different terms *interaction* and *communication*. As for the development of a user-friendly interface, in this case, we are talking about complex technical devices equipped with electronics, which is most accurately reflected in the concept of *communication*. But, nevertheless, it is most appropriate to use a more concise concept of *interaction*: *human-machine interaction*.

Human-Machine Dialog

The use of the concepts "*human-machine dialog*", "*operator-computer dialog*", "*operator-computer dialogue*" allows us to assume that there is a dialog between a human and a machine. To answer the question whether a dialog between humans and machines is possible, we must first analyze the concept of dialog.

Dialog is undoubtedly a part of communication, but it is usually seen as communication between people or a group of people (Collins, n.d.). It can exist in the form of an oral dialog between several persons, as a written text such as dialogues in fiction, as communication between several persons recorded on paper, or communication by fixing statements in writing in the case of hearing-impaired people. To determine the legitimacy of using the term "human-machine dialog", it is necessary to find out whether human-machine dialog has the same attributes, properties and characteristics as communication between people, to what extent they correspond to verbal communication between a human and a machine.

Any communication implies (face-to-face to a greater extent, remote to a lesser extent) the use of nonverbal signals of the sign system in addition to verbal signs. The spectrum of nonverbal signs in face-to-face communication is wide: gestures, facial expressions, intonation.

In the absence of visualization of the interlocutor, the number of nonverbal signals affecting the course of the dialog also decreases, that is, the number of signals given may remain the same, but they will not all be perceived by the interlocutor and the

desired pragmatic effect will be absent. Moreover, the phonetic means of nonverbal communication (tempo, timbre, speech volume, pause fillers, speech melody) can interfere with the perception and interpretation of human speech by a machine.

And the programs themselves with their voice phrases are as much as possible deprived of nonverbal speech signs. Statements in such programs are built in accordance with the norms of literary language.

Another important feature of dialog between people is the emergence of not only a verbal dialog, but also a dialog of worldviews inherent in each interlocutor. The machine asking and answering questions is not the bearer of a certain worldview. Its questions and answers depend on the software installed, and its moral and spiritual values are determined by the programmers' worldview. At the same time, the questions asked and answered by the machine may not reflect the programmer's position on the issue, it is more likely to act as a definition of basic human values.

Communication between humans and machines can proceed through nonverbal signs, which reduces it to maximum functionality, strict sequence of actions, complete absence of emotional coloring, and excludes the exchange of worldviews.

Thus, the concept of *human-machine dialog* does not absorb the main properties and characteristics of the term *dialog*, but corresponds to the concept of *communication*. Communication is a general concept, a subspecies of which is dialog. Since the concepts of *dialogue* and *communication* are not synonymous, i.e. are not equal to each other, it is logical to assume that dialog is one of the components of communication, while the second part is assigned to other forms of communication, for example, the interaction of a person with a machine or machines with each other. Thus, as the second and third parts of the concept of *communication*, we can distinguish human-machine and machine-machine interaction.

CONCLUSION

This study is a linguist's attempt to systematize the terminological basis of the so-called "man-machine interaction" from the perspective of dialogue, interaction, communication, related *computer* and *machine* terms, as well as the problem of translating the terms containing *human* and *man* from English into Russian and German. As a result of this study, we can offer table 1 reflecting the four functions of the analyzed terms and the concept that, from my point of view, is the most relevant:

Table 1. Terms reflecting the main functions of the analyzed concepts

No.	Function	Concept
1.	***Development of a user-friendly interface***	*human-machine interaction*
2.	***Bringing machine communication closer to natural one***	*human-machine communication*

3.	***Combining the human and machine abilities***	*human-machine cooperation*
4.	***Exchange of information between humans and machines***	*human-computer communication*

This identification of separate strands does not put them all on the same level. The definitions of these concepts also revealed an aspirational dimension which assigns special meaning and rank to some of them over others. Most ambitious and perhaps unrealistically ambitious proved to be „computer-human collaboration“ which seeks to overcome the notion of the computer as a tool but posits the collaboration of equals. In contrast, „human-machine communication“ designates almost neutrally a general area of study. This suggests, finally, a landscape which reveals the standing in respect to each other of the central claims and central terms (fig. 7).

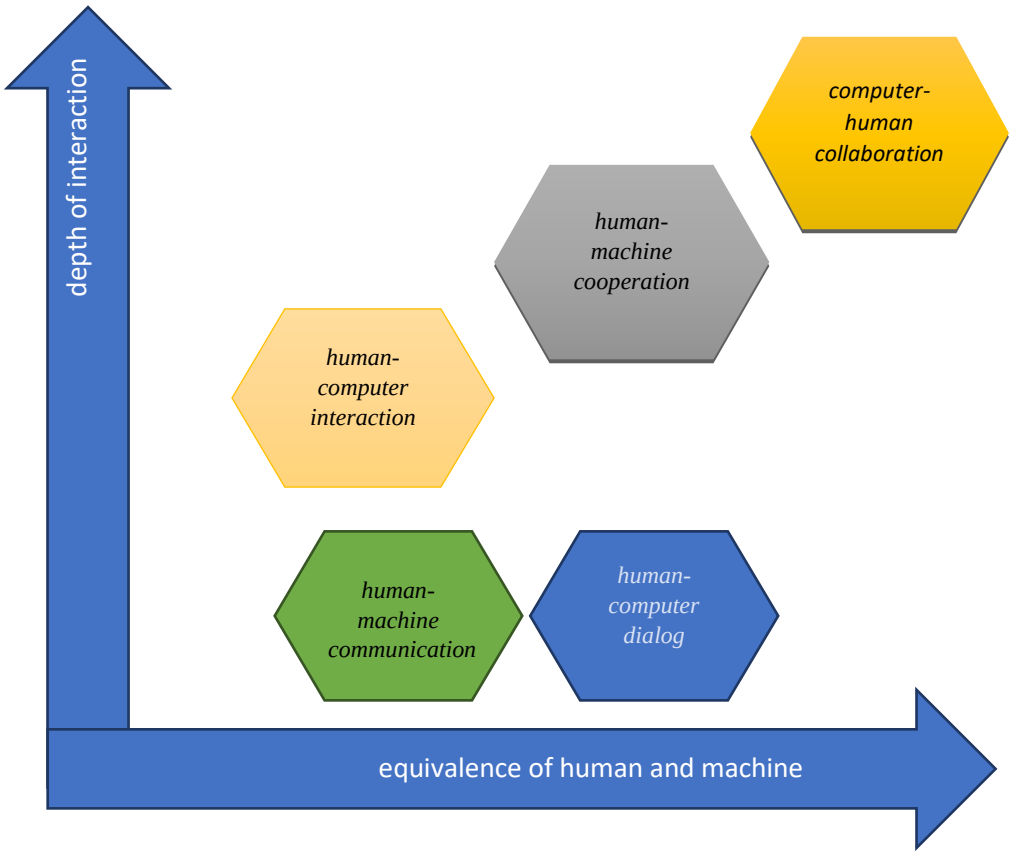


Figure 7. Aspirational facets of terms

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