Technology and Language

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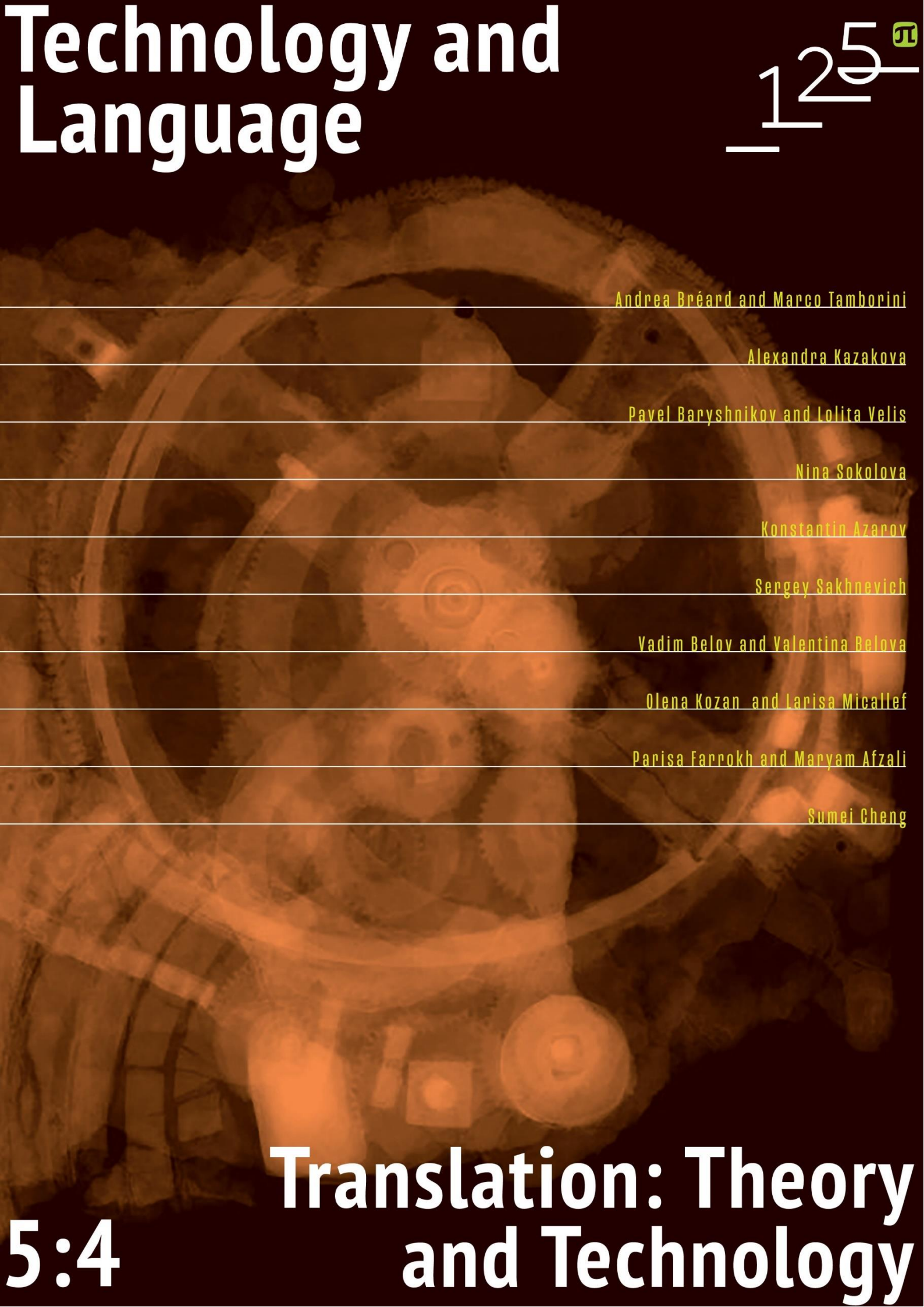

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Translation: Theory and Technology

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Translation – Theory and Technology
Guest Editors

Andrea Bréard and Marco Tamborini

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Editorial introduction

Translation: The Interfaces of Language and Technology

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Abstract
The many languages in which technological objects are written – visual, natural, symbolic, olfactory, artefactual, etc. – and the many ways in which technology is used to translate between these languages raises a series of philosophical questions. This editorial surveys some of these questions, providing a brief introduction to the growing interest in the concept and practices of translation as a key to understanding our relationship with and the production of technological objects and knowledge forms. We focus on epistemological aspects of the linguistic and grammatical turn in technology studies and anthropological questions of the use of translation as an epistemological tool to better delineate the characteristics of the human being. Finally, the seven articles contained in this special issue on *Translation - Theory and Technology* are briefly presented in terms of their common thematic and philosophical approaches.

Keywords: Epistemology of translation; Anthropology of translation; Transcultural conceptual change; *Homo translator*

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Редакторская заметка

Перевод: Интерфейсы языка и технологий

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Аннотация
Множество языков, на которых написаны технологические объекты – визуальные, естественные, символические, обонятельные, артефактные и т. д. – и множество технологических способов, перевода между этими языками поднимают ряд философских вопросов. В данной редакционной статье рассматриваются некоторые из этих вопросов, дающие краткое представление о растущем интересе к концепции и практике перевода как к ключу к пониманию наших взаимоотношений с производством технологических объектов и форм знаний. Мы фокусируемся на эпистемологических аспектах лингвистического и грамматического поворота в технологических исследованиях и антропологических вопросах использования перевода как эпистемологического инструмента для лучшего определения характеристик человека. Наконец, семь статей, содержащихся в этом специальном выпуске “Перевод – теория и технология”, кратко представлены с точки зрения их общих тематических и философских подходов.

Ключевые слова: Эпистемология перевода; Антропология перевода; Транскультурные концептуальные изменения; Homo translator

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INTRODUCTION

A mechanical device delivers faithful translations of rotary motion via gears and into the vertical back and forth of a beam - and vice versa. The figure 1 below shows such a device – the remains of the Hellenistic Antikythera Mechanism dated approximately to the second century B.C. (Freeth et al., 2006, Freeth & Jones, 2012; Jones, 2017). Actually we do not see the astronomical machine with its bronze gearwheels itself, but the result of x-ray photography. Its outer screen has disappeared, a ghostly image of the inside has been registered on photographic paper. Such visual translation of the internal structure of the mechanism to the outside revealed details from the machine's inner world opaque to ordinary light. Physical and chemical processes both have transmitted between technological objects without interpreting their very nature and inner workings.

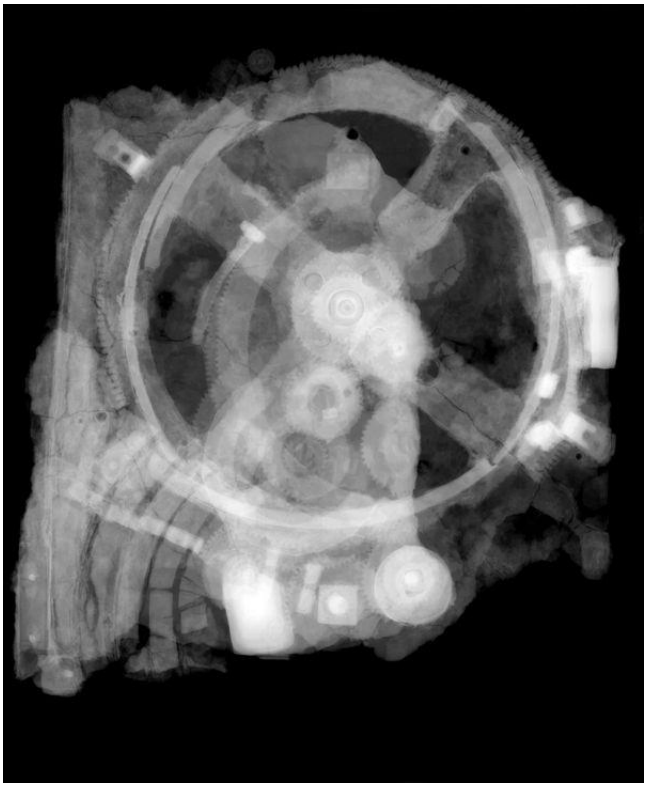

Figure 1. Radiograph of the Antikythera Mechanism created by X-Tek Group © Antikythera Mechanism Research Project) (see Freeth, 2013)

Ludwig Wittgenstein analogized such translations that do not involve interpretation to the ways in which a musical performance can be mapped onto the grooves of a gramophone record as well as a score (Sterrett, 2005). Today, with cutting-edge technology, we can listen to captivating contemporary music performances that result from the instant translation of the body language of dancers on stage into an acoustic symphony (Zhou et al., 2024). Central to such new forms of artistic expression is an AI-embedded interactive music system that enables a sophisticated connection between physical movement and music. As the dancers move across the stage, their movements

are captured and directly translated into an atmospheric soundscape by an AI system trained to pair motion sequences with melody and emotional dimensions of music.

Here, inter-translatability between different languages is no longer related to logical form. If only the data set describing the dancers' motions in relation to musical mood and rhythm is huge enough, machine translation requires nothing but the probabilistic discovery of the most likely correlative patterns. The same holds for machine translation between natural languages and the identification of collocations, i.e. the occurrence of word context in phrases. Again, no interpretation is involved. To be sure, there are other technical but also cultural descriptions of the process of translation which appreciate gains and losses, proximity and distance, inventiveness and transformation, insinuation and appropriation.

If one thinks of the techniques and practices of rendering old meanings in new settings, one will appreciate how works and ideas need to be (re-) created (Montgomery, 2000). Technical translation has long been dismissed as an activity of relatively little cultural importance. Suggesting instead that translation was central to the emergence of a new scientific, technological, and socio-political culture allowed to understand better the processes and in-betweens (Bréard, 2019) whereby translation has helped universalize "modern" science and technology by adapting, appropriating, and naturalizing it to the diverse languages, practices and societies of the world. In particular new approaches to the study of the history of non-Western sciences focused not on assertions about the "incommensurable" characters of languages and civilizations, but rather on the specific modalities of translatability of technology in its social and cultural contexts (Crozet & Horiuchi, 2004).

For example, when during the second half of the nineteenth century algebraic symbols were introduced to the Chinese public in manuals on calculus or conic sections, it was the algebraic language, more precisely the opposition that this (Western) language offered between determinate, possibly unknown, but fixed numbers (constants) and the indeterminate non-numerical entities (variables), that was of primary semiotic interest. In Chinese positional 'celestial element' (*tianyuan* 天元) algebra, the art of manipulating polynomials or equations was not co-extensive with the idea of denoting a variable. The encounter of these two mathematical cultures was a major signifying event. The reasons also lie within the Chinese mathematicians' perception of the introduction of Western mathematical notations into the Chinese discourse itself, and their confrontation to the entailed semiotic problems. As their comments and terminological choices testify, the problem of signification was particularly severe in those cases where no functional relation existed between a symbol (or a name) and a corresponding mathematical reality, i.e. in the case of existing symbols for the absence of anything, and in the inverse case of the absence of names for existing mathematical objects. The symbolic language was thus not simply adopted by Chinese translators, but a new, proto-grammatical symbolism was created which upheld close ties to the characteristics of natural language (Bréard, 2001).

One can also think of translation as in geometry as a movement of all the points of a geometric object by the same distance, in the same direction and in the same sense, in other words, along the same vector. If translation is thus seen as a kind of transport from the bank of a river to the other side, would this be akin to the work of engineers who

transport their knowledge of functional regularities in biological nature into the sphere of human devices? Translating nature's strategies into design is a complex process that raises several philosophical questions.

Indeed, in recent years, there has been growing interest in the concept and practices of translation as a key to understanding our relationship with and the production of technological objects. This interest arises, on one hand, from the linguistic and grammatical turn in technology studies (Coeckelbergh, 2018; 2017; Nordmann, 2020; 2023; Tamborini, 2024b) and, on the other, from the influence of French philosophy of technology, particularly the Actor-Network Theory (ANT) and the notion of hybrid objects (Valler and Blumczynsk, 2024; Latour, 2005; 2012). In this context, several fundamental questions emerge: Which approaches and issues are shaping this research? What future developments are possible? And, given the interdisciplinary nature of this special issue, what can philosophy learn from other fields that engage with translation? In the next sections, we will explore two closely related aspects of philosophy of technology and translation: an epistemological one and an anthropological one.

EPISTEMOLOGY

Since Walter Benjamin's (2002) seminal work on the task of the translator, translation has been viewed as the creation of a new work that retains a certain resemblance to the original. Benjamin uses the geometric metaphor of a tangent touching a circle to illustrate how translation approaches the original while inevitably diverging from it. In the context of modern biorobotics – one of many technological fields grounded in the concept of translation – this point of contact is represented by the shared language between biology and technology. This is often expressed through morphology, i.e. the study of biological forms. Within this language, biological forms are reinterpreted as complex technological constructions (Tamborini, 2022b).

A paradigmatic example is the OroBOT, a robot designed to replicate the movements of *Orobates pabsti*, an extinct organism (Nyakatura et al., 2019). This robot allows researchers to study the locomotion of extinct species by reconstructing the relationships between form and function. By analyzing the anatomy of similar living organisms, collecting functional data, and translating these into technological systems, researchers generate new insights. This process does not merely copy nature but interprets it through robotic models, thereby raising new scientific questions. For instance, OroBOT has offered insights into the transition from aquatic to terrestrial life.

Therefore, biorobotics is not based on imitation but on a process of translation. Biological forms and mechanisms are transformed into technological language, creating models that test hypotheses and deepen scientific understanding. As Tamborini has shown in various studies (Tamborini, 2022a; 2023b; 2024a; 2024b), this translation occurs at multiple levels: from simulating specific functions to replicating organic forms, and even combining both aspects to create robots that mimic complex capabilities. The core of biorobotics is thus the transformation of biological language as we conceive and understand it into technological systems, fostering a dialogue between biology and

engineering to explore the natural world. In this context, translation departures from a shared language rooted in morphology.

ANTHROPOLOGY

The second point concerns the use of translation as an epistemological tool to better delineate the characteristics of the human being – what has been referred to as *homo translator* in (Tamborini 2024a; 2023a). This approach invites reflection not only on the nature of technological objects but also on the structures and qualities of the translating subject itself. Embracing this perspective is essential: understanding the human being as a translator paves the way for redefining our relationship with technology. Back in 1877, philosopher Ernst Kapp already used the concept of translation – albeit in a different sense from contemporary thinkers – to explore the translator's identity: "Machinal kinematics is the unconscious transfer of organic kinesis into the mechanical, and learning to understand the original with the help of translation becomes the conscious task of cognitive science!" (Kapp, 1877, p. 208). Kapp identifies the original, that is, the human being, as the measure of all things, revealing a profound anthropocentrism that is difficult to sustain today.

To move beyond this impasse while respecting the epistemological principle of translation, a different starting point is needed. As North American translation theorist Lawrence Venuti observed: "the greatest scandal of translation: asymmetries, inequities, relations of domination and dependence exist in every act of translating, of putting the translated in the service of the translating culture. Translators are complicit in the institutional exploitation of foreign texts and cultures" (Venuti, 2002, p. 4). This, highly relevant to linguistic translations, retains validity in the technological context as well. But what kind of validity?

Bruno Latour's reflections help clarify this transformation. In *Reassembling the Social: An Introduction to Actor-Network-Theory*, Latour explains that an overemphasis on the autonomy of language has led to a loss of connection with reality and the identity of the speaker. Language has become a closed, self-referential system. Philosophers of language, writes Latour, have distinguished between intermediaries and mediators:

- "An intermediary … is what transports meaning or force without transformation: defining its inputs is enough to define its outputs. For all practical purposes, an intermediary can be taken not only as a black box, but also as a black box counting for one, even if it is internally made of many parts" (Latour, 2005, p. 39).
- "Mediators transform, translate, distort, and modify the meaning or the elements they are supposed to carry" (Latour, 2005, p. 39).

Latour states that "there is no society, no social realm, and no social ties, *but there exist translations between mediators that may generate traceable associations*" (Latour, 2005, p. 108). The translating subject is thus a mediator who generates new realities. In technological practice, language is not merely a tool for transporting meaning or force without transformation: but a constitutive force that creates subjects, objects, and their

relationships. It does not simply describe the world; it shapes it, giving form to both the people and things under discussion.

The translation process between nature and technology involves practical and functional elements that connect different entities while maintaining their distinctness and enabling mutual communication. The inherent asymmetry in translation and the "relations of domination and dependence" thus become opportunities to create new technological frameworks and forms of life. This process, however, demands an awareness of the asymmetries between the biological and the technological, ensuring that translation does not become exploitation.

What role, then, does the *homo translator* assume in this practice? Venuti again provides insight: "By far the greatest hindrances of translation, however, exist outside the discipline itself. Translation is degraded by prevalent concepts of authorship, especially in literature and in literary scholarship, and these concepts underwrite its unfavorable definition in copyright law, not only the codes of specific national jurisdictions, but the major international treaties" (Venuti, 2002, p. 2).

Highlighting the practice of translation in the production of technological forms makes visible the *intrinsic creativity* of engineering acts within bio-inspired disciplines (Tamborini, 2024c). These do not merely imitate nature passively; rather, they create something that only tangentially touches the biological, giving rise to autonomous and innovative realities.

The *homo translator* thus becomes a bridge between the biological and the technological, the natural and the artificial. Translation must not become a tool of exploitation, as Venuti warns, but an opportunity to explore new possibilities for coexistence and interaction between diverse forms of life. In other words, the *homo translator* not only interprets the world but continually redefines it, acting as a mediator who contributes to constructing new forms of knowledge and life.

To be sure, the following collection of seven papers can't do justice to the breadth and depth of these considerations but it offers isolated entry-points. The first two contributions consider translation processes between different forms of language – natural, symbolic, visual, musical – with different cognitive functions. Alexandra Kazakova (2024) opens up a new direction of research, *Translanguaging in Engineering*, which investigates what we can learn about human cognition from an analysis of jumps and switches between various forms of communication of engineering science content. Pavel Baryshnikov and Lolita Velis look at choices of perceptual vocabulary, in particular olfactory vocabulary in a comparative approach. By comparing samples of the literary genre with technical literature from the National Corpus of the Russian Language, they address problems in and solutions for the translation between complex semantic fields of smells, loaden with metaphoric associations (Baryshnikov & Velis, 2024).

The next two papers both have a historical outlook on translation. Nina Sokolova (2024) draws a longue durée history of translations between sounds and images from ancient Greece to the twentieth century. Her four case studies illustrate different models of how language allows theoretical unification between independent realms. Konstantin Azarov (2024) takes Tolstoy's philosophical views on translation as a starting point to discuss Tolstoy's hands-on translation strategies when he rendered the Chinese Taoist

canon, the *Tao Te Ching*, into Russian. The challenges of translating poetic, allusive, and imaginative writings, Azarov argues, make human stylistic creativity indispensable for cultural communication.

The final three articles expand more specifically upon the question of necessity of human agency and extend it to questions of technology or AI-based processes both in translation and translation teaching. Sergey Sakhnevich (2024) conducts translation quality assessment experiments, thereby reorienting the perspective on translation towards the end-users, the readers, their linguistic, emotional, cultural and sociodemographic contexts. Vadim Belov and Valentina Belova study discourse markers which are particularly important in technical and scientific writings since they are used to convey in natural language the validity and degree of reliability of facts. Expressions such as "of course," "certainly," "obviously," or "naturally" are nevertheless difficult to grasp for their semantic properties and high context-dependency and therefore complex to translate. Based on data from English-Russian and Russian-English parallel corpora, the authors identify a cognitive process that includes an intermediary mental representation between source and target text (Belov & Belova, 2024). Olena Kozan and Larissa Micallef, in the last contribution to the thematic focus of this issue, actually do test generative AI models in translation and argue for a phygital approach. Their test corpus is one of Turkish folk songs, *türkü*, particularly important for its preservation of linguacultural characteristics, and therefore of high pedagogical relevance. A suggestion is made on how to integrate digital tools in the classroom, where, in the absence of a suitable dictionary, critical post-translation analysis can effectively reveal incoherencies of machine-generated phrases, but also uncover aspects of Turkish linguaculture (Kozan & Micallef, 2024).

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Research article

Translanguaging in Engineering Practice

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Abstract

Multilingualism is characteristic to engineering practice. The historical evolution of engineering implies the growing role of scientific knowledge which is explicated through the languages of mathematics, natural sciences and programming. Similarly, the contemporary organizational forms of engineering activity rely on the growing body of formalized rules and quantitative metrics, although the residuals of tacit and practical knowledge are known to persist. On the other side, engineering as collective practice is unfolding both through the formal and informal communication, which contextualizes meanings within the unique constellations of actors, institutional hierarchies, and sociomaterial assemblages. The ensemble of natural and formal languages and visualizations, and switching between different language functions reflect the complexity of engineering activities. Of special interest is the process of translanguaging, which has been studied predominantly in the context of international communication. Following the Vygotsky-Leontiev approach, translanguaging in engineering practice is discussed from the point of view of speech and collective learning. The empirical studies highlight the heuristic aspect of translanguaging. The intertwining of languages in engineering is often not seamless – the collective learning processes become explicit when the languages meet their limitations, revealing both insufficiency and complementarity, and becoming a problem or a subject of reflection themselves. The further implications for epistemology of engineering are discussed: the processes of production and explication of knowledge, the relationship between knowledge and activity, and the status of the cognitive subject.

Keywords: Engineering practice; Engineering knowledge; Activity theory; Philosophy of engineering; Engineering studies

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Научнаястатья

Транслингвальность в инженерной практике

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Аннотация
Многоязычие – характерная черта инженерной практики. В исторической перспективе в инженерии возрастает роль научного знания, кодифицированного посредством языков математики, естественных наук и программирования. Аналогичным образом, современная организация инженерной деятельности опирается на растущий массив формализованных правил и количественных показателей, хотя остатки неявного и практического знания, как известно, сохраняются. Вместе с тем коллективная инженерная практика осуществляется как через формальную, так и неформальную коммуникацию, в которой смысл производится в контексте уникальных констелляций акторов, институциональных иерархий и социоматериальных ассамбляжей. Комплексность инженерной деятельности отражается в совокупности естественных и формальных языков и визуализаций, а также переключении между различными функциями языка. Особый интерес представляет феномен транслингвальности, который до сих пор изучался преимущественно в контексте международной коммуникации. В соответствии с подходом Выготского-Леонтьева, транслингвальность в инженерной практике рассматривается с точки зрения речевой деятельности и коллективного обучения. Эмпирические исследования подчеркивают эвристический аспект транслингвальности. Переплетение языков в инженерной практике не всегда бывает бесшовным – процессы коллективного обучения становятся явными, когда языки сталкиваются со своими ограничениями, обнаруживая как собственную недостаточность, так и взаимодополняемость, и сами становятся проблемой или предметом рефлексии. В статье обсуждаются дальнейшие последствия для эпистемологии инженерии: процессы производства и экспликации знания, отношения между знанием и деятельностью, а также статус познающего субъекта.

Ключевые слова: Инженерная практика; Инженерное знание; Деятельностный подход; Философия инженерии

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INTRODUCTION

There are few professions that require as much variety of means of communication as does engineering. The combination of natural, formal and visual languages – in varying proportions – constitutes engineering both as a bulk of knowledge (engineering sciences) and as collective practice (engineering projects). As Peter Pelz (2020) argues, "the languages for engineering are spoken and written languages such as German or English, the language of mathematics, programming languages and technical drawing. But also abstract design elements such as bearing, beam, mixer are elements of a further engineering language."

The notion of translanguaging has been developed in linguistics to describe the practices of bilinguals or multilinguals using the repertoire of multiple languages. It may also point at the joint usage of the linguistic and non-linguistic elements, e.g. images. A close concept of code-switching is often used to accentuate the discrete character of languages, or the deliberate and controlled alternation between them. In this work, translanguaging is used in a wider sense – to describe the flow of communication in engineering practice, based on the intertwining of multiple languages. The structure of the paper is as follows. In the first section, the philosophical problematization of engineering languages is presented. A few approaches are discussed with no intention of exhaustive overview. The existing background of engineering studies is discussed in the second section. In the third section, some empirical evidence on translanguaging processes is interpreted from the point of view of cultural-historical activity theory. The last section concludes with the implications for the epistemology of engineering.

A PHILOSOPHICAL INQUIRY INTO LANGUAGES OF ENGINEERING

Comparing the existing approaches in philosophy of engineering, Carl Mitcham and Robert Mackey state that a linguistic one is promising, yet underdeveloped. What they are advocating is not merely linguistic philosophy of engineering, rather the philosophy of engineering language. A Wittgensteinian philosophy of engineering, for example, would study the language game(s), also questioning how many of them are present in engineering. Limiting engineering to one "game of efficiency" (or "problem-solving") seems to undermine the ideological, aesthetical, religious, and other domains of meaning. In line with Ian Hacking's "lingualism," on the other hand, Mitcham and Mackey (2010) suggest examining "engineering language – that is, the technical language of engineering – as its own special phenomenon" (p. 56). However, following the authors' goal "to consider in what ways a reflection on language within a regionalized field of human practice might contribute to advancing a philosophy of that practice" (p. 54), it must be noted that language of engineering practice is not merely *technical*. Instead, the way engineering is practiced requires an ensemble of languages to integrate technical, organizational, political, economic, and other "realities" – which implies translation between these languages.

The neglected domains of philosophy of language with regard to philosophy of engineering are discussed by Bocong Li (2022). He argues that philosophers have mostly overlooked the dramatic rise of linguistic science and its applications after de Saussure.

Nowadays, with the leading role of linguistics both in social sciences and information technologies, this isolation is no more sustainable. Within "linguistic philosophy" itself, its primary logical bias has led to little attention given to the reality of action or event (verbs and adverbs), in favor of objects (nouns) and properties (adjectives), with some exceptions, such as Donald Davidson (2001). The consequences of "neglect of action" in philosophy of language are twofold: either action itself is "dissolving" in the object world, or language is separated from the other modes of human activity, often in the form of logocentricsm. This inhibits philosophy of engineering as philosophy of practice. Bocong Li (2021) applies comparative linguistic analysis to epistemology of science and philosophy of engineering. He reveals the differences in the sentence patterns and the "noun vs. verb" ratios; and a greater amount of determinative, declarative and descriptive sentences in epistemology and normative (or imperative) sentences in engineering. In general, epistemology is a "nominal concept system," while philosophy of engineering is a "verbal concept system." However, Li Bocong's conceptual analysis considers primarily the ways of thinking and speaking *about* science and engineering rather than communication *within* scientific and engineering communities of practice. The question is, then, how these modes co-exist and translate into each other in scientific-technological projects.

Louis Bucciarelli's (2002) work provides the closest look at the use of language in engineering practice, and, at the same time, an illustration of Li Bocong's criticism of the ontologization of language. Bucciarelli suggests a "Tower of Babel" vision of the design process, in which engineers, "working for the most part alone," as he claims, construct the separate object worlds with regard to their competencies andresponsibilities, and not only "see the object differently," but also "speak different languages." Bucciarelli suggests that the division of labor in an engineering collective creates the isolated worlds of measurements, metaphors, and significance, which are "proper" for their own functions, but mutually neither commensurable nor translatable. One may wonder how such "towers" are still finished, if "one speaks structures, another electronics, another manufacturing processes, still another marketing, etc." (Bucciarelli, 2002, p. 224). To this Bucciarelli replies that, firstly, most projects face multiple failures along their way, and, secondly, there is a safe zone of "boundary objects" (material representations and visualizations, such as sketches, drawings, diagrams, charts, models, prototypes, etc.). He considers these artifacts "linguistic," since they not only convey meaning and represent something else, but their interpretations evolve in time, depending on "context and intentions."

This broader concept of engineering languages, including the non-verbal, is in line with semiotics of art, architecture, etc. However, it is unclear, how would the boundary objects do translation, if both natural and formal languages *and* visualizations are subject to changing interpretations. Also, the (natural) language demarcation is known as both a political and theoretical issue in linguistics, and the same may be said about engineering languages – are they separated by discipline, function, or paradigm? Who are the "native speakers," how are they grouped and divided, and is there any "politics" behind it? To sum up, Bucciarelli's approach seems to imply an over-heterogenization of engineering due to its focus on language ontology rather than on the practice of speaking.

EMPIRICAL STUDIES OF TRANSLATION IN ENGINEERING

The issues of translation in engineering practice have been studied mostly in terms of international communication but pursuing different directions. A first group of studies is dedicated to relativism in formal languages. The formal languages are supposed to be free of ambiguity and imprecision, serving as a universal medium in a specialized domain. The level of mathematization is associated with maturity of a scientific discipline. Since engineering is taught in mathematical language globally, it is believed to converge or at least be able to communicate without national borders, just like science. However, comparative studies reveal some cultural relativity even in disciplines that are part of the engineering curriculum, namely, statistics and probability theory (Krasnoshchekov & Semenova, 2022) and mechanics (Altenbach, 2020). While some of these cultural variations can be historically contingent (such as naming findings and processes after their authors or creators), others are explained by theoretical differences between the national schools. It may be questioned though, how persistent these conceptual differences prove to be in practical work, and whether it is not only methodologically but also ontologically relevant how a process or its result, an action or a situation, an object or a property is described. Krylov et al. (2021) claim that "[t]here 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."

A second group of studies is focused on the learning processes and the acquisition in parallel of language competencies and professional knowledge. Some studies suggest that translanguaging enables the learning process. Students demonstrate better results in the disciplines that have been taught in more than one language in comparison to those taught solely in native or in foreign languages (Airey, 2008). This might be explained by a higher reflexivity in learning: when the medium becomes problematic, it requires more effort to formalize or explicate what is already known, and this allows one to diagnose misinterpretations or one's lack of knowledge. At a later stage of professional socialization practicing engineers face the problem of translanguaging in the international collectives. The frame of communication may activate creativity or obstruct it. For example, in formal meetings conducted in English, non-native speakers tend to demonstrate less initiative and rely more on visual means of presentation. In technical writing engineers act as "consecutive interpreters" of themselves, thinking in their mother tongue and translating into English, which stimulates their precision and accuracy, but which also creates risks of simplification. In the context of informal discussion, the combination of native and foreign language seems to enable creativity, since expressing and explaining oneself in a hybrid mode without restrictions stimulates better elaboration of one's one ideas: "[b]y utilizing a more natural communicative modality, talking-it-through meant coming-to-know-while-speaking, as interlocutors metatalked and synchronized their intended personalized meaning" (Du & Zhou, 2022).

TRANSLANGUAGING IN COMMUNITIES OF ENGINEERING PRACTICE

The focus on how languages "co-operate" in communities of engineering practice – rather than in the codified body of engineering science texts – seems to be fruitful for an empirically grounded epistemology of engineering. The theories of collective learning rely to a large extent on Lev Vygotsky and Aleksei Leontievs's sociocultural perspective, according to which learning occurs in and through social interaction. This approach is characterized by three principles that are common to Marxist philosophical anthropology: the activist viewpoint (praxis), the unity of individual and collective activity, and historicism. In his classical work *Thinking and Speech* (which, symptomatically, was translated into English as *Language and Thought*), Vygotsky (1934/1962) often refers to Alexander Potebnya's idea that "the thought is not expressed but completed in the word." Not the language itself, but the practice of speech, and the contrast between "inner" speech and social speech refines human thinking.

As a part of the research on tacit knowledge and explication in engineering practice, a series of semi-structured in-depth interviews was conducted in the years 2021 to 2024 with engineering educators who were heading laboratories at technical universities in Russia and China in the fields of nanotechnologies, laser and optics, oil and gas exploration – the general study design, methodology and results of research are to be published in a forthcoming paper (Kazakova, 2024). Without aiming at a complete presentation of the research findings, some points regarding translanguaging can be noted. Situated communication and translanguaging were among the crosscutting topics in the interviews of the educators and their reflection on practical learning. The informants discuss the self-reflective process of explication and transfer of knowledge in the frame of the major communicative situations: teaching, controversy, negotiation, and translation. The functional (e.g. multidisciplinary) or hierarchical (e.g. supervisory) division of labor, i.e., lack of shared knowledge, tend to stimulate the process of explication.

The informants agree on the complementarity and non-interchangeability of natural and formal languages and visualizations (sketches, drawings, mock-ups, models, prototypes etc.), also accentuating the irreducibility of gestures which is characteristic of formal or informal face-to-face communication and which is "lacking" in the mode of distance communication. The subjective experience of insufficiency or limitation of language was compared by one of the informants to "stumbling" – a metaphor which combines delay, disruption, but also a shortcut in communication. The wider repertoire is crucial for an interdisciplinary communication – according to another informant, "[a] text [message] to a neighbor never suffices." The informants are deliberating and planning to switch between languages in their public monological speech (for example, the sequence of illustrations, calculations and verbal descriptions), but they doubt the possibility to fully control this operation in dialogical communication: As one informant noted, "the most detailed instruction ends with finger pointing." Most of the informants also tend to agree that "coming-to-know-while-speaking" occurs even in the course of highly familiar, repetitive, and relatively simple tasks. Similarly, most of them use it as

pedagogical method or heuristic technique, initiating discussions with or between their counterparts – e.g. describing the difficulties and mistakes or speculating about the functions of other participants.

These findings seem to be consistent with the general principles of cultural-historical activity theory. Since engineering "language" (be it colloquial, scientific, or visual) is inseparable from the practice of "speech," it should not be substantialized in order not to elide the more tacit processes of meaning-making in engineering. Even when participants are solving individualized problems or tasks, they are producing meaning in the context of a larger collective project, thus through a form of internalized conversation with the immediate or larger community. The individual-collective production of meaning is best understood as a dialectics of part and whole – the individual actions have meaning within a collective activity, which, on its part, is understood through personified actions. The object-world is thus neither stable nor autonomous. Interaction and dialogue imply co-tuning of the means of expression, and the expansive use of the whole repertoire available within the communicative situation. Translanguaging in this sense is seen as a means of efficient communication, but also as an insight for reflective engineering practice stimulated by external or attributed questioning.

CONCLUSION

Multilinguality is distinctive to engineering more than to other professions, since engineering unfolds in an ensemble of natural and formal languages, switching between different functions of language and also between verbal and visual communication. The formal languages have explicit rules and applications that serve to reduce the ambiguity of interpretations. The visualizations and physical models have less explicit rules of construction but provide visible evidence for comprehension. Natural language has a metalinguistic function that allows explicating both the functions and the boundaries of other languages. So far, translanguaging has been considered mostly in empirical studies of engineering education and international communication, that is, in situations when language itself is problematized. However, translanguaging may be seen as a source for the production and explication of knowledge which is characteristic of the collective and interactive nature of engineering practice. The practices of speech and intersubjective meaning-making point towards the collective learning process in an engineering community of practice.

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Research article

Perceptual Experience and the Problem of Translation: Olfactory Metaphor in Technical and Literary Texts

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Abstract

Language as a system and its connection with the perceptual properties of consciousness, reflected in the linguistic picture of the world, is the most important research object of modern scientific studies of language. Today, perceptual vocabulary is studied through various methodological approaches in the disciplinary field of cognitive research. This article examines the perception of smell as a special type of perceptual experience reflected in the semantics of olfactory vocabulary (vocabulary for describing smells and the experience of perceiving smells). The complexity of classification and description of olfactory perceptual experience, as well as its rich associative semantic component, make the olfactory language code difficult to translate, and therefore there is a need to develop translation strategies applicable when working with this non-trivial language material. The purpose of this research is to analyze the peculiarities of the use of olfactory vocabulary in technical and literary texts. Here, "technical" means texts that accompany marketing and production processes in the manufacture of aromatic substances and products, for which the composition of the aroma is one of the main identifying properties of the product (perfumes, tea, wine, etc.). Since technical and literary texts have different functional goals, it is expected that the use of olfactory vocabulary and the properties of metaphorical contexts will differ significantly. We believe that this difference poses unusual problems for the translator, and in this research, we will discuss methods for solving them. The illustrative materials for the study were examples of descriptions of the olfactory field from technical texts, as well as examples of literary and artistic olfactory descriptions from the National Corpus of the Russian Language selected using the continuous sampling method.

Keywords: Olfactory experience; Perceptual vocabulary; Olfactory metaphor; Perfume discourse; Translation problem; Translation strategies

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Научная статья

Перцептивный опыт и проблема перевода: Ольфакторная метафора в специальных и художественных текстах

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Аннотация
Язык как система и его связь с перцептивными свойствами сознания, отраженными в языковой картине мира, является важнейшим объектом исследования современных научных исследований языка. Сегодня перцептивная лексика изучается с помощью различных методологических подходов в дисциплинарной области когнитивных исследований. В данной статье рассматривается восприятие запаха как особый тип перцептивного опыта, отраженный в семантике ольфакторной лексики (словаря для описания запахов и опыта восприятия запахов). Сложность классификации и описания обонятельного перцептивного опыта, а также его богатая ассоциативно-семантическая составляющая затрудняют перевод обонятельного языкового кода, и поэтому возникает необходимость в разработке стратегий перевода, применимых при работе с этим нетривиальным языковым материалом. Целью данного исследования является анализ особенностей использования обонятельной лексики в специальных и художественных текстах. Здесь “специальные” означают тексты, которые сопровождают маркетинговые и производственные процессы при изготовлении ароматических веществ и продуктов, для которых композиция аромата является одним из основных идентифицирующих свойств продукта (парфюмерия, чай, вино и т.д.). Поскольку специальные и художественные тексты имеют разные функциональные цели, ожидается, что использование обонятельной лексики и свойства метафорических контекстов будут существенно отличаться. Мы считаем, что это различие создает необычные проблемы для переводчика, и в этом исследовании мы обсудим методы их решения. Иллюстративными материалами для исследования послужили примеры описаний обонятельной сферы из специальных текстов, а также примеры литературных и художественных обонятельных описаний из Национального корпуса русского языка, отобранные с использованием метода непрерывной выборки.

Ключевые слова: Обонятельный опыт; Перцептивная лексика; Обонятельная метафора; Парфюмерный дискурс; Проблема перевода; Стратегии перевода

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OLFACTORY VOCABULARY AS AN OBJECT OF LINGUISTIC RESEARCH. HISTORY OF THE ISSUE

A person can distinguish many odors, but the lack of strict descriptors gives rise to the problem of their naming and classification. There is no single explanation for the cause of these difficulties. Some researchers bring to the fore socio-anthropological prerequisites, namely the secondary significance of the "lower senses" in comparison with vision and hearing (Simmel, 2010). Others find the explanation in cultural and historical prerequisites, and in the characteristics of cognitive processes. In particular, the main difficulty is the high associative intensity and privacy of olfactory experience, which is why it is customary to either not mention smells at all or describe them in an allegorical form (Levinson, 2010).

The process of smell perception is individual, closely related to the binary evaluation system of perception (pleasant/unpleasant) and memory (Arshamian et al., 2011; Cerulo, 2018). All of the above points to the complex nature of olfactory experience (Candau, 2016; Young, 2014) and leads to the question of the causality of phenomenal judgments, which is understood as internal awareness of the content of mental states expressed in linguistic form (Baryshnikov, 2021). Internal self-reports about the adequacy of perceptual processes require social verification through a figurative semantics that is shared by all communication participants (Baryshnikov, 2018).

When trying to strictly describe odors, people find themselves in the subjective space of individual phenomenal experience and is forced to resort to various stylistic figures to more accurately represent the qualitative content of odor perception. As a result, the content of olfactory vocabulary is often subjective, associative, and highly contextual, which makes it difficult to convey olfactory sensations within the conceptual system of one's native or source language but also or even more so when translated into other languages.

In the second half of the 20th century, relativistic and comparative approaches allowed us to take a different look at olfactory experience and its lexical consolidation. Attitudes toward odors may vary depending on the historical and situational context, and on the cultural and social habits of the individual (Nakagawa & Kuwahara, 2020), which indicates the heterogeneity of the olfactory vocabulary in different languages.

Today, there are several popular approaches to the study of olfactory vocabulary. Here is a classification of these approaches:

I. The linguistic-cultural approach. Within its scope, olfactory vocabulary is analyzed in the context of intercultural interaction. In these studies, the hypothesis of linguistic relativity plays a special role. Of interest is the comparison of the evaluation of odors in different cultures and socio-discursive practices, as well as the reverse process – the influence of ways of olfactory experience on the articulation of olfactory preferences (Majid, 2021; Majid & Burenhult, 2014).

II. The linguistic-cognitive approach combines the results of two research methods:

1. Cognitive research. These studies examine areas of the brain that respond to specific stimuli. Recent research has identified a deep connection between the perception of smells and the area of the brain responsible for emotions and value judgments, which

explains polarity (like/dislike) and ability of smells to evoke memories. Moreover, when reading words with olfactory semantics, the same brain areas respond as during olfactory perception (González et al., 2006).

2. Linguistic research:

Comparison and collation of vocabularies of different sensory organs

Within this approach, the authors consider the principles of the multimodality formation (some use the term "synesthesia"). As a rule, due to the complexity and breadth of research tasks, work is often carried out on material from one language. At the same time, there is a comparison of expressions in different languages in order to describe multimodality ("synesthesia") as a stylistic device (Chan et al., 2014). The description of olfactory experience through other perceptual senses indicates a deep psychophysiological connection between the organs of perception.

Studies of concepts and categorization

They are carried out more often on literary texts, both within one language and through comparison of several languages. Data from the study of olfactory vocabulary make it possible to identify the author's way and culturally determined ways of describing smell, mechanisms of influence, and methods of precise characterization (advertising discourse, technical texts).

Comparative studies

They are carried out with the aim of finding translation techniques and solutions to translation problems. Roman Viktorovich Valkov notes that the reproduction of the odoric code occurs in two ways: syntactic transformations (replacing one-part impersonal sentences characteristic of the Russian language with two-part sentences in English) and lexical transformations (greater variability when working with the English language, since, according to Valkov, specific semantics is more characteristic of English equivalents. Because of this, one Russian word describing a smell may have several English equivalents) (Valkov, 2013).

The lexical representation of olfactory experience in the Russian tradition has been most studied in two areas: 1) smell and its expression in perfumery, advertising, and other types of discourse (Ostapova, 2020); 2) the concept of smell as an indicator of linguistic and cultural peculiarities (Filimonova, 2008). Western research is characterized by the following subject areas: 3) linguistic representation of olfactory experience in machine learning (Kowalewski & Ray, 2020); 4) the influence of smell on a person's psycho-emotional state (Nakagawa & Kuwahara, 2020); 5) the role of body odor in communication (Niu & Zheng, 2020); 6) similarities and differences in attitudes towards odors in different cultures (Oleszkiewicz et al., 2020).

Thus, an interdisciplinary approach obviously recommends itself for the study of olfactory experience and ways of representing it in language when analyzing translation problems, since the content of this experience is subjective, multidimensional, and contextually rich. It is also important to note that interdisciplinary works often reflect an intersection of the concepts of "olfactory experience" and "linguistic descriptions of olfactory experience."

FUNCTIONAL ROLES OF OLFACTORY METAPHORS IN TECHNICAL AND LITERARY TEXTS

A specialized text is a text containing certain professional knowledge or a description of experience, skills, and abilities, and aimed at transmitting the content of knowledge without any distortion or excessive aesthetic functions. The main function of a technical text is communicative and informative, i.e., recording, transmitting, and storing scientific knowledge. Therefore, this type of text has its own fixed terminological apparatus, understandable to all participants in communication (Klyoster & Shumailova, 2017).

Of greatest interest for the study of olfactory metaphor are texts that directly appeal to the direct experience of smell perception, for example, texts of perfume discourse. In this type of text, olfactory vocabulary is strict and regulated.

There is no single and definitive classification table in the perfumery field. The industry uses key descriptors. Most often, odors are divided (according to the main element of the composition) into the corresponding groups: 1) spicy, 2) citrus, 3) edible, 4) herbal, 5) floral, 6) resinous, 7) woody, 8) earthy, 9) animalic (Dima, 2021), however, this list can be supplemented (*Fragrance ingredient glossary* , n.d.).

Since smells have long defied classification, the vocabulary of perfumery has borrowed much from other sensory systems. In a perfume composition, there are top, middle, and base notes. Marketing uses semiotics of color, shape, material (Silva & Mazzilli, 2014). In a similar way, such metaphorical expressions as "woody green," "chypre green," "sweet green," "snow floral," "pink vanilla," "milk rose," "heavenly heliotrope," etc. (Sanchez & Turin, 2014) penetrate into the terminological dictionary.

When describing perfume products and translating these descriptions, it is necessary to evoke a number of olfactory associations in the reader, and the following techniques can be used:

1) Direct description by naming the components (amber, vanilla, incense, lavender, citrus, etc.)

2) Description of the overall composition, reference to the properties of the group ("huge floral," "fruity patchouli," "woody floral," etc. (Sanchez & Turin, 2014)

3) Description with a reference to a famous product ("... resembled the old Chant d'Aromes", "... hints at Cuir de Russie by Chanel" (Sanchez & Turin, 2014)

4) Description through qualitative adjectives (modest, seductive, monochromatic, etc.)

Technical texts can be divided into two key areas by the purpose of their impact:

1. Scientific and educational (texts aimed at the actual transfer and recording of knowledge)

2. Descriptive. These are texts mainly for promoting and selling a product. In this case, the main goal is not just a description of the composition, but also a direct impact using emotional and evaluative vocabulary.

Let us consider the contents of Table 1.[1] The examples show that when describing and translating perfume products, terms (top note, middle note, etc.) and names of

components used in the industry are taken and translated by transliteration, literal translation, or selection of an equivalent depending on the presence of the lexeme in the target language. We can argue that the translation of special perfumery texts avoids difficulties mostly either due to unified terminology or through the use of established names of raw materials.

Table 1. Examples of perfume products descriptions[2]

No.	Original	Translation
1.1	Red Tobacco by Mancera is a Woody Spicy fragrance for women and men. Red Tobacco was launched in 2017. Top notes are Cinnamon, Agarwood (Oud), Incense, Saffron, Nutmeg, Green Apple and White Pear; middle notes are Patchouli and Jasmine; base notes are Tobacco, Madagascar Vanilla, Amber, Sandalwood, Guaiac Wood, White Musk and Haitian Vetiver.	Red Tobacco Mancera – это аромат для мужчин и женщин, он принадлежит к группе древесные пряные. Red Tobacco выпущен в 2017 году. Верхние ноты: Корица, Уд, Ладан, Шафран, Мускатный орех, Зеленое яблоко и Белая груша; средние ноты: Пачули и Жасмин; базовые ноты: Табак, Мадагаскарская ваниль, Амбра, Сандал, Гваяк, Белый мускус и Ветивер.
1.2	Fenty by Fenty is a Chypre Floral fragrance for women and men. Fenty was launched in 2021. The nose behind this fragrance is Jacques Cavallier. Top notes are Blueberry and Tangerine; middle notes are Bulgarian Rose, Geranium and Magnolia; base notes are Patchouli and Musk.	Fenty Fenty – это аромат для мужчин и женщин, он принадлежит к группе шипровые цветочные. Fenty выпущен в 2021 году. Парфюмер: Jacques Cavallier. Верхние ноты: Черника и Танжерин; средние ноты: Болгарская роза, Герань и Магнолия; базовые ноты: Пачули и Мускус.
1.3	Pure Poison by Dior is a Floral fragrance for women. Pure Poison was launched in 2004. Pure Poison was created by Carlos Benaim, Dominique Ropion and Olivier	Pure Poison Dior – это аромат для женщин, он принадлежит к группе цветочные. Pure Poison выпущен в 2004 году. Pure Poison был создан Carlos Benaim, Dominique Ropion и

[2] To fill out Table 1, we used data from the web-page (https://www.fragrantica.fr/parfum/1667/Midnight-Amber-67732.html) equipped with a multilingual database brought to strict correlation. (Note that manual processing of the vocabulary revealed translation inaccuracies).

	Polge. Top notes are Jasmine, Orange, Bergamot and Sicilian Mandarin; middle notes are Gardenia and Orange Blossom; base notes are Sandalwood, White Amber, Cedar and White Musk.	Olivier Polge. Верхние ноты: Жасмин, Апельсин, Бергамот и Сицилийский мандарин; средние ноты: Гардения и Цветок апельсина; базовые ноты: Сандал, Белая амбра, Кедр и Белый мускус.

Unlike technical texts, literary texts are often aimed at the general public and perform an aesthetic, influencing function. In this case, olfactory vocabulary characterizes the author's personal picture of the world, and can act as: a marker of space; character descriptor; a means of creating an atmosphere (Olitskaya & Chertkova, 2020).

Conventionally, the use of olfactory descriptions in a literary text can be reduced to the following:

1) Smell as a characteristic (of a character, place, situation, etc.), e.g., "a wonderfully pleasant, manly and rich baritone was heard, the very sound of which smelled of something unusually noble, well-mannered and even ambrosial" (Turgenev, 1978).

2) Smell as an assessment, e.g., "Bazarov's bad manners had impressed her unpleasantly for the first minutes of the visit like a bad smell or a discordant sound" (Turgenev, 1981, vol. 7. p. 74) or "[they] are occupied and don't worry about their own nothingness, it doesn't stink to them" (Turgenev, 1981, vol. 7. p. 119).

3) Smell in a figurative sense, e.g., "Have your smell, your own smell, that's what!" (Turgenev, 1978).

Table 2. Examples of olfactory description in literary texts and their translations

No.	Original	Translation	Source
2.1	**запах** жилого покоя	the **smell** of his living-room	Н. В. Гоголь. Мертвые души (1835-1852) | Nikolay Gogol. Dead Souls (C. J. Hogarth, 1931)
2.2	**Запах** съеденного молью сукна, пыли и какой-то кислоты, которым отличается наша бричка	the combined **odour** of moth-eaten cloth, dust, and sourness peculiar to our britchka	Л. Н. Толстой. Отрочество (1854) | Leo Tolstoy. Boyhood (C. J. Hogarth, 1910-1935)
2.3	отменным дворянски-гвардейским **запахом**	exquisite aristocratic **perfume**	И. С. Тургенев. Дым (1867) | Ivan Turgenev. Smoke

			(Constance Garnett, 1896)
2.4	**запах** ржаного хлеба и мухояра	**odour** of rye bread and mustiness	И. С. Тургенев. Новь (1877) | Ivan Turgenev. Virgin Soil (Rochelle S. Townsend, 1929)
2.5	grippy **smell of** Vicks Nose Drops	**пахнет** гриппозными лекарствами	J. D. Salinger. The Catcher in the Rye (1951) | Дж. Д. Сэлинджер. Над пропастью во ржи (Р. Райт-Ковалёва, 1965)
2.6	Hearts of Love hairdressing mingled with asafoetida, snuff, Hoyt's Cologne, Brown's Mule, peppermint, and lilac talcum.	помадой для волос, жевательной резинкой, нюхательным табаком, ай-да-колоном, мылом, сиреневой пудрой и мятными конфетами.	Harper Lee. To Kill a Mockingbird (1960) | Харпер Ли. Убить пересмешника (Нора Галь, Р. Облонская, 2013)
2.7	the heavy **odour** of opium met him	ему ударил в лицо душный **запах** опиума	Oscar Wilde. The Picture of Dorian Gray (1890-1891) | Оскар Уайльд. Портрет Дориана Грея (М. Абкина, 1960)
2.8	she would always chew coffee or gargle cologne to disguise the **smell**	всегда можно пожевать кофе или прополоскать рот одеколоном, чтобы отбить **запах**	Margaret Mitchell. Gone with the Wind, Part 2 (1936) | Маргарет Митчелл. Унесённые ветром, ч. 2 (Т. Кудрявцева, 1982)

Table 2 shows that when translating the olfactory code in literary texts, the translator often encounters difficulties, since the text may contain historicisms, historically determined meanings of lexemes, etc. At the same time, the less cultural, historical, and emotional coloring of the vocabulary and the more unpoetic the object of smell in the text (2.7, 2.8), the easier it is to select an equivalent, and vice versa.

The above examples illustrate that olfactory metaphors in technical texts are used to unambiguously describe an olfactory marker and to achieve marketing goals. At the same time, the literary text includes olfactory vocabulary to create an image of a person, place, event, and convey evaluative and symbolic elements. Unlike technical texts, for a literary text it is not the verified accuracy in characterizing the smell that is important, but the selection of such linguistic units that would create a special associative environment with its rich semantic space, and this is what represents the main difficulties for the translator.

For a technical text, an olfactory metaphor is an attempt to point to a specific object or source of smell; for a literary text, it is a stylistic device.

Hence, a reader of technical texts who is ignorant of terminology risks falling into a "semantic gap." In the case of fiction (unless the author writes for a narrow circle of readers), an obscure olfactory metaphor is a mistake of the author. Since a literary text is a reflection of the author's worldview, olfactory vocabulary acquires both a personal and cultural-historical connotation, which obliges the reader in some cases to seek the correct understanding. As the contextual richness of the olfactory vocabulary increases, a translator, in turn, will face problems that are more complex.

EXAMPLES OF TRANSLATION PROBLEMS WHEN WORKING WITH OLFACTORY METAPHORS

Translation is a complex process of transforming a linguistic product from one language to another, in which an important criterion is the preservation of the semantic and structural integrity of the text. Umberto Eco notes that the translated text must convey the intentions of the original text, which is not always possible due to cultural and linguistic characteristics. To solve translation difficulties, it is possible to transform the text and replace individual elements, if this allows making the same impression on the reader (Eco, 2006).

Olfactory experience is complex in itself, since the olfactory vocabulary mostly consists of:

1) Descriptions that are difficult to accurately interpret due to their abstractness (sweet, sour, bitter smell)

2) Metaphors that appeal directly to experience.

When we talk about metaphors we mean metaphors which the reader may not possess, but which can be constructed through the understanding of individual lexemes (the smell of war) (in this case, the reader packs up the object of smell with various semiotic connotations and, in fact, builds their own idea, and does not open up to the author's code) or metaphors which the reader does not possess and which cannot be "evoked" through linguistic means.

Table 3. A selection of examples from the original book (Turin & Sanchez, 2011) and its translation into Russian (Sanchez & Turin, 2014)

No.	Original	Translation
3.1	which gives the rich and sweet chypre idea its bitter backbone	который сообщает богатой и сладкой шипровой идее горькую основу
3.2	the shimmering classical accord of leather, immortelle, spice, rich pipe tobacco…	мерцающий классический аккорд кожи, бессмертника, пряностей, ароматного трубочного табака…
3.3	… and Gold is his Bruckner's Ninth	…и Amouage Gold – это его девятая симфония Брукнера
3.4	Though the silken background is no longer as rich as the sultanate and the top note is evidently thinner	Шелковистый шлейф Amouage Gold ныне не столь богат, как казна султана, да и начальные ноты явно менее различимы.
3.5	… the dressing-up of cheap heliotropin with wildly expensive iris	…чтобы украсить недорогой гелиотропин дорогим и благородным ирисом

When translating technical texts (Table 3), we see that the translator has no problems selecting a semantic equivalent to the well-known vocabulary that has become technical ("chypre" – "шипровый", "classical accord" – "классический аккорд", etc.). However, since the literary text is more artistic, as evidenced by the author's stylistic methods, the translator has to take into account the author's style. See Table 4.

Table 4. Examples of literary texts and their translations taken from the database of the Russian National Corpus.

No.	Original	Translation	Source
4.1	Все эти воины были превосходно вымыты, выбриты, продушены насквозь каким-то истинно дворянским и гвардейским запахом, смесью отличнейшего сигарного дыма и	All these officers were superlatively washed and shaved, and thoroughly saturated with that genuine aroma of nobility and the Guards, compounded of the	И. С. Тургенев. Дым (1867) | Ivan Turgenev. Smoke (Constance Garnett, 1896).

	удивительнейшего пачули	best cigar smoke, and the most marvellous patchouli	
4.2	…как вдруг в соседней комнате раздался быстрый скрып тонких лаковых сапогов и, предшествуемый тем же отменным дворянски-гвардейским запахом, вошел Валериан Владимирович Ратмиров	…when suddenly in an adjoining room there was the sound of the rapid creak of thin kid boots, and preceded by the same exquisite aristocratic perfume, there entered Valerian Vladimirovitch Ratmirov	И. С. Тургенев. Дым (1867) | Ivan Turgenev. Smoke (Constance Garnett, 1896).
4.3	…который не видал ни грязи, ни топи, не слыхал противного запаха от стоячей воды или навозной плотины	…he was impervious to the unpleasant smell from the stagnant water and the material of the dam	С. Т. Аксаков. Семейная хроника (1856) | Sergey Aksakov. A Russian Gentleman (J. D. Duff, 1917).
4.4	Зеленоватый мох, весь усеянный мертвыми иглами, покрывал землю; голубика росла сплошными кустами; крепкий запах ее ягод, подобный запаху выхухоли, стеснял дыхание	The ground was covered with greenish moss, sprinkled all over with dead pine-needles; blueberries grew in dense bushes; the strong perfume of the berries, like the smell of musk, oppressed the breathing	И. С. Тургенев. Поездка в Полесье (1857) | Ivan Turgenev. A Tour in the Forest (Constance Garnett, 1899).
4.5	Кабинет этот, мрачный, тесный, весь пропитанный кислым запахом вакштафа, возбуждал в уме сравнение с жилищем волка или лисицы	The room, dark and close, soaked through and through with the sour smell of stale tobacco, suggested a comparison with the lair of a wolf or a fox	И. С. Тургенев. Поездка в Полесье (1857) | Ivan Turgenev. A Tour in the Forest (Constance Garnett, 1899).
4.6	Во время чтения ставился возле него на одноногий круглый столик серебряный жбан	While he read, he had placed at his side on a round, one-legged table, a silver tankard of frothing	И. С. Тургенев. Старые портреты (1880) | Ivan

	с каким-то особенным мятным пенистым квасом, от которого приятный запах распространялся по всем комнатам	spiced kvas of a special sort, which sent an agreeable fragrance all over the house	Turgenev. Old Portraits (Constance Garnett, 1899).
4.7	…унылостью во взгляде, вытянув сгорбленный стан, заложив обе руки за спину, распространяя запах ржаного хлеба и мухояра и ничего не слыша	straightening his bent back, his hands clasped behind him, diffusing an odour of rye bread and mustiness, not hearing a single word that was being said around him	И. С. Тургенев. Новь (1877) | Ivan Turgenev. Virgin Soil (Rochelle S. Townsend, 1929).
4.8	Благовоние цветов, наполнявших церковь, сливалось с сильным запахом новых насеренных армяков, дегтярных сапогов и котов – и над теми и другими испарениями удушливо-приятно царил ладан	The sweet scent of the flowers, which filled the whole church, mingled with the smell of the peasant's coats, tarred boots and shoes, the whole being drowned by the delicious, overpowering scent of incense	И. С. Тургенев. Новь (1877) | Ivan Turgenev. Virgin Soil (Rochelle S. Townsend, 1929).
4.9	And I noticed another, by the aid of my nostrils; a fragrance of stocks and wallflowers wafted on the air from amongst the homely fruit-trees	И я отметил еще одну, о которой мне поведали ноздри: под приветливыми плодовыми деревьями носился в воздухе сладкий запах левкоя и желтофиоля	Emily Brontë. Wuthering Heights (1847) | Эмили Бронте. Грозовой перевал (Н. Вольпин, 1956).
4.10	…the feudal silhouette against the sky, admired the gardens, the sparkling odor of jonquils and the frothy odor of hawthorn and plum blossoms and the pale gold odor of kiss-me-at-the-gate	…вырисовывался на фоне неба, восхищалась искристым ароматом нарциссов, пенным благоуханием боярышника и сливы, бледно-золотым запахом жимолости	F. Scott Fitzgerald. The Great Gatsby (1925) | Ф. Скотт Фицджеральд. Великий Гэтсби (Е. Калашникова, 1965).

The situation is no less complicated with olfactory metaphors that have culturally specific features. Here the translator faces a choice: to use detachment or resort to domestication.

In Table 4 (4.1, 4.2), the "дворянский" (noble) and "гвардейский" (guards) smell is quite difficult to imagine, and the author himself further explains it. The translator does a literal translation, and it is noteworthy that "Guards" is capitalized for this purpose. Perhaps the reason for this was the polysemy of this word. The thing is that the word "guard" can mean an ordinary soldier, a bodyguard of a ruler, or a prison officer. In this case, the capitalization emphasizes noble origin.

In this example, the same "noble-guards" aroma is visible, but this time the author of the source text does not indicate its description and the translator prefers to limit themselves to the adjective "aristocratic."

Despite the fact that the next example (4.3) does not seem difficult from the point of view of selecting an equivalent, in order to translate "навозной плотины" (dung dam) the translator must at least understand the word "навозная" (dung) itself. Since this word has several meanings depending on the stressed syllable: "НавознОй" (obsolete) participle meaning "brought from somewhere" and most well-known "НавОзный" adjective meaning "related to manure" (Efremova, 2000).

In the next example (4.4), the translator moves away from the original text, replacing the word *"выхухоль" (Desmana moschata* or Russian muskrat) with the well-known "musk," which on the one hand adds clarity, and on the other hand deprives the text of originality, since it is unlikely that Turgenev was not familiar with the word "musk," yet he did not use it here. It would therefore seem evident that the reason for using "muskrat" lies in the novel itself, as can be seen from the title *("Trip to Polesie").*

Another difficulty is related to historicisms (4.5). Considering the years of the life and the social position of the author, the attempt to add detail seems important. However, for the average reader of the present century, such realities as "вакштаф" *(vakshtaf* meaning a type of tobacco) are no longer understandable and even less understandable for a foreign reader. However, the big question is whether it was worth replacing it completely with "stale tobacco" endowing the word with content that is not expressed in any way in the text. Here, the translator sacrificed the name of the tobacco itself, which in turn is semantically and contextually loaded, since "Vakshtaf is a medium-grade tobacco used by clerks" (Efremova, 2000)

This example is interesting in its own way, because in another passage (4.6, 4.8) the same translator does not seek to replace a little-known reality with any description.

Perhaps such diversity of solutions is associated with the historical life of words. Such words as *"квас" (kvass,* a type of non-alcoholic drink), *"вакштаф" (vakshtaf,* a type of tobacco), *"мухояр" (mukhoyar*, a type of fabric*), "насеренные армяки" (naserennye armyaki*, a peasant's coats of heavy cloth), *"дегтярные сапоги" (degtyarnye sapogi, tarred high boots), "коты"* (*koty*, women's warm shoes) are cultural markers. Some of them remained realities and became cultural clichés (e.g., *kvass*), others became historicisms.

The same thing happens in the above case (4.7), where the translator is forced to replace "мухояр" (*mukhoyar*) with "mustiness," narrowing the meaning. Out of the

obsolete words, the translator chooses which to use and which to replace or even omit.

Since olfactory vocabulary cannot do without flowers as objects of smell, difficulties may arise here too, as can be seen in the example (4.9). More often this is due to the plants themselves, which sometimes have several names. “Wallflowers” / “Erysimum” can be called both “желтушник” and “желтофиоль.” “Stock” also has more than one translation: “левкой” / “маттиола.”

Difficulties arise with plants that have additional connotations and are a semiotic sign, since the figurative meaning is often lost in translation (4.10).

From the examples it is clear that the olfactory vocabulary causes difficulties both at the stage of searching for equivalents (cases with floronyms and historicisms), and when choosing a translation taking into account connotations and situational factors. When faced with realities that are unknown in the target culture, translators resort to substitutions or omissions to avoid misinterpretations.

The translator chooses translation strategies depending on the situation, task, and style of the text. Within a technical text, the translator will more often resort to using terminology and searching for strict equivalents. When working with a literary text, the cultural and emotional role of olfactory vocabulary is important. If olfactory descriptions do not cause difficulties in translation, literal translation is possible; if they cause difficulties but do not carry a semantic and stylistic load, free translation and its inherent techniques are allowed. When faced with difficult passages (semantically and stylistically loaded), the translator has to sacrifice either the closeness to original text or its clarity for the reader, based on which they resort to specification or generalization to smooth out cultural difficulties.

Thus, so far, we have talked about the challenges and translation solutions in cases where a translator had to translate from language to language or from culture to culture. Although the translation of olfactory vocabulary has its own peculiarities and difficulties, the translation solutions used are mostly not unique, since the olfactory experience remains within the framework of the language, i.e., today a translator has sufficient translation techniques developed in the translation studies.

Therefore, it makes sense to touch upon the translation of olfactory vocabulary as a translation from experience to experience, i.e., to consider the problem at the level of phenomenal judgments. This means that the linguistic material must correlate with awareness of the olfactory experience. At this level, the translation problem will become more acute as the descriptions become more metaphorical. It is one thing when a translator conveys olfactory descriptions that a reader is familiar with and can easily imagine. A different thing is to translate perceptual experience that the reader (and perhaps the translator either) does not have. It is obvious that in such situations a translator is forced to use language to create “artificial phenomenal states” that are not based on the reader’s actual experience. The quality of these states and the possibility of their formation in general seem questionable. If perceptual experience cannot be translated, then translation in the full sense of the word is impossible in principle, even with all the accuracy at the linguistic level. It is important to note that the untranslatability of linguistic forms representing perceptual experience can be viewed not as a failure of methods, but as a necessary ethical (sic!) condition of the translation process itself.

Untranslatability emphasizes the importance of recognizing the differences between forms of individual experience. When readers face the untranslatable, they have to stop and think. This pause allows the readers to realize that not everything can be expressed in words, and that some aspects of human experience remain beyond the reach of language. This creates space for ethical reflection on how we interact with other people and their unique experiences. The pause caused by untranslatability can be an impulse for a deeper understanding of the text. Of course, the possibilities for creating such ethical gaps are more characteristic of the semantic layer of artistic texts (Foran, 2023).

CONCLUSIONS AND DISCUSSION

Based on the analyzed material, we can argue that olfactory experience, expressed lexically, is a complex multidimensional research object, to which different approaches can be applied. Depending on the type of text, the use of olfactory vocabulary serves to achieve different functional goals. In technical texts, olfactory vocabulary turns into regulated terminology, since technical texts aim at knowledge formation, transmission, and preservations. These texts are characterized by a strict conceptual apparatus, which would allow certain specialists to clearly express themselves on a specific topic. In literary texts, on the contrary, olfactory vocabulary is used to create an atmosphere, describe characters, events, and surroundings. It is superimposed on a complex semiotic code that needs interpretation.

When faced with difficulties of translating olfactory vocabulary in technical texts, the translator only needs to study the terminological dictionary. If there are difficulties in literary texts, the translator needs to delve into the specifics of the author's olfactory code. The translator must take into account the era, culture, peculiarities, and personal connotations, revealing the textual functions of olfactory descriptions in the overall structure of the text. In this case, the translator faces a choice: a) adhere to detachment, using unfamiliar olfactory realities, thereby immersing the reader in a foreign culture; b) adhere to "domestication," replacing or omitting olfactory descriptions that are difficult to understand or represent. This approach simplifies the structure of the text and makes it understandable for the reader, but at the same time deprives the latter of some of the connotations, cultural, historical and stylistic features of the original text.

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Research article

Translating Sounds into Visual Images, and Vice Versa

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Abstract

This article outlines the history of theoretical developments, techniques and technologies for translating audio track sounds into graphic elements or pictorial images, and vice versa. The presentation includes various attempts by philosophers (Pythagoras, Aristotle), artists (Guiseppe Arcimboldo, Olivier Messiaen, Alexander Scriabin, Arnold Schoenberg, Wassily Kandinsky, Valentin Afanasyev, Richard David James), natural scientists (Isaac Newton, Robert Hooke, Ernst Chladni, Hans Jenny), engineers (Louis Bertrand Castel, Evgeny Sholpo, Arseny Avraamov, Boris Yankovsky) to reveal the unity of color and sound and to translate colors as well as drawings into sound forms and vice versa. It features a whole variety of such translation types throughout the history of humankind, including mathematical, neuropsychological, physical, technical, and software translation. In the first type, translation is carried out by correlating the wavelength of a particular sound or musical tonality with a certain hue. Its adherents created a color and sound matching table based on their calculated mathematical formulas. Some of them then construct technical devices (like color-harpsichords) that allow this translation to be clearly demonstrated to the public. Within the framework of the neuropsychological approach, the phenomenon of synesthesia is being analyzed as well as the manifestations of this ability for a holistic perception of reality by artists and musicians who tried to convey their experience through works of art in which color and sound are constantly converted into each other. Representatives of physical translation focus on translating sounds into graphic forms and conduct experiments on the effect of sounds of different frequencies and amplitudes on physical substances such as sand, special powder or even liquids, classifying the resulting graphic forms. Adepts of technical translation are mainly engaged in sound recording, which is carried out by applying certain graphic patterns to film. A modern software approach allows for the translation of sound and image into each other in both directions using digital technologies.

Keywords: Sound-Color Translation; Sound of Image; Seeing Sound; Multimodal Perception; Audio-Visual Unity

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Научная статья

Перевод из звука в изображение и обратно

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Аннотация
Статья посвящена исследованию истории теоретических разработок, техник и технологий перевода звуков аудиотреков в элементы графики и/или живописные образы, и наоборот. Анализу подвергаются разнообразные попытки философов (Пифагор, Аристотель), артистов (Дж. Арчимбольдо, О. Мессиан, А. Скрябин, А. Шёнберг, В. Кандинский, В. Афанасьев, Р.Д. Джеймс), естествоиспытателей (И. Ньютон, Р. Гук, Э. Хладни, Х. Дженни), инженеров-экспериментаторов (Л.Б. Кастель, Е. Шолпо, А. Авраамов, Б. Янковский) выявить единство цвето-звуковых и/или звуко-графических образов, осуществить перевод цвета/узора в звуковые формы и обратно. Исследуется всё многообразие типов подобных переводов в течение истории человечества, включая такие, как математический, нейропсихологический, физический, технический, программный. В первом типе перевод осуществляется посредством соотнесения длины волны того или иного звука или музыкальной тональности с определенным оттенком цвета. Его адепты на основании высчитанных ими математических формул создают таблицы соответствий цвета и звука. Некоторые из них в дальнейшем конструируют технические приспособления (типа цветных клавесинов), позволяющие наглядно демонстрировать данный перевод. В рамках нейропсихологического подхода анализу подвергается феномен синестезии и проявления данной способности к целостному восприятию действительности художниками и музыкантами, пытавшимися передать свой опыт посредством художественных произведений, в которых цвет и звук постоянно конвертируются друг в друга. Представители физического перевода концентрируют внимание на переводе звуков в графические формы и ставят эксперименты по воздействию звуков разной частоты и амплитуды на физические субстанции типа песка, особого порошка или даже жидкости, классифицируя получившиеся графические формы. Адепты технического перевода занимаются, в основном звукозаписью, осуществляя ее путем нанесения на пленку определённых графических узоров. Современный программный подход позволяет осуществлять перевод звука и изображения друг в друга в обоих направлениях с помощью специального программного обеспечения.

Ключевые слова: Аудиовизуальный перевод; Окрашенный звук; Звучащие краски; Мультимодальное восприятие; Синестезия; Единство аудиовизуальных форм

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INTRODUCTION

The sound and visual "dimensions" of our world at first glance seem to afford different ways of experiencing, knowing, or revealing reality. They are absolutely dissimilar modalities of perception. The human ability to create auditory sign systems, it would seem, does not intersect with the visual dimension, and there is no possibility of "translating" music into visual form.

However, this is not entirely true. An object can be characterized by visual and auditory features, which in a sense allows one to construct a holistic impression. Throughout human history, many people, including scientists, engineers, composers and visual artists, have sought to convey this holistic image, to reveal the interconnection and unity of audiovisual channels of perception, to provide the ability to translate one modality into another. They did this with different goals: to demonstrate the unity of reality; to enable deaf people to perceive music (Castel) to enrich the methods of artistic influence on the emotional world of recipients (Scriabin, Messiaen, Kandinsky, James); to support with evidence the possibility of influencing the body through various sounds (Jenny); to create sound recording machines (Sholpo, Avraamov); to expand the sound palette of modern music limited by the sounds of existing musical instruments (Yankovsky), etc.

This paper aims to explore the various methods of such "translation" of the progressions of sound into the visual and back, from the first theoretical attempts of antiquity to contemporary methods of conversion that are performed with the help of computer technologies.

FROM SOUND TO COLOR: MATHEMATICAL TRANSLATION

Since ancient times, people have tried to comprehend and describe the unity of reality by drawing parallels between the visible and audible worlds. The pioneer here was Pythagoras. He suggested a direct connection between audible combinations of sounds and the harmony perceived by the visual organs. According to the ancient Greek thinker, the movement of planets attached to the celestial spheres produces music of extraordinary beauty, which is a mere reflection of the perfection and harmony of the universe. Sounds and visual images are manifestations of the same principle of the unity of the world, which can be described mathematically.

After Pythagoras and his disciples, Aristotle contemplated the relationship between sound and color, and in his *Metaphysics* he claimed that color is measurable by number, and consonance is also a number, a ratio, and the transition through the smallest intervals from the outermost string of the lyre to the highest through intermediate tones is similar to the movement from white – through scarlet and gray – to black (Aristotle, 350 B.C.E / 2013, p. 171).

Therefore, ancient Greek philosophers attempted to understand the essence of the unity of the universe, and one result was that they saw a match between sound sequences and color spectra. However, the value of finding a unified theoretical perspective distracted them from the possibility of achieving unity in a practical way.

During the Renaissance, the painter Guiseppe Arcimboldo (1527–1593) regained interest in the relationship between sound and color. He began by grading colors from white to black (with a special range of gray gradations) and relating them to the system of harmonic proportions of tones and semitones developed within the Pythagorean school. Arcimboldo laid out a scale of transitions from one shade to another with thinly applied layers of black glazes on a white base and wrote out the corresponding steps of the musical scale. Light color tones corresponded to lower notes, dark ones to higher ones.

Arcimboldo also invented the first ever color clavichord, with each note corresponding to a color. The lowest notes were represented by white, the middle notes by yellow, green, and blue, and the high notes by purple, violet, and bright red.

A few years later, the German scholar monk Athanasius Kircher created tables of the relationship between musical notes, colors, their brightness and saturation (*Ars magna lucis et umbrae*, 1646). Later, in his work *Musurgia Universalis* (1650), Kircher developed correspondences between color and musical intervals.

At the end of the 17th century, Newton decomposed sunlight into five colors (red, yellow, green, blue, purple) and proposed a hypothesis that the hue of each color corresponds to a certain wavelength. Assuming that the properties of color and sound are the same, he matched between basic notes and colors, found that two colors were missing and supplemented the color palette of the rainbow with orange and indigo.

Newton wrote: *"*The Rectilinear Sides MG and FA were by the said cross Lines divided after the manner of a Musical Chord. Let GM be produced to X, that MX may be equal to GM, and conceive GX, λX, ιX, ηX, εX, γX, αX, MX, to be in proportion to one another, as the Numbers, 1, $^{8}/_{9}$, ⅝, ¾, ⅔, ⅗, $^{9}/_{16}$, ½, and so to represent the Chords of the Key, and of a Tone, a third Minor, a fourth, a fifth, a sixth Major, a seventh and an eighth above that Key: And the Intervals Mα, αγ, γε, εη, ηι, ιλ, and λG, will be the Spaces which the several Colors (red, orange, yellow, green, blue, indigo, violet) take up" (Newton, 1730, p. 127) (fig. 1, 2).

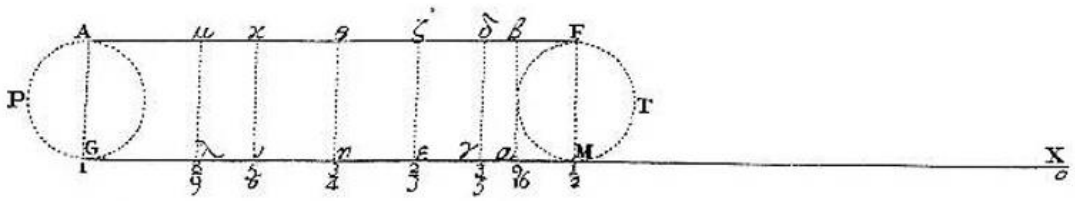

Figure 1. Musical intervals by Newton (Newton, 1730, p. 128)

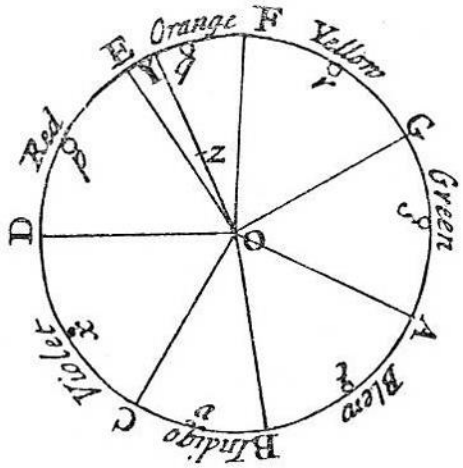

Figure 2. Correspondence between musical intervals and the primary colors of the spectrum, according to Newton (Newton, 1730, p. 155)

Based on Newton's theory, the Jesuit monk Lois Bertrand Castel proposed in 1734 to create music for the eyes that could be perceived by deaf people. As a result, he invented the color harpsichord (Clavecin Oculaire). When it was played it produced no sound but only changes in the color range (Franssen, 1991, p. 33).

The principle of the instrument was as follows: when the musician pressed a key, a panel (or in another version, a crystal illuminated by a candle flame) of the color corresponding to the sound appeared in the frame above the harpsichord. Longer optical waves corresponded to lower frequency sounds. At first, Castel used only seven colors, later he included a range of musical semitones and obtained the following table of correspondences: C – blue, C# – pale green, D – green, D# – yellowish-green, E – yellow, F – peach, F# – orange, G – red, G# – magenta, A – violet, A# – bluish-violet, B – violet-blue.

Later Castel's idea was criticized by Johann Gottlob Krüger, who claimed that it was too subjective to correspond the colors and musical notes in such a way as it is described above. He tended to achieve real harmony in visual representation of music.

Krüger arranged some candles in a shape of semicircle. Each of the candles was placed in the focus of a hollow mirror. "The beams of light coming from the candles were each focused by a lens, such that all the beams projected into one point, the middle of the full circle, where a screen was set up. Each key of the instrument was not only triggering an ordinary harpsichord mechanism but was attached as well to a lever that normally screened off one of the beams, but when moved by pressing the key, pushed a circular window of colored glass into the beam, resulting in the projection of a colored circle onto the screen. The diameters of the windows decreased as the corresponding tones got lower, enabling the simultaneous projection of different colored circles to visualize a colour chord, showing the root of the chord as a primary colour along the circumference of the projected circle and an array of increasingly superimposed colors towards the centre" (Franssen, 1991, p. 38) (fig.3).

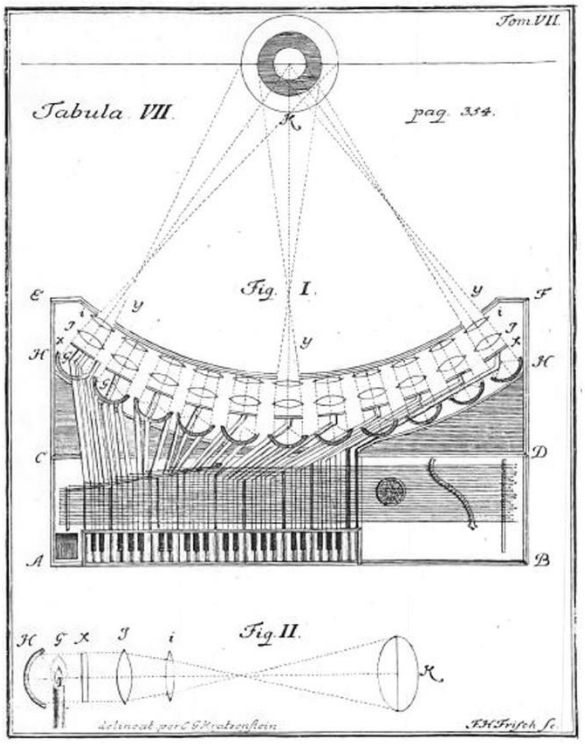

Figure 3. Clavecin Oculaire by Johann Gottlob Krüger (Krüger, 1743, plate 7)

In the 20th century, many versions of color organs were created. Among their creators were Alexander Wallace Rimington, Bainbridge Bishop, Mary Hallock-Greenewalt, and others.

In Russia, a representative of the Leningrad underground, Valentin Afanasiev, developed his own system of translating sound into color (1997). Having analyzed previous attempts, he concluded that until now the creators of such translations relied either on their own subjective associations of a particular note with color, or on intuition. From Afanasyev's point of view, the system of sounds (acoustic waves) can be unambiguously correlated with the system of colors (electromagnetic waves) due to the existence of general laws of musical and pictorial harmony.

Both music and painting have a psychophysical effect on a perceiver. Both sound and color are irritants that cause certain tensions in the human psyche. At the same time, tensions of the same intensity caused by the impact of sound or color can be interchangeable. Just as a musical chord can cause certain tensions in us, exactly the same effect is achieved by the impact of color combinations on the eyes.

If in music a composer deals with tonal, subdominant or dominant relations (functional), then in the visual arts the basis of relations is the principle of complementarity of red, blue and yellow colors. Afanasyev mathematically calculated and substantiated the mutual proportionality of such relations of music and painting. The following figure shows one of the formulas for his system (fig.4).

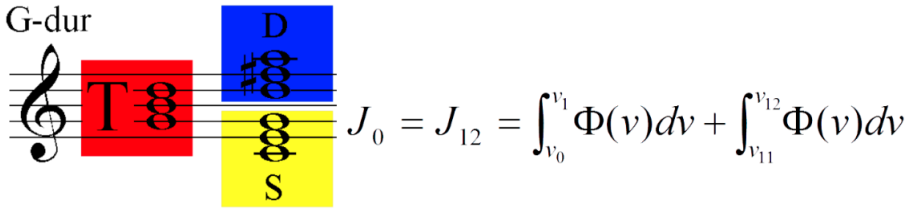

Figure 4. Common laws of sound and color (Afanasiev, 2024)

According to Afanasyev, certain colors cannot correspond to individual notes. "It is necessary to link the relationships of sounds and colors depending on the plane in which they are presented: melody, harmony or tonality. In other words, the same note in a work can be colored in different colors. Thus, the artist-composer chooses the color tonality of his work, and all subsequent development occurs according to the established laws of sound and color" (Afanasiev, 2024).

The tone color specified by a composer is displayed as a background or the staff on which the notes will be written later. If we take the *Prelude in Es minor* from Volume I of J.S. Bach's *Well-Tempered Clavier* as an example, then, if the author had marked the tonality in red (E-flat), the other colors would have lined up as follows (fig. 5):

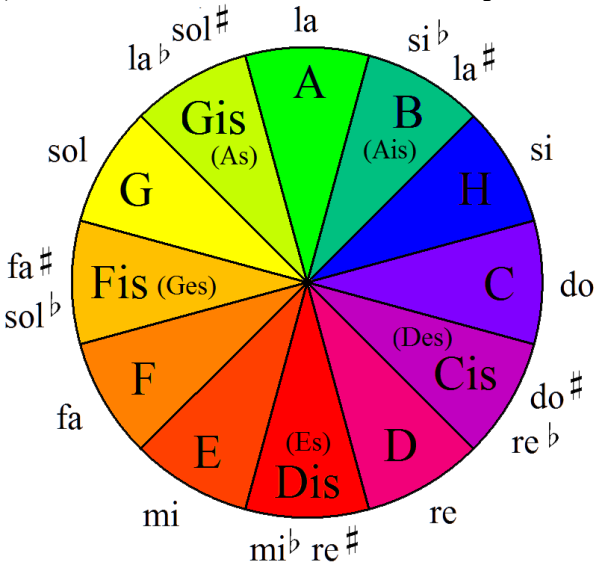

Figure 5. Correspondence between colors and musical tones (Afanasiev, 2024)

If we take the initial fragment of the *Prelude in Es minor*, we can see a transition from a major to a minor key. This transition could be demonstrated by changing color from warm (red and orange) into cold (reddish purple) (fig.6).

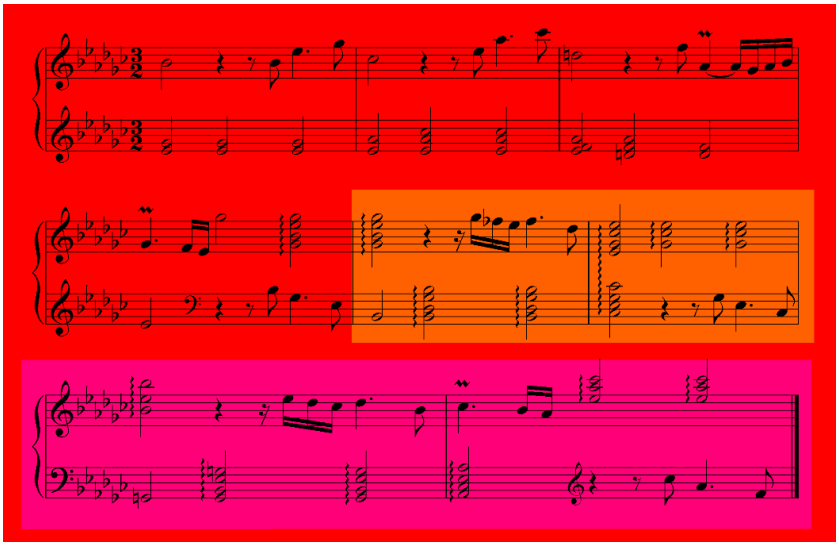

Figure 6. Fragment from the *Prelude in Es minor* from Volume I of J.S. Bach's *Well-Tempered Clavier* (Afanasiev, 2024)

NEUROPSYCHOLOGICAL TRANSLATION: AUDIO-VISUAL UNITY

There are people who perceive each hue as correlated with a sound of a certain pitch. “On a closer examination of the multimodal perception, it can be seen that sounds involuntarily trigger colors, lines and shapes in certain human subjects, unified into unique audio-visual experiences” (Borza, 2016, p. 61). Such people are called synesthetes, and their special capacity is chromesthesia, or sound-to-color synesthesia. Whitelaw (2008) called for considering synesthesia not only a neurophysiological, but also a cultural phenomenon, since many synesthetes are creators of synthetic works of art that allow other people who do not have such a rare capability to perceive the world as a whole, in the unity of its audiovisual forms.

Among musicians, this phenomenon was observed in Scriabin, Nikolai Rimsky-Korsakov, Mikalojus Čiurlionis, Messiaen, Schoenberg, Duke Ellington, Billy Joel, Thomas Köner, Tori Amos, and others. Each of them used their synesthetic abilities in their own way.

Synesthetic experience can manifest itself in the use of color references in the titles of musical works, as in Messiaen’s *The Colors of the Celestial City, Blackbird, Chronochromie, The Sadness of the Big White Sky*. Or as color references in the score: *The Reed Warbler, Quartet for the End of Time* (Johnson, 2023, p. 15).

Synesthesia can also be expressed in a composer’s desire to reproduce his experience of the holistic experience of music and color, as was the case with Alexander Scriabin. Scriabin created his own system of color-tonality relationships: “The color underlines the tonality; it makes the tonality more evident” (Myers, 1911, p. 228), where C major was associated with red, D major with yellow, G major with orange-pink, and A major with green.

In 1911, Scriabin wrote his first synesthetic work, *Prometheus: The Poem of Fire*. His idea was to create a work that would unite sound and color. Being a chromesthete, he could not imagine music that would lack simultaneous color expression. The score of *Prometheus* was supplemented with a special performance line, Luce (from Italian for "light") (fig. 7), which prescribed the sequence of color flashes of light that corresponded to the tonalities being played. It was written in regular notes without any explanation of the correspondence between notes and colors and was to be played using the Tastiera per luce ("keyboard with lights").

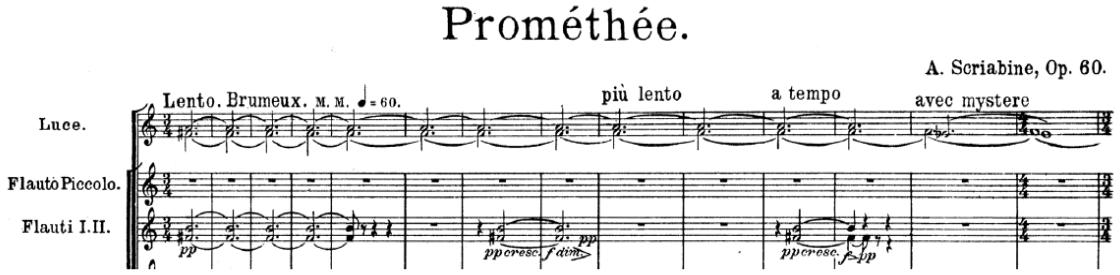

Figure 7. Score of *Prometheus* with the part of Luce (Scriabin, 1911)

In order to bring his idea to life and to demonstrate the idea of color music, Scriabin needed to develop specific equipment. The composer's friend, the engineer Alexander Moser, began working on its creation. His idea was to connect the keys to special bulbs, each of which would be responsible for a particular sound (fig. 8). But this device was never brought to the level necessary for the adequate implementation of Scriabin's project.

Figure 8. Moser's color light instrument project (from the collection of Memorial Museum of Aleksander Scriabin in Moscow, Russia)

Enthusiasts from the USA, inspired by the idea of Scriabin's color music, came up with a new way to implement it. For the first time, *The Poem of Fire* with light

accompaniment was performed at Carnegie Hall in New York in 1915, about a month before the composer's death. A gauze screen was stretched over the heads of the musicians onto which multi-colored lights were projected, replacing each other in time with the music.

In Russia, *Prometheus* was first performed in accordance with the composer's original plan only in 1962: streams of light were projected directly onto the walls of the hall, becoming brighter or dimmer depending on the pitch of the notes being played, changing the color palette depending on the tonality.

Another composer and sometimes painter, Arnold Schoenberg (1874–1951), also conceived of the mutual enrichment of sound and color in a *Gesamtkunstwerk* ("total work of art"). If we try to "translate details of musical language, which reason cannot understand, into the language of our concepts the essence is lost" (Kandinsky & Marc, 1912/2005, p. 92). To convey this essence, to present it differently but still coherently, can only be done by using the language of another art.

In his monodrama *The Happy Hand* (1924), Schoenberg created an illuminated-scene design, which turns out to be subordinate to the music. In the musical score, he clearly wrote down his instructions regarding the stage design, costumes, appearance of the characters, as well as the nature and color of the lighting. The composer personally made sketches for the drama, conveying his color ideas, describing in detail the moments of changing lighting during this or that action of the characters on stage.

Some artists also sought to bridge the gap between sounds and colors by hearing how colors "sound." Thus, Wassily Kandinsky used his gift for hearing colors in his work to create paintings such as *Musical Overture* (1919) *The Violet Wedge* (1919), *Composition IV* in his essay on Scriabin, and *Composition VIII* (1923), inspired by Mahler, as well as a tableau entitled *Parallels of Color and Sound* (Rucsanda, 2019). He also created four "color-tone dramas": *The Yellow Sound, The Green Sound*, *Black and White*, and *Violet*. The opera *Der Gelbe Klang (The Yellow Sound*) (1912) had no plot in the usual sense, but was a mixture of color, light, and sound, featuring five "bright yellow giants (as big as possible)" and "vague red creatures, somewhat reminiscent of birds" (Casini, 2017). The action was described in it through constant cross-references between the sounds of the orchestra and the colored beams of spotlights illuminating the figures on stage: "Suddenly all colors vanish (the giants remain yellow), and a dim white light fills the stage. In the orchestra single colors begin to speak. Corresponding to each color sound, single figures rise from different places" (Kandinsky & Marc, 1912/2005, p. 223).

In his text *On the Spiritual in Art,* Kandinsky draws parallels between colors and musical instruments: "Blue, presented musically, resembles a flute, dark blue resembles a cello and, becoming darker, the wonderful sounds of a double bass; in a deep, solemn form, the sound of blue can be compared to the low notes of an organ" (Kandinsky, 1967, p. 96). White "sounds like a non-sound, which quite accurately corresponds to certain pauses in music <…>. Presented musically, black is a complete final pause" (p. 101). "The light, warm red color resembles the sound of a fanfare with a tuba overtone <…>. Red cinnabar sounds like a tuba" (p. 104). Deep green – like a cello. Cold red – like a violin. Orange – like an alto violin. Violet – like an English horn, bassoon.

PHYSICAL TRANSLATION: NATURE-DRAWN SOUND

In the 17th century, scientists noticed the ability of sounds to imprint themselves in the form of patterns. Robert Hooke was one of the first to draw attention to the patterns on loose surfaces from sounds. In 1680, while running a bow over a metal plate, he discovered patterns that were formed from the flour scattered on it. Ernst Chladni expanded his experiments in 1787, creating an entire encyclopedia of patterns that different sound waves leave on sand (Faraday, 1831) (fig. 9).

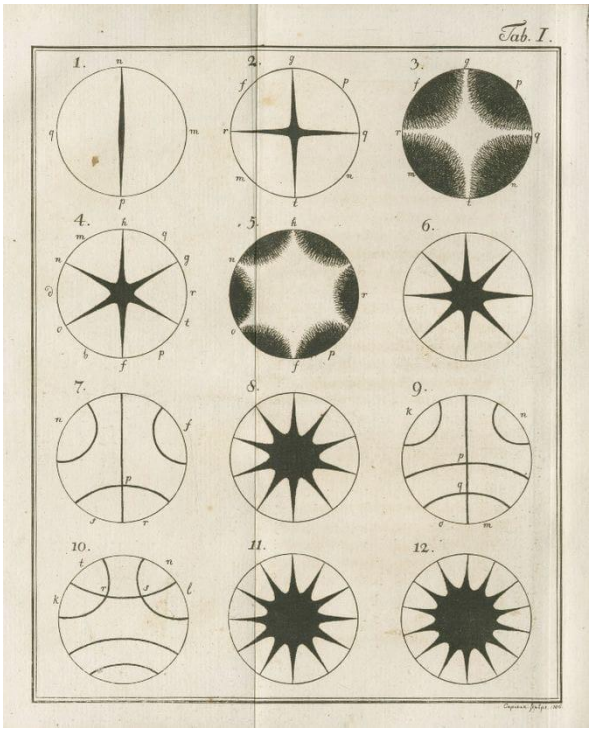

Figure 9. Chladni's figures (Chladni, 1787, p. 87)

Inspired by Chladni's ideas, Swiss physician Hans Jenny created the science of cymatics (from the Greek κῦμα – "wave") in 1967. His aim was to study the effect of sounds on the human body. Having improved Chladni's technique, he invented a device called a tonoscope, capable of converting any sound (including the human voice) into an image. Jenny recorded individual vowels in different languages of the world using a tonoscope and noticed that when they were pronounced in ancient languages (for example, Sanskrit), the sand took the form of written symbols corresponding to the vowels being pronounced.

Using lycopodium powder, Jenny also created moving 3-D objects (fig. 10, 11).

Figure 10. Loud sound (large amplitude), lifting the powder up (Jenny, 2001, p. 69)

Figure 11. Acoustic irradiation transforms a layer of lycopodium powder into round shapes every one of each rotates on its axis and around the whole figure (Jenny, 2001, p.75)

TECHNICAL TRANSLATION: GRAPHICS TO SOUND

Sound recording technologies showed the connection between sound and the visual in a new way. Sound received its own specific visual form, not yet connected with color. In 1889, in Russia, Vekshimsky invented a device for optical sound recording. The vibrations of the membrane caused by the sound are transmitted to a mirror, which reflects a light beam. The beam, in turn, passes through a thin slit, forming a “light stroke,” and the set of strokes of different heights makes up a picture of sounds as mountain peaks. In 1904, Eugene Augustine Last presented a prototype of a system for optical sound recording on film, recording the definiteness of sound as changing waves.

In 1919, American inventor Lee De Forest received a patent for a film sound recording process in which he improved the design of Finnish inventor Eric Tigerstedt and the German Tri-Ergon system and called this process *Forest's Phonofilm*. In *Phonofilm*, sound is recorded directly onto the film in the form of a track of variable optical density, in contrast to the "variable width" method in the *Photophone* system developed by RCA. Changes in the track density correspond to a pulsating current of audio frequency from a microphone and are applied photographically to the film, and during the screening of the film are converted back into an electrical signal by a photocell. Thus, the idea of converting an audio signal into a visual one and back received its further development, as well as practical application.

At the same time, Soviet engineers were conducting their own research to convert sound into graphic form. As a result, two systems with a low-inertia galvanometer were developed in Moscow and Leningrad at almost the same time: with a variable width of the optical track by Alexander Shorin, and with a variable density phonogram *Tagefon* created under the supervision of Pavel Tager.

The overall scheme of recording is as follows: the sound of the amplified microphone is transmitted to special equipment connected to the incandescent lamp. The rotation (corresponding to rhythm and tone) of the light emitted from it passes through a special lens and is recorded on the moving photosensitive film.

Studying the visual imprint of sound, Soviet researchers in the 1920s began to think about "reverse translation." If there is a visual representation that uniquely corresponds to a voice or audio recording, then could decorative patterns be "translated" into music? There were several researchers in the Soviet Union working in this direction.

In 1931, Sholpo designed the *Variophone*. It consisted of cardboard disks attached to a rotating circle with teeth of various shapes cut into them, forming one or another sound wave. As they rotated, these disks periodically interrupted a beam of light, which formed the outlines of the soundtrack. A beam of light emanating from a projector shone through the rotation of these disks and was recorded on film as a picture. Then these images, passed through a sound projector, were converted into sound (fig. 12).

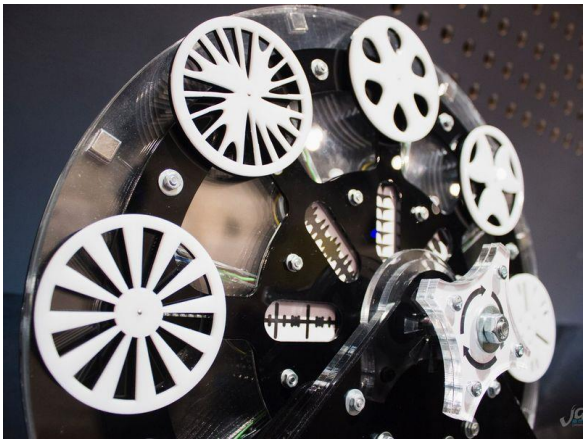

Figure 12. "Variophone" by Sholpo with cardboard discs with basic wave shapes (from the collection of the Museum of Sound in St. Petersburg, Russia)

If Sholpo, before creating his device, graphically recorded and combined various sounds and consonances, composer Arseny Avraamov immediately began with the use of ornaments. He drew them on paper (fig. 13), then photographed them on the soundtrack of a film and reproduced them using a projector. Moreover, if the melody of the resulting compositions was recognizable, then their timbre was unique. It seemed as if the music was voiced by some unknown instruments.

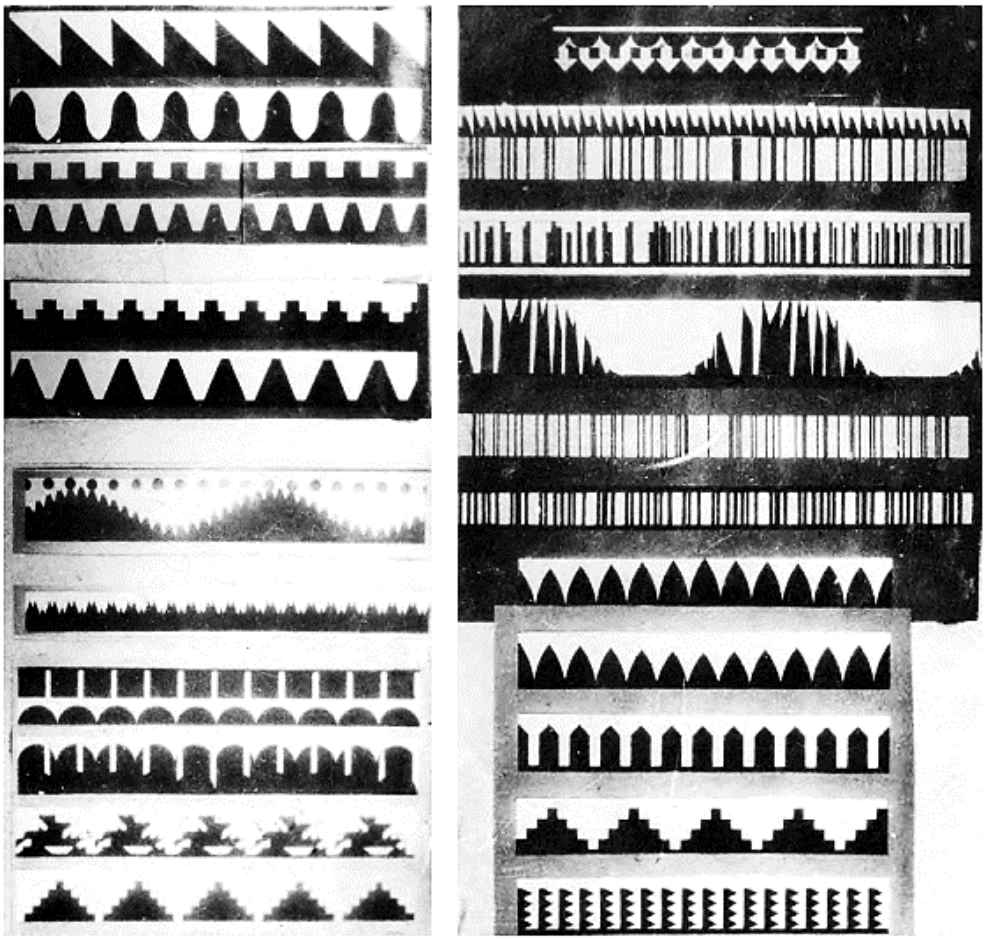

Figure 13. Patterns for translation graphics into sounds (see Smirnov, 2013, p. 179)

Later, Avraamov tried to translate into sound more complex geometric figures such as algebraic equations and images of molecular movements within certain chemical elements.

Unlike his colleagues, Boris Yankovsky wanted to achieve the definition of not only the form of the sound wave (which was dictated by the ornament), but also the timbre. His plans included the creation of new tonal systems, complex polyrhythmic effects. For this purpose, he proposed to assemble a collection of sound elements similar to the periodic table (fig. 14) and on its basis form a universal language of sound which would be studied by a new discipline – *Synthetic Acoustics*. According to Yankovsky, just as the gaps in the periodic table are gradually filled thanks to the latest discoveries in

chemistry, with the help of *Synthetic Acoustics* it is possible to fill the gaps in the system of orchestral tonal colors. He proposed to do this by selecting and crossing the sounds he selected and recording sound waves using sinusoids.

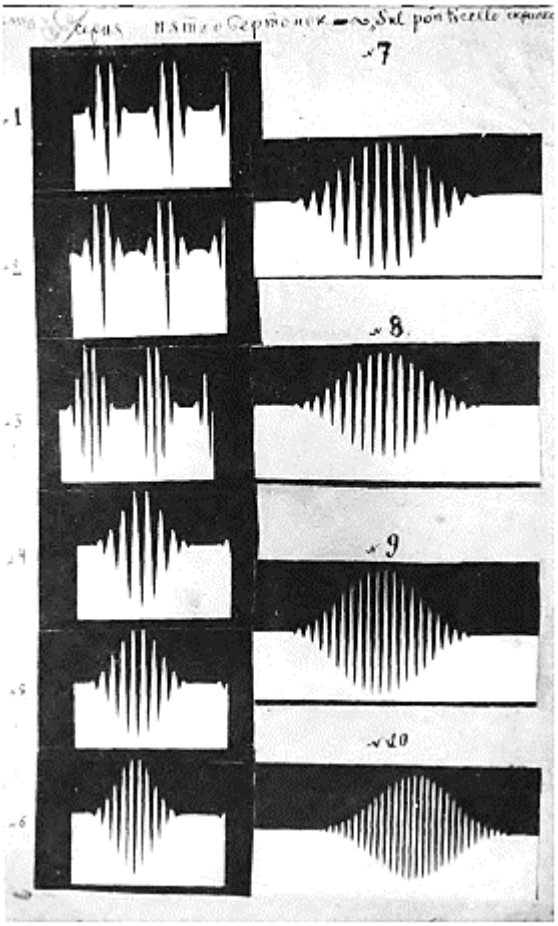

Figure 14. Sounds of synthetic instruments that were supposed to fill the gaps between the sections of a symphony orchestra (see Smirnov, 2013, p. 179)

Animator Nikolai Voinov cut out sound wave profiles from paper, synthesized them optically using the *Nivoton* tool he created, and then photographed fragments of the soundtrack on an animation machine, converting the image into sound. By combining them with the video sequence, he received a full-fledged synthetically voiced animated film.

SOFTWARE TRANSLATION: FROM SOUND TO IMAGE, AND BACK

Digitalization has significantly expanded the possibilities for "translating" audio and visual forms into each other. In the 20th and 21st centuries, special programs for converting sound into graphics/color and back are created using computer technology. The principle of operation of such programs is as follows. Every sound has two main

parameters: frequency (which determines the pitch of sound) and amplitude (responsible for the volume). In a spectrogram (a visual display of sound), frequencies are displayed on the vertical axis (Y), amplitude is designated by one color or another, and the horizontal axis (X) reflects the time characteristics of the audio track.

At present, such computer programs use different variants of sound-to-visual image conversion (their differences lie in different degrees of scaling, compression and stretching of axes). They are used for medical purposes (ultrasonic examinations, which result in a visual image that is easier for a doctor to comprehend and interpret than audio recording), in the analysis of various audio data obtained from nature (for example, birdsong or roaring of some wild animal). These programs could be also used for automatic addition of sound effects to videos for the purpose of reducing manual sound editing work (Zhou et al., 2018).

At present, such computer programs use different variants of sound-to-visual image conversion (their differences lie in different degrees of scaling, compression and stretching of axes). They are used for medical purposes (ultrasound examinations, which result in a visual image that is easier for a doctor to comprehend and interpret), in the analysis of various audio data obtained from nature (for example, birdsong or roaring of some wild animal).

There are browser programs that allow a person to see various sounds in color and three-dimensional representation (for example, fig. 15, to “draw music”, that is, by adjusting the key, octave, etc., one can then move the cursor across the screen, which will be displayed both visually and audibly (for example, https://spectrogram.sciencemusic.org/)

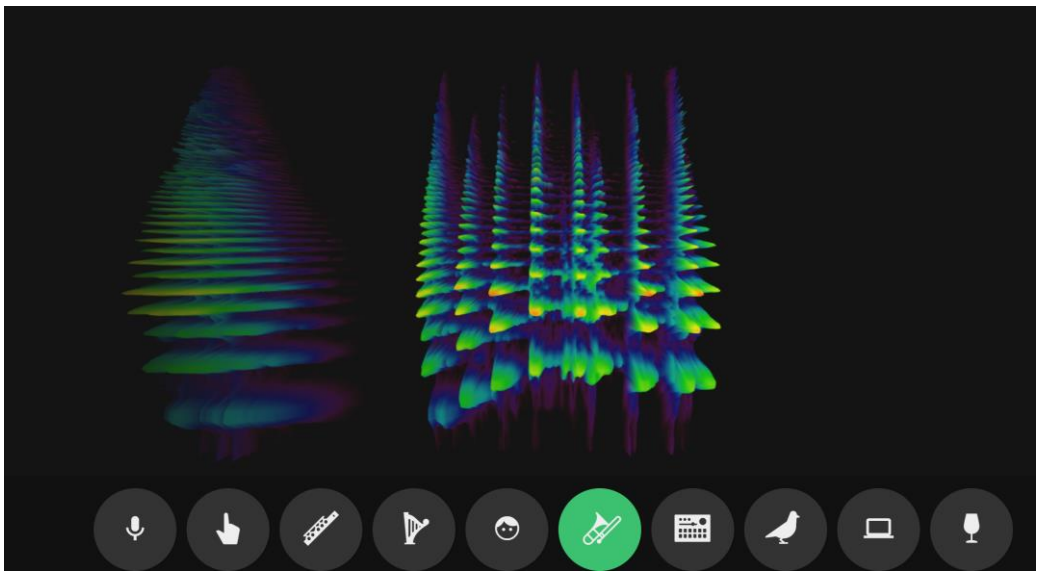

Fig. 15. Visual representation of saxophone sounds (Jeremy Morril and Boris Smus, https://musiclab.chromeexperiments.com/spectrogram-service/)

The *Increat* program (2003) allows translation between audio and visual data based on the analogy between the main parameters of sound and color. Thus, red shades of the image correlate with the left channel of the stereo sound system, green – with the right, and yellow – with both channels. Such sound characteristics as pitch, volume, duration of sound correspond to brightness, color intensity, a certain length and shape of the line.

Some musicians have begun to use similar technologies in their works. For example, Richard David James (*Aphex Twin* art project), having created images, records them as a melody, then mixes these "pictures" of audio files with other sounds, creating unique tracks. By passing these music tracks through a spectrograph, it is possible to perform the reverse operation of obtaining a picture from sound. Thus, by inserting a spectrogram into the soundtrack of his composition *Equation*, James captured the "face of a demon". As it turned out later, this image was a modified self-portrait of the musician. By changing some settings in Spectrogram, a program that allows visualization of the original soundtrack, user Jarmo Niinisalo saw and showed to other people the face of the creator of the composition himself (fig. 16).

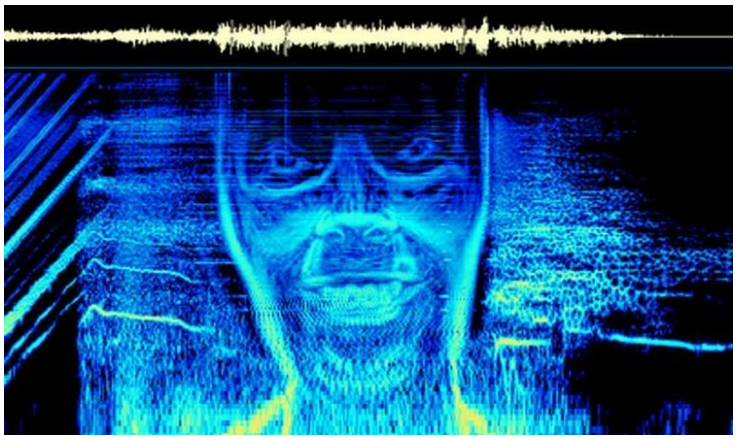

Figure 16. Original "Face of the Deamon" in the soundtrack *Equatio* by Aphex Twin, obtained using a linear frequency display scale instead of a logarithmic one (Wadsworth, 2016)

Thus, new technologies make it possible to create multi-layered meanings in a work of art, accessible to the perception only of advanced users, stimulating them to actively participate in the creation, to make efforts to decipher and translate auditory information into visual information, hinting at the presence of deeper meanings hidden behind the original melody or image.

Another software called Virtual ANS is a graphic editor simulating the photoelectronic synthesizer ANS which was created by Evgeny Murzin in 1958, named after Alexander Nikolayevich Skryabin. It allowed for the first time to draw music in the form of a spectrogram without the participation of live instruments and performers. This is a graphic editor that gives the user the ability to turn sounds into images, download and listen to pictures, draw microtonal/spectral works with a unique cosmic sound.

Recently, software developments have continued to convert sound into image and back. At the same time, they are becoming increasingly focused on the average user, who is constantly connected to their smartphone.

Thus, one of the latest developments is the PhonoPaper camera application created on the basis of Virtual ANS, which provides the ability to listen to images with encoded sound (PhonoPaper codes). In the application, you can also create your own codes: a sound no longer than 10 seconds will be recorded from the microphone and converted into an image.

Browser synthesizers allow us to experiment with converting images into sound. The most common and easiest way to convert sounds is to use individual lines or a set of dots of different heights.

Among Google's experiments is “Paint with music” (https://g.co/arts/BGBT8h2p4QqnnCPW6). Here a person can select a specific background, and using one or more of the suggested tools, draw lines that will then be played according to the pitch of the sound, visually exploding at the playing point with a multitude of multi-colored circles.

Inspired by the ANS optical synthesizer, an artist Olivia Jack created a simple web-based graphical synthesizer called Pixelsynth. By default, a person can select one of the pictures drawn on a black background or even text (Fig. 17), which is gradually played from left to right (shown by the red stripe). Accordingly, by drawing in the program in white, you can change the sound.

Fig. 17. Pixelsynth web synthesizer that plays white-on-black drawings (Olivia Jack, https://ojack.xyz/PIXELSYNTH/)

In general, the digitalization of visual and auditory objects has brought their nature closer together, which has expanded the possibilities for their transformation. For example, the tone value of each pixel in a drawing can be converted into a sound

frequency. Artificial intelligence is increasingly becoming an intermediary in translation. In some cases, the AI image-to-music translation is mediated by text, in others the translation is direct (for example, The Synesthetic Variational Autoencoder SynVAE translates images into music in such a way that objects that are similar in color and location sound similar (Müller-Eberstein & Noord, 2019).

CONCLUSION

Despite the difference between the visual and auditory modes of perception of reality, ideas about their complementarity, as well as the possibility of mutual translation of sound and visual forms, has interested humanity since ancient times.

At first, theoretical attempts at such a translation appeared, with the help of mathematics. Pythagoras, Aristotle, and then Arcimboldo, Newton, Castel and other scientists sought to establish correspondences between individual sounds and the colors of the spectrum based on calculations of the length of the sound wave and the corresponding hues of color. Sometimes such attempts also had practical application in the form of various musical instruments capable of simultaneously reproducing a sound and the color corresponding to it.

Other scientists proposed a different version of such translation – a physical one. As a result of experiments with various substances, they discovered that sounds, acting on these substances, are capable of creating certain patterns on them. The result of such research was the creation of a device (tonoscope) with the help of which any sound can be translated into an image. The purpose of its creation was, first of all, the desire to improve and facilitate the decoding of the results of medical examinations. Nevertheless, representatives of other professions became interested in the possibility of such translation and began to use it for their own purposes.

Over the past three centuries, artists have also been interested in the possibility of translating musical and visual series. This holds especially for artists who experience synesthesia. They developed a neuropsychological mode of translation that is based on the innate ability of some people to perceive sounds as colored, allowing for the establishment of correspondence between the pitch or timbre of a sound and certain shades of color. These "translations" lead to the emergence of works of art that reflect a holistic vision of the world.

There is also a technical variant of audiovisual data translation, connected with the optical system of sound recording on film with the help of special equipment. Its adherents attempted to translate graphic patterns into a soundtrack. The result of which was, first of all, sound recording equipment

In the contemporary world, software translation dominates, converting sound into images and returning them through computer software.

The digital conversion of auditory and visual signals provides a unified language in which both can be expressed. It will be important to more closely consider how this unification related to other approaches to the unification of sight and sound, including the mathematical/theoretical approach of the Pythagorean. Also, it is open to debate whether this unification provides a synesthetic holistic vision of a world that is digital or can be

digitized throughout. If physicians and physicists drew on the inherent similarity of light waves and sound waves and their resonance which would materially affect physical bodies, there is now a move from a common wave nature to a common representational form, namely that of the digital.

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Research article

Memory and Style: Leo Tolstoy's Philosophy, the Tao Te Ching, and Machine Translation

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Abstract

In a world of intercultural conflict, when the Huntingtonian paradigm reaches new levels of relevance, all sources of cultural self-reflection and intercultural dialogue are vital. Answering to Francois Jullien's notion of the gap, Tolstoy's views on translation exhibit its integrative potentional which machines cannot grasp. Some, like Alan Turing, developed the notion of an artificial intelligence in respect to a harmonizing dialogue, others defined it with reference to translation as perfect simulation. This raises the question whether translation should also be considered a harmonizing dialogue between two cultures. Tolstoy shows that it is more than mere harmonization but involves integration, thus indicating how the worlds of automated and human translation are unrelated to each other, coinciding only by accident or luck. Tolstoy moved from the idea of intellectual progress through harmonization to that of integration, from saying to showing, producing a cultural amalgam. From a literal point of view, translations can be semantically and syntactically incorrect, and yet reflect the state the original author was in. The opening stanza of Laozi's *Tao Te Ching* in the Russian translation edited by Tolstoy demonstrates this complexity. The psychological effects of the illogical or absurd, of koans, and of brilliant poesy, are indeed the final challenge to automated translation. In respect to Taoism, this has been discussed by Evgeny Torchinov, and it will be shown also by attending to Tolstoyan translational strategies regarding the *Tao Te Ching*. Machines should not replace human translators for cultural communication. Even in a world of total and totalitarian neuromorphic production, human translation will have the potential to function as a special kind of communicative art.

Key words: AI; Communication; Laozi; Integral; l'ecart; Cultural amalgam

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Научная статья

Память и стиль: Философия Льва Толстого, Дао Дэ Цзин и машинный перевод

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Аннотация
В мире межкультурного конфликта, когда парадигма Хантингтона достигает новых уровней релевантности, любые источники культурной саморефлексии и межкультурного диалога становятся жизненно важными. Взгляды Толстого на перевод, напоминающие “l’ecart” (“разделение”) Франсуа Жюльена, показывают потенциал этой области, который машины не могут постичь. Толстой не только указывает, как миры автоматизированного и человеческого перевода не связаны друг с другом, но и как они являются потенциальными близнецами только благодаря контролируемой случайности в сборе данных ИИ. Во-первых, Толстой рассматривал перевод как источник литературного творчества, памяти и стиля. Во-вторых, появляется толстовская идея гармонизации как формы интеллектуального прогресса. Наконец, Толстой перешел от гармонизации к интеграции, от рассказа к демонстрации, став культурной амальгамой. Начальная строфа “Дао дэ цзин” в русском переводе, отредактированном Толстым, демонстрирует эту заключительную стадию в ее сложности. Психологические эффекты нелогичного или абсурдного, коанов и блестящей поэзии, действительно, являются последним вызовом для автоматизированного перевода. Эти факторы обсуждались в связи с даосизмом Евгением Торчиновым и будут показаны в “Дао дэ цзине” через толстовские переводческие стратегии. Машины не должны заменить людей в культурной коммуникации. Даже в мире тотального и тоталитарного нейроморфного производства человеческий перевод имел бы потенциал функционировать как особый вид коммуникативного искусства.

Ключевые слова: ИИ; Коммуникация; Лао-цзы; Интеграл, l’ecart; Культурная амальгама

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INTRODUCTION

Consider, in Pierre-Simon Laplace's fashion, a demon who is capable of finding two pieces in the Library of Babel which, due to chance and the Library's vast combinatorial potential, are like translations of each other. Are these two texts in fact translations of one another? On the one hand, one illustrates the sense of the other in another language. But would the one text relate to the other in the same way as does the lifelong translation of Sima Qian's *Shiji* by Rudolf Vyatkin, or the decades-long translation of the Gospels by Leo Tolstoy? If translation is considered as a movement from one side of a river to another, with Wittgenstein's ladder pushed aside after it has fulfilled its function, there is still that function, the movement, and different tasks and additional problems to work on. The approach of Tolstoy to translation is not so much about how to translate, but how the two worlds, so-called automated translation and human translation, are unrelated to each other and are would-be twins not in spirit but only by a controlled accident.

In Tolstoy's eyes, the translator is the final interpreter, not just changing the wording and grammar, but helping to integrate or re-integrate the source material, thus contributing to the progress of humanity. Tolstoy calls this process "integral," a way to integrate the meaning of the text being translated by compressing it, removing many words and letters to try to find the single symbol of truth resembling the Indian Om (ॐ).

This paper consequently elaborates on different aspects of Tolstoy's decades-long translational adventure, to show how, from the source of "memory and style" translation became one of the supreme forms of creativity for the great writer. The significance of translation resides in the meeting of cultures, in what François Jullien would call – remarkably, in Tolstoy's fashion – a gap. Mechanization of such intricate and complex matters jeopardizes intercultural dialogue and threatens to impoverish the culture. Ultimately, "teaching" a machine to truly translate would be analogous to "teaching" it to respect.

SURVEY OF TOLSTOY'S TRANSLATIONS

The history and context of Tolstoy's decades-long adventure in translation has been researched in depth by a Turkish specialist in Russian literature, Hanife Çaylak (2015). However, Çaylak's work confines itself to literary history. Here her work will be enriched by examining one significant case, Tolstoy's involvement in translating Laozi's *Tao Te Ching*. The question of Tolstoy's philosophy of translation and its relation to the problem of machine translation remains wide open and approachable, thanks in large part to the wide scope and systematization of the biographical material provided by Çaylak.

The first significant encounter by Tolstoy with the world of translation was while writing his very first work of fiction, the semi-biographical *Childhood*. Tolstoy was doing both, translating Laurence Sterne, Heinrich Heine, and Benjamin Disraeli, and probably others during the daytime, and writing his own fiction at night (Çaylak, 2015, p. 774; Tolstoy, 1937, p. 177). Tolstoy discovered translation not as a way to reach other cultural worlds, but, according to his diaries, as a way of learning how to write. In a sense,

translation in this special experience becomes an extension of reading, and often, one process replaces another. The relevant diaries of 1852 and 1853 are rich with days when Tolstoy read rather than translated anything, or was riding, playing cards, traveling through Chechnya and Dagestan. In the diaries he scolded himself for all these diversions except for reading. And of course, reading is essential for developing writing skills, but translating venerated authors seems to be a less obvious addition to the self-education program of a young writer, an analogue to painters' time spent copying old masters. Tolstoy explicitly claimed that he wanted to develop "memory and style" through translation (Paperno, 2014, p. 11). So, in the very beginning, Tolstoy's approach to translation was his own and quite special. It also showed his tendency towards eclecticism if we consider the variety of authors mentioned in his diaries.

During the preparation for *War and Peace*, Tolstoy created an absolutely different approach to translation. He made a translation from French of the correspondence between two members of the high aristocracy, Maria Volkova and Varvara Lanskaya. Previously, Tolstoy presented it as if it were a found object, namely as the correspondence between two characters of *War and Peace*, Maria Bolkonskaya and Julie Karagina. The letters of Volkova and Lanskaya were directly quoted in the novel with minor changes. This event puts the philosophy of translation in a peculiar light, different than one would expect from a traditional view of Tolstoy's intellectual heritage because Tolstoy blurred the line between the roles of author and of translator.

After that often overlooked experimental gesture reminiscent of Marcel Duchamp, Tolstoy needed translations for his pedagogical experiments when he decided to make his own translation of Aesop included in Tolstoy's collection of readings for pupils (Tolstoy, 1953, p. 247). In the late 1860s and early 1870s, Tolstoy showed great interest in Greek language, literature and philosophy. Aesop was to become Tolstoy's fellow traveler and exemplar, the more so as time went on, especially in Tolstoy's late short stories, so treasured by Ludwig Wittgenstein. There is the absence of the moral summary at the end of these stories as was customary for fables, but instead there is a special moment: Tolstoy wants to show, rather than say, according to the famous maxim by Wittgenstein.

Usually a very particular form of Bible studies is considered to be Tolstoy's main translational project, also according to Çaylak. Indeed, *The Gospel in Brief* (1883), Tolstoy's only finished work on religion, expresses views on the philosophy of religion relevant until the very last years of the writer's life. It demonstrates an extremely counter-intuitive approach to translation, combining elements from all previous work of Tolstoy as a translator. However, there was one more very significant engagement with translation that is overlooked in Çaylak's analysis, and this is Tolstoy's participation in the translation of Laozi's *Tao Te Ching* (1894). It is the first published Russian translation of the text. However, it is not the first translation of *Tao Te Ching* in Russian, that being the text by Dmitrij Sivillov done in the 1820s (Zhang & Luo, 2023). Tolstoy's Gospels and his *Tao Te Ching* are best understood together. Unbeknownst of Sivillov, Tolstoy tried to translate the principle text of Taoism uniting and harmonizing different western translations. Tolstoy worked on this project together with his disciple, Yevgeny Popov. It was a project

reminiscent of Tolstoy's work with the Gospels from approximately 1879 to approximately 1892. However, just like the main text regarding the harmonization of the Gospels (1891), Tolstoy abandoned the idea. Probably harmonization did not satisfy him, he was already moving on to his integral view on the world. His conception of integration got a practical realization in *Gospel in Brief* and philosophically was presented in *What is art* (1897). Tolstoy's *Gospel* is a unified rendition of the pluralist view presented in the canonical Gospels, just as his attempt to translate *Tao Te Ching* united different visions of the text from French, German and English translations. Ultimately, Tolstoy edited the first Russian translation of *Tao Te Ching* with Konishi Masutaro as translator, who believed Tolstoy to be a Taoist. Tolstoy and Konishi considered French and Japanese translations of Laozi's work, as well as the Chinese original. The translation is indebted to the French version by Stanislas Julien. However, the dependency does not go beyond questions of literal translation from classical Chinese. Thus, there are some debates with Julien in the notes of Konishi's translation. For instance, the note to the 9th line in stanza 29 "或歔或吹" ("huo xu huo chui") indicates a difference with Julien. Konishi and Tolstoy's text translated the line as "[they] howl or blow" ("*voyut ili duyut*"), following the Chinese correctly if a bit out of context of the stanza, while in Julien the same line is translated "[some of them] warm up and [others] cool down" ("les uns réchauffent et les autres refroidissent"). In contemporary translation by Moss Roberts the two variants are synthesized "[n]ow breathe hot, now cold" (Laozi, 2001, p. 90).

TOLSTOY AND PHILOSOPHY OF MACHINE TRANSLATION

Let us try to find a place for Tolstoy's philosophy of translation inside the subject-related academic mainstream. In the philosophy of translation, for a long time, the main focus has been on the dream of automated translation (Granell & Varela, 2023). This question of automated translation goes far beyond the narrow field of business communication. If Alan Turing's understanding of AI was in dialogical form, its critics, Anatoly Dneprov in 1961, and John Searle in 1980, reacted in thought experiments based on analogies with automated translation (Azarov, 2021). It is not an accident that artificial intelligence as a metaphor for a set of generative procedures is best shown through translation. In both cases, the generated analogue of translation work and the successful simulation of consciousness, there is an idea that simulation will somehow provide the real thing. It is as if a translator is the natural enemy of strong AI, and below it will be shown how exactly it is so.

Before getting to the radical aspects of Tolstoyan "integral" position, let us consider another, more moderate view, according to which in translation there is a meeting of two cultures as if having a conversation, or encountering what Jullien called "l'ecart" ("the gap" or, in the translation by Pedro Rodríguez, "the divide"). This moment seems inevitable in the translation of any abstract text. The idioms, the cultural-context-sensitive words and phrases, the values, all these elements collapse and mix, they concentrate. And to some degree, if we take a closer look at the philosophy of comparative studies by French sinologist Jullien, "l'ecart" opens a window for interpretation and mutual understanding. According to Jullien, as Rodríguez summarizes in a note,

> [r]ather than set cultures side by side, Jullien places them on either side of an exploratory divide, so that they can "reflect" each other. In so doing they reveal each other's biases – or, to use another of Jullien's images, they discover each other's cultural headwaters – and thus bring forth new possibilities. (Jullien, 2018, p. ix)

As a result, what Jullien (2018) calls "the common" ("le commun") may appear, it is what "comes to light once cultures that are set face-to face across a divide have reflected each other, each bringing to light what lies beneath the other's biases" (p. 17). Therefore, what at the surface seem to be an extreme case, in a deeper analysis could work as different only in degree as one represents the cultural role of a translator. Jullien's belief in this effect is based on the meeting of Chinese and European civilizations, and it is up to the philosophy of culture to show how it is necessarily so for any other cultural meeting. Tolstoy, on the other hand, being a representative of Russian culture, is a real living amalgam of European and Chinese civilizations. He is, so to speak, exposed to the three elements of Russia, the West, and China. Such amalgams seem to be more safely reliable, then the voluntarily chosen "divides" that are sought out by Jullien. Nevertheless, as the survey of Tolstoy's translations has shown, any translator should be considered as embodying and experiencing such a gap or, in particularly significant cases, such an amalgam.

Jullien's "l'ecart" has great affinity to what Tolstoy would call by a very special term of "integration". Tolstoy uses the term from time to time in his diaries and theoretical works, however he seldom explains what he means by it. Probably, the most explicit case is in a passage from *What is Religion*. In Aylmer Maude's translation, with modifications by Gary Jahn "Tolstoyan integration" is presented in this way: "reasonable men should do, and always have done, in reference to the infinitely small affairs of life affecting their actions, what in mathematics is called integrate: that is to say, they must set up, besides their relation to the immediate facts of life, a relation to the whole immense Infinite in time and space conceived as one whole" (quoted in Jahn, 1975, p. 63). Moreover, reasonable people draw guidance for their actions from this source, just as Laozi's sage draws his actions from following the Tao of the universe. Integration helps one see oneself in the context of infinitely big scientific data regarding the world – not as someone lost in the forest but as a point on the map somewhere. The bigger the scale, the smaller the field around this point up to the cosmic point of Chinese abstract painter Li Yuan-jia (李元佳) that is related to the yin-yang symbol of Taoism. Regarding translation, it is both an example of how translation can influence the translator, and what translation should be according to Tolstoy – a way of presenting numerous textual possibilities in a condensed form, thought in opposition to the infinity of the universe as the limit of the integral.

On the one hand, the translator Tolstoy approached the sacred texts from East and West as a student, but not as a student of art, as it were with Laurence Sterne, Heinrich Heine, or Benjamin Disraeli, but of wisdom. On the other hand, we cannot see Tolstoy

as a pupil of Sterne, Heine, or Disraeli because in many aspects the three authors are quite far apart from each other. Two are masters of prose, and one of poetry. Two are from the 19th and one is from the 18th century. If we compare the mixture of Sterne, Heine, and Disraeli with Tolstoy's late tendency of eclecticism, we would see that Tolstoy's choice of the authors is hardly the result of limited resources, although not all books were available for Tolstoy during his military service. But, on the contrary, this choice is a beginning of Tolstoyan important personal trait. Tolstoy took from many different sources throughout his life, often making a distinct set of sources inconsistent with the dominant viewpoint of his time. He combined folk fairy tales, religious texts of the Russian church, Indian and especially Chinese philosophies. All could be sandwiched by Tolstoy in a single text, as it is the case with the article written in response to Émile Zola, where Tolstoy made Laozi reply to Zola and positivists, the article's title being "Non action," after the Taoist conception of *wuwei*.

Tolstoy's eclecticism raises the question of the influence of Chinese philosophy, because the Chinese mind is a mind of eclecticism par excellence, not only intellectually, but also aesthetically. The ideal dish in China combines five tastes, that is, all possible tastes. The ideal palette combines five colors (*wuse* 五色) meaning all possible colors, blue, red, yellow, white and black – as stated in 1842 by Julien whom Tolstoy and Konishi read. This is what F. Jullien calls "compossibility – the act of entertaining all possibilities equally (…) falls to the painter to exploit" (Jullien, 2018, p. ix). Since everything is present in the void (Laozi, 2021, stanzas 2, 5, 40), then syncretism is a consequence of following this ideal.

Tolstoy's syncretism in his translation becomes understandable not only as a syncretism of content, but as a methodological syncretism, not dividing tasks into stages and goals or prioritized hierarchies, but intuitively bringing together a confluence of processes and meanings that tend to be taken apart by an analytical mind, that distinguishes means and ends and separates out statistical probabilities and logical chains. As Francois Jullien (2018) puts it, "compositional logic is embedded in our [Western] language. Its fundamental schema, as the Greeks themselves observed, is the structure of the alphabet (letters, as units, come to compose syllables, words, phrases, and speech)" (p. 31).

In stanzas 2, 5, 40 Laozi claims that nothingness (*wu* 無, "*nichto*" in Tolstoy and Konishi's Russian translation, Stanislas Julien's "le non-être") produces something or being (*you* 有) in the form of primordial eclecticism of chaos. The creativite potenial of this primordial state is manifested by the softness, weakness, submissiveness, and adaptivity of a newborn baby, of water, or a river. The Taoist opposition of "being" and "nonbeing" is linguistically much closer to "absence" and "presence," especially in contemporary Chinese. It is important that the Russian language allows to translate absence and presence as "*nalichnoye*" (can be translated in English as "present-to-us") and "*otsutstvuyushchiye*" ("not-present-to-us"), as it was indeed translated in some recent Russian Laozi studies. This intimates the very subtle idea inside the absence-*wu*, that it is not substantial, but relational, as is Chinese thinking in general according to Jullien.

However, the language of Tolstoy and Konishi in the *Tao Te Ching* is more indebted to Hegelianism which dominated the Russian academic scene at the time of their translation operating with the opposition "*bytiye*" ("being") and "*nichto*" ("nothingness"). Nevertheless, Tolstoy, as a native Russian speaker and, what is more crucial in this context, as a genial writer in this language, is still influenced by the Chinese idiomatic-lexical resource.

For certain pragmatic situations, ordinary reason is certainly suitable, but for self-cultivation, one must understand the toxic side effects of a purely mechanical or procedural reason. Tolstoy does not simply translate, he criticizes, reacts, denies, and creates the language from which he translates no less than the language into which he translates.

Let us return to the case of the ladies' correspondence from 1812. When Tolstoy turned it into a literary ready-made and later translated the correspondence, it was just a curiosity, one of countless similar documents that had hopelessly lost their context, the living environment in which letters to Moscow were written, mailed, read, soaked with tears, and even burned along with the old capital. And yet, Tolstoy hit a nerve as he extracted for analysis the thick venous blood of the Russian spirit of the early 19th century. However, was Tolstoy really interested in the particular content conveyed in those letters?

When reading those letters, we do not know who their authors were, or their feelings. Certainly their internal dialogue is nowhere accessible to us. The Jullienian "gap" or "divide" is hidden from us by a good translator. We do not know how far apart our cultures or epochs are, how different or congenial they are. Any translation requires a similarly ambitious reinvention of the translated text. Translators experience the authors as their characters, as the case of Tolstoy's encounter with Volkova and Lanskaya shows. The translator thinks and speaks of the author of a text being translated in the third person, attributing feelings and sentiments. In complex cases of inconsistent, conflicted, self-contradictory texts, translators are forced to find those reference points of the author's spiritual vicissitudes that obey only the law of drama. And this means that only people can translate people, lead them into the common world of the phenomenality of bodily, socio-cultural and aesthetic development. Here, the Tolstoyan *Tao Te Ching* is particularly illuminating. And the story behind translation matters more than the result which can be achieved at times by mere language-processing just as numbers can also be translated from one field to another (Heusch et al., 2018). Tolstoyan translation is the meeting of two cultures, not only of two languages or sets of statistical data. And only in cases of emergency, when there is an extreme lack of time, it is reasonable to ignore all the story and allow the above-mentioned demon from the library of Babel to fool us.

THE OPENING STANZA OF THE TAO TE CHING AND WHAT COMPUTERS STILL CAN'T DO

Besides the three levels of phenomenological order of the living world (social, cultural, and psychological), Tolstoy with his understanding of translation shows one more level, where machines necessarily fall short when compared to human beings. This

can be seen in Konishi and Tolstoy's translation of the opening stanza of the *Tao Te Ching* which is something of an anomaly in the practice of translation into Western languages, not just in relation to the standards of the 19th and early 20th centuries. To be sure, the opening stanza itself is anomalous, it is the *Tao Te Ching* in miniature, "an anchor to reexamine the different paths [to the Tao of the *Tao Te Ching*]" (Tan & Bao, 2022, p. 1). In Chinese the opening line is:

> 道可道，非常道。名可名，非常名。(*Dao ke dao, feichang dao. Ming ke ming, feichang ming.*)

Even to an ear completely alien to Chinese, the line resonates with two series of triple repetitions, one related to *Tao*-way (道), the other to *ming*-name (名). The paradigmatic translation of the sentence in English, particularly close to the modern meaning of the words Laozi uses, can be found in Legge:

> The Tao that can be trodden is not the enduring and unchanging Tao. The name that can be named is not the enduring and unchanging name.

The consensus on the meaning of the words here is that Tao is a way to be walked (trodden, led, followed) or something verbal, to be expressed, spoken or named. Konishi and Tolstoy, however, took a different approach. Despite the literal meaning of the Chinese words and the known extant translations by Julien, James Legge's (1891), and Victor von Strauss's (1870), Konishi and Tolstoy render this line differently:

> The Tao that is actual is not the general Tao.
> The name that is actual is not the general name.

Konishi and Tolstoy managed to combine the Tao as something verbal, as something which can be said ("*ausgesprochen*"), as in Strauss's translation, and Tao, as in Tao-the way, as seen in Julien's and Legge's translations. Thus, Konishi and Tolstoy succeed in keeping the question of the "verbal" or "non-verbal" nature of Tao open. The second peculiarity of Konishi and Tolstoy's text regards what Tao is not. In all translations of the period, it is "not eternal Tao" (*changdao* 常道, von Strauss's "ewige Tao", S. Julien's "la Voie éternelle", Legge's "enduring and unchanging Tao"). In Konishi and Tolstoy's text, it is "general" or even "ordinary Tao" ("*obyknovennoye Tao*"), where the words chosen are far from being ordinary or natural for the Russian language. To say that something is actual but, at the same time, is not an ordinary or general instance of itself is odd in English too. In a sense, this beginning could be intended to produce a particular effect on the reader, from the very first stanza pushing readers towards viewing the text as something that can change their world view. To say that p is not eternal p (the generalized form for Legge, von Strauss, etc.) is far from being the same as saying that q is actual but not a general q (Konishi and Tolstoy). In the former case, p is denied the special conditional attribute of eternity. The latter seems to be a way of saying that q is actually not itself. This leads, in effect, to the meaning of the sentence collapsing with the sentence's last word, as in the original line in classical Chinese, practically showing how

our cognitive functions are limited in comparison to Tao. It parallels the effects of koans and some ingeniously good poetry. If we sapient beings experience something like this, our language-based high psychological functions will fail us for a moment and we will enjoy our deeper animal selves. In a program, this can only be seen as a glitch, a "bug" to be removed. The dominance of machine translation threatens to eliminate such inspirationally stimulating or mind-provoking experiences, experiences that are best preserved by human translations of philosophical texts.

Konishi and Tolstoy found a way to deliver the effect of the opening line of the *Tao Te Ching* in languages where the nouns that are needed for this particular effect do not coincide with verbs. In Chinese, the nouns and verbs perfectly coincide, so that the discourse considers Way-*Tao* which can be trodden-*Tao*, an entity q, which denies itself through q-ing, denies itself through itself, so that q that q-s is not q ("道(q)可道(q-s), 非常道(is not q)"). Konishi and Tolstoy's is, and remains, a highly original interpretation of the opening stanza. However, what is more important here is the effect it produces through a particular technique of translation. The technique itself is not based on grammar or lexical material. In fact, the translation is both grammatically and lexically incorrect but produces the same effect. In terms of Tolstoy's aesthetic theory from *What is art* where he presents his integral method of writing, it is infected with the same state the author of the work was in. The first line of Konishi and Tolstoy's translation points to the reality beyond the language by means of the Russian language, just as the Chinese original does by means of Chinese. It is a scale so big that philosophers whom Tolstoy calls "the teachers of humanity" turn our to be the teachers of the same doctrine – just as giant and diverse buildings can become a single dot on a large map that at a large scale signifies the city the buildings are in. The translation should be true to the spirit, as Tolstoy often phrases this task in other places. Moreover, the Russian writer allows the spirit to integrate itself back into a dot resembling the cosmic Taoist point by abstract painter Li Yuan-Jia.

CONCLUSION

Tolstoy, as a thinker, posits an intriguing case for the philosophy of translation, just as he does with many other facets of philosophy. Tolstoy shows translation first as a creative and communicative activity. In his final years, the great writer formulated a sort of translational methodology for philosophizing, based on his notion of integration in a mathematical as well as spiritual sense.

The nuanced communicative, organic, and aesthetic functions of human translation, as shown by Tolstoy, suggest that machine translation could be one of the factors in reigniting the clash of civilizations in the 21st century. The technocratic view of the other, as well as the technocratic view of oneself, can lead to cultural and civilizational differences being underestimated, which can in turn lead to conflict. This is probably not a primary concern when the natural resources and other economic necessities of humanity are at stake. However, it is still something important to consider. Tolstoy's case stresses the role of translators and interpreters as an important medium, a silent membrane between lingual-cultural entities. Mechanization of the process of translation risks

neglecting an important feature of human self-consciousness, making us even less self-controlled and more auto-aggressive as a species. This resonates nicely with the deep integration by Tolstoy in his anti-theory of the concept of non-violence, or *ahimsa*. The limits of machine translation are not simply about context-recognition, though this does continue to create difficulties (Wu et al., 2024, p. 1), but rather the limits of respect.

Even in a world of total and totalitarian neuromorphic production, human translation would have the potential to function as a special kind of mental art necessary for mutual aesthetic admiration, intercultural respect and understanding, as beautifully suggested by Tolstoy's theory and practice of translation.

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Research article

Experimental Translation Assessment – A Recipient-Oriented Approach

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Abstract

There are numerous techniques and technologies for checking the accuracy and quality of translations. Most familiar perhaps is reverse translation which focuses on the quality of the translator or machine translation system. This paper adopts the perspective of the recipient of the translation and thus on readers' perceptions of the translated text: recipient experiments evaluate the recipient's perception and comprehension of the translated material. Two types of recipient experiments are distinguished – experiments in the natural setting and phenomenological experiments. The first kind of experiment revolves around the demographic and cultural characteristics of the readers: Do they successfully achieve an understanding of the original text in their native language? Phenomenological experiments approach translation as a process of reproduction and transmission of the emotional, cultural, and contextual aspects of texts. For example, in an experiment with the translation of poetry, native speakers of both languages read the original poem and its translation. Afterwards, a survey is conducted to understand what feeling or emotion the original poem evoked and how this feeling was conveyed in the translation. Typically in phenomenological experiments the self-reporting of subjects about internal states is part of the methodology. This method brings to the fore the interests and expectations of readers. It points to the predicament that translation requires audience segmentation but that this segmentation can be arbitrarily fine-grained. This applies also to the translation of technical texts at different levels of expertise. Ultimately, the phenomenological approach opens up opportunities not just for predicting reactions to translation, but for an understanding of how recipients perceive and interpret the text.

Keywords: Translation assessment; Recipient-oriented translation; Perceptions of meaning; Phenomenological experiment

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Научная статья

Экспериментальная оценка перевода – Рецепиентоориентированный подход

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Аннотация
Существует множество методов и технологий для проверки точности и качества переводов. Наиболее известным, пожалуй, является обратный перевод, который фокусируется на качестве работы переводчика или системы машинного перевода. В данной статье акцент переносится на получателя перевода и, следовательно, восприятие читателями переведенного текста: эксперименты с получателями оценивают восприятие и осмысление переведенного материала. Различают два вида рецепиентоориентированных экспериментов – эксперименты в естественной установке и феноменологические эксперименты. Первый тип экспериментов связан с демографическими и культурными особенностями читателей: успешно ли они понимают текст на своем родном языке? Феноменологические эксперименты рассматривают перевод как процесс воспроизведения и передачи эмоциональных, культурных и контекстуальных аспектов текстов. Например, в эксперименте с переводом поэзии носители обоих языков читают оригинальное стихотворение и его перевод. Затем проводится опрос, чтобы понять, какое чувство или эмоцию вызвало стихотворение в оригинале и как это чувство было передано в переводе. Как правило, в феноменологических экспериментах частью методики является самоотчет испытуемых о внутренних состояниях. Этот метод выдвигает на первый план интересы и ожидания читателей. Результат указывает на то, что перевод требует сегментации аудитории, но эта сегментация может быть сколь угодно тонкой. Проблема также относится к переводу технических текстов для реципиентов разного уровня квалификации. В конечном счете, феноменологический подход открывает возможности не только для прогнозирования реакции на перевод, но и для понимания того, как получатели воспринимают и интерпретируют текст.

Ключевые слова: Оценка перевода; Реципиентоориентированный перевод; Восприятие смысла; Феноменологический эксперимент

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ВВЕДЕНИЕ

В то время, как перевод является важной составляющей коммуникации международных организаций, государств, и отдельных людей, реципиентоориентированный перевод предотвращает отдаление переводчика от получателя перевода, ведь такое отдаление может иметь самые негативные последствия для социума. Любой неосторожный перевод, не учитывающий нужд реципиента перевода, чреват конфликтами и даже жертвами. И наоборот, когда мы ориентируем перевод на его реципиента, перевод служит буфером, часто способствующим примирению наций и классов.

Проблема реципиентоориентированного перевода всегда находилась в фокусе внимания исследователей, которые пытаются понять получателя текста. Вопрос был затронут в скопос-теории Каталины Райс и Ганса Вермеера, в теории культурооориентированного перевода Сьюзанн Басснетт-Макгайр, в концепция двух переводов Виссариона Григорьевича Белинского, в теории культурного трансфера Мэри Снелл-Хорнби, в иллюзионистской и антииллюзионистской теориях Иржи Левого, в теории перевода как ниспровержения переводчика Роберта Лоуэлла, в адаптивной концепции перевода Абая Кунанбаева, в теории тотального перевода Пеэтэра Торопа и в теории динамической эквивалентности Юджина Найды. В работах Каратаева, Валеева, Кондакова и Липкина рассматриваются влияние определенного сегмента на реципиентоориентированный перевод (Каратаев, 1962, с. 230) и учитываются потребности и сообщение, которое реципиент хочет передать, принимая во внимание специфику языка и культуры получателя (Валеев, 2012, с. 124; Липкин, 2007, с. 124). В работах Найды и Тапера изучается динамическая эквивалентность как качество перевода, при котором сообщение текста оригинала передано на язык-получатель таким образом, что реакция получателя сообщения была аналогична реакции получателей в языке-отправителе (Nida & Taber, 1969, p. 67), а в работе Швейцера (1973) определяется адекватный перевод как перевод, вызывающий у иноязычного получателя реакцию, соответствующую коммуникативной установке отправителя (с. 89). Отдельно хотелось бы отметить перевод с точки зрения психолингвистики – как старой школы (Галеева, 1992, с. 104), так и современных психолингвистов (Zasyekin, 2010).

Однако, то, о чем писали вышеприведенные авторы, может быть названо естественной установкой на перевод, или по Брентано (1996), интенциональностью недоверия (с. 78), когда переводчик не доверяет своему сознанию и рассматривает перевод как внешний по отношению к своему сознанию. С точки зрения данной естественной установки существуют два варианта: нереципиентоориентированный перевод и реципиентоориентированный перевод, второй из которых является гораздо более эффективным, потому что нереципиентоориентированный перевод в естественной установке – это, когда переводчик переводит так, как ему нужно, не обращая внимания на нужды и потребности реципиента перевода. Он не подбирает подходящие для реципиента перевода шаблоны и не собирает информацию о его нуждах. Реципиентоориентированный перевод в естественной установке – это когда переводчик переводит так, как нужно реципиенту перевода, уже обращая

внимания на нужды и потребности последнего. Предварительно собрав информацию о нуждах реципиента перевода, он подбирает шаблоны из своего сознания или из компьютерной базы данных для нужд получателя.

Казалось бы, проблема решена: мы собираем или используем уже имеющуюся информацию для осуществления перевода, который бы устроил его реципиента. Однако, в естественной установке даже реципиентоориентированный перевод продолжает вызывать недовольство у его получателя, так как переводчик, используя эвристики, полагается на заранее определенные структуры и выражения, которые он применяет к каждой новой переводческой ситуации. Это снижает способность переводчика адаптироваться к нуждам и потребностям реципиента перевода.

Пролиферация шаблонов прошлого опыта и пролиферация шаблонов перевода в результате сбора информации о реципиенте перевода привели к тому, что на определенном этапе и реципиентоориентированный перевод достиг предела своего эволюционного развития, что привело к противоречию между все более и более исчерпывающей информацией о нуждах реципиента перевода, и, тем не менее, остающимся внушительным разрыве между этими нуждами и продуктом перевода. Дальнейшее сближение переводчика и реципиента перевода можно осуществить при помощи сочетания естественной установки на перевод с феноменологической, которая выдвигает на первый план восприятие, чувство ориентации и понимание текста. В данном контексте изучая восприятие, понимание и реакцию на текст, предлагаемые эксперименты могут способствовать поиску эффективных подходов к сближению переводчика и получателя перевода.

Эксперименты в сфере реципиентоориентированного перевода отличаются от других типов экспериментов по нескольким причинам. Во-первых, в данных экспериментах фокус ориентирован на того, кто получает переведенный текст или сообщение. В частности, в отличии от других типов экспериментов, где целью может быть оценка производительности переводчика или системы машинного перевода, эксперименты в сфере реципиентоориентированного перевода оценивают восприятие и понимание переведенного материала со стороны получателя. Во-вторых, данные эксперименты могут включать в себя различные методы и техники оценки качества перевода, такие как опросники, интервью, оценка по шкале и другие инструменты. Они помогают собрать данные о восприятии и понимании переведенного текста со стороны реципиента. В-третьих, в экспериментах в сфере реципиентоориентированного перевода важно учитывать контекст использования перевода. Например, перевод научной статьи может быть предназначен для чтения или использования в бизнес-среде. Поэтому эксперименты в сфере реципиентоориентированного перевода могут представлять ситуации, которые более близки к реальным условиям использования перевода. И, наконец, эксперименты могут включать различные языковые пары и учитывать культурные и лингвистические особенности реципиентов. Это позволяет получить более точные и релевантные результаты о восприятии и понимании перевода в разных контекстах и для разных аудиторий.

ЭКСПЕРИМЕНТАЛЬНЫЙ ПОДХОД

Несмотря на обилие исследований и экспериментов в области теории перевода, существует значительный разрыв между теоретическими знаниями и практической реализацией реципиентоориентированного перевода. Это предопределило необходимость осуществления экспериментов в области теории в сфере реципиентоориентированного перевода.

Таким образом объектом рефлексии являются эксперименты в сфере реципиентоориентированного перевода, поскольку такие эксперименты могут дать более глубокое понимание того, как получатели воспринимают и интерпретируют переведенные тексты. Соответственно, экспериментальные методы фокусируются на восприятии переведенных текстов реципиентами, способствуя оценке точности и качества перевода, улучшению переводов и методов их оценки.

Для достижения поставленной цели необходимо определить различные методы экспериментов с реципиентами, исследовать преимущества и недостатки каждого метода и разработать методологию для экспериментов с получателями, учитывающую интересы и ожидания. Наконец, необходимо проанализировать результаты экспериментов для выявления моделей воспринимаемого качества перевода.

Эксперименты в Естественной Установке

Эксперименты с оценкой качества перевода используются для определения с точки зрения конечного пользователя. Они могут включать в себя сравнение различных методов или моделей перевода, а также сравнение перевода с оригиналом текста или существующими переводами. Для сбора данных могут применяться разные методы, например, опросы, тестирование или анализ восприятия и понимания текста. В эксперименте по сравнению качества перевода привлекаются разные переводчики, которые переводят один и тот же текст на разные языки. Затем оцениваются и сравниваются их переводы с точки зрения лингвистической точности и стилистической согласованности.

В экспериментах с использованием профиля аудитории исследователи создают профили аудиторий с разными потребностями и ожиданиями от перевода. Затем, переводчики исследуют эффективность различных подходов к переводу в соответствии с этими профилями. Такие эксперименты помогают понять, каким образом адаптировать перевод под нужды различных аудиторий и оптимизировать коммуникацию. Например, в Грузии двум разным группам реципиентов перевода, владеющим русским языком грузинам и не владеющим грузинским языком русским, дали читать отрывки из девяти переводов “Мерани” Николоза Бараташвили (1984) и шести переводов “Витязя в тигровой шкуре” Шоты Руставели. Такая характеристика как принадлежность к определённой национальности сыграла ключевую роль при выборе перевода. Русским больше понравился перевод Николая Заболоцкого, а на второе место они поставили перевод Пантелеймона Петренко, грузины же – наоборот (Тороп, 1995, с. 16-17). Результат такого эксперимента можно занести в статистические данные и в

дальнейшем использовать при удовлетворении тех или иных нужд и потребностей реципиентов перевода.

Эксперименты с использованием новых технологий, такие как машинное обучение и нейронные сети, значительно повлияли на область перевода. В экспериментах с использованием этих технологий исследователи оценивают их эффективность и возможности в реципиентоориентированном переводе. Они также исследуют, как новые технологии могут помочь в удовлетворении потребностей различных аудиторий и повышении качества перевода. Например, компании Оливер требуются работники, которые смогут исследовать нужды и потребности реципиентов перевода для того, чтобы полностью удовлетворять их, работать с программой CAT для того, чтобы поддерживать и обновлять переводческие базы данных, составлять словники, корректировать и редактировать перевод, ориентированный на реципиента перевода. Такие переводчики получили название "транскриэйторы", потому что в будущем переводчики будут выполнять не только задачи перевода текста, но и требовать навыки транскрипции или преобразования одного языка в другой. Поэтому название "транскриэйтор" может отражать расширенный функционал и возможности будущего переводчика (Transcreator 2020).

В ходе изучения влияния культурного контекста на перевод, изучаются работы переводчиков из разных стран с разным культурным и временным бэкграундом. Известным примером является перевод Библии: протестанты нуждаются в упрощенном переводе Писания, католики требуют придерживаться букве Писания, таким образом культурные различия влияют на конечный продукт перевода. Например, в Ветхом Завете Короля Джеймса мы видим конструкцию в действительном залоге "…and every thing that is in the earth shall die…", потом в другой исторический промежуток времени, в Современной Библии Дауэй-Рэймс, мы наблюдаем более сложную конструкцию в страдательном залоге: "…all things that are in the earth shall be consumed…" (Douay-Rheims Bible, 2008, p. 10). В упрощенном Ветхом Завете Уильям Тиндейла мы не видим артиклей: "In the begynnynge God created heaven and erth…" (Tyndale, 1998, p. 1) ("В самом начале Бог создал небо и землю…"). В Современной Святой Библии артикли обременяюще (для простого потребителя перевода) присутствуют: "In the beginning God created the heavens and the earth…" ("В начале всех начал Бог создал небеса сии и землю сию…") (Holy Bible, 1995, p. 2). Тиндейл также избегал употребления причастий, используя в Ветхом Завете простые предложные конструкции: "The erth was voyde and emptie ad darcknesse was vpon the depe…" ("Земля была неплодоносной и пустой и над глубиной океана была тьма…") (Tyndale, 1998, p. 1), в то время как в Современной Святой Библии наблюдаются Причастия I и Причастие II: " The earth was barren with no form of life, it was under a roaring ocean covered with darkness…" ("Земля была опустошенной и безжизненной, она простиралась под ревущим океаном, покрытым мраком…") (Holy Bible, 1995, p. 2)

Эксперименты в Феноменологической Установке

Феноменологическая установка сознания на перевод означает, что перевод является коррелятом сознания переводчика. Коррелят состоит из ноэзиса и ноэмы, где ноэзис – это направленность сознания на объект, а ноэма – это содержание сознания, представленное в виде потенциального перевода.

У нас два участника переводческой коммуникации, поэтому наличествуют два нозиса, переводчика и реципиента перевода, и, соответственно, две ноэмы, переводчика и реципиента, что создает проблемы как для процесса перевода, так и для продукта перевода и означает “конфликт интерпретаций”, так как разные получатели информации могут придавать различное значение объектам, которые переводятся в зависимости от контекста и их позиции. Различие в ноэисах, или наборе ожидаемых идей и знаний, и ноэмах, или наборах ожидаемых идеальных моделей действительности у переводчика и реципиента перевода является одной из преград, которая мешает им полноценно понимать друг друга на протяжении всей истории перевода.

Например, ноэма “кролик” имеет различные значения в зависимости от контекста и позиции реципиентов. Для ноэзисов некоторых реципиентов перевода, ноэма “кролик” представляет собой диетическую пищу, редкого и дорогостоящего деликатеса, доступ к которому затруднен. Для ноэзисов других реципиентов ноэма “кролик” становится объектом обожания и нежности. А для ноэзисов третьих, ноэма – это решение проблемы продовольствия в послереволюционный период. Пример с комедией “Кто подставил Кролика Роджера” также демонстрирует, что ноэма, представленная Кроликом Роджером, может иметь различные смыслы для ноэзисов разных реципиентов перевода. Для некоторых он является кроликом, любителем красивой жизни. В то время как для других реципиентов перевода Кролик Роджер является сверхкроликом, которого обожают все.

Наличие двух различных ноэзисов и ноэм говорит о том, что нужды и ожидания реципиента перевода игнорируются или не учитываются полностью. Следовательно, два ноэзиса должны стать одним ноэзисом, ровно, как и две ноэмы должны стать одной ноэмой. Аподиктичность точки зрения переводчика по отношению к реципиенту перевода не является аподиктичной и должна быть подвергнута радикальному методическому сомнению. Поэтому необходим эксперимент в сфере изучения ноэзисов и ноэм самых разных реципиентов перевода. В рамках данного исследования мы ставим целью изучение влияния переводческой установки на восприятие поэтического текста. Традиционный подход к переводу часто основывается на так называемой естественной установке, при которой переводчик стремится передать “объективный” смысл текста, как он его понимает, полагаясь на свой языковой и культурный багаж, но не углубляясь в индивидуальные переживания. Такой подход нередко приводит к шаблонным решениям, которые могут не соответствовать субъективному восприятию реципиента. В противовес этому, мы рассматриваем феноменологическую установку, которая предполагает, что переводчик приступает к работе с исходным текстом как к феномену, явлению сознания. Он отходит от предвзятых мнений, прислушивается к своим переживаниям и чувствам, которые вызывает у него текст.

При этом, перевод становится коррелятом его сознания, выражением его личного опыта прочтения. В нашем исследовании мы предлагаем участникам оценить два перевода одного и того же стихотворения Райнера Марии Рильке (2012) "Могилы гетер" (Tombs of the Hetaerae). Один из переводов, выполненный Константином Петровичем Богатыревым, стремится к максимальной понятности и точности, характерной для естественной установки. Переводчик в данном случае выступает как посредник, передающий информацию. Другой перевод, созданный Андреем Дитцелем, выполнен в феноменологической установке. Здесь переводчик, опираясь на свои субъективные переживания, стремится передать эмоциональную атмосферу стихотворения, его философские аспекты, личные ассоциации и воспоминания, которые у него вызывает текст. Таким образом, перевод Дитцеля становится не только актом передачи информации, но и выражением его личного опыта, своего рода "потоком сознания". Для проверки влияния данных переводческих установок на восприятие текста, мы провели эксперимент среди двух групп реципиентов: студентки педагогического университета (возраст 18-22 лет) и менеджеры среднего звена (возраст 35-45 лет). Мы предполагаем, что студентки, в силу своего возраста и, возможно, более глубокого интереса к поэзии, будут более восприимчивы к феноменологическому переводу. В то же время, менеджеры, более прагматичные и, возможно, менее знакомые с поэтическим языком, также могут оценить перевод, выполненный в феноменологической установке, но их предпочтение может быть не таким выраженным. Результаты исследования показали, что, как и предполагалось, большинство студенток (80%) предпочли перевод А. Дитцеля, выполненный в феноменологической установке, при этом разница между предпочтениями переводов оказалась статистически значимой. Менеджеры также в большинстве отдали предпочтение феноменологическому переводу (60%), однако, эта разница была менее выраженной, чем у студенток. При этом, предпочтения к переводу А. Дитцеля у студенток были выражены статистически значимо сильнее, чем у менеджеров.

В качестве стимульного материала для следующего эксперимента было выбрано простое предложение на английском языке: "The structure of their dwelling places reflected their inter-dependence." Для эксперимента были подготовлены два перевода этого предложения: первый – в естественной установке, ориентированный на точность, понятность и ясность ("Зависимость от друга порождает соответствующий дизайн жилищ человеческих существ"), и второй – в феноменологической установке, где акцент сделан на передаче эмоционального тона, личных переживаний и философских ассоциаций ("Чувство взаимосвязанности, как будто дома построены друг для друга, как будто их форма является отражением того, что они не могут существовать друг без друга. Образы домов, тесно прижатых друг к другу…"). Участниками исследования стали носители как английского, так и русского языков. Для того чтобы исключить влияние различий в уровне владения языком на результаты эксперимента, мы включили в методологию критерий отбора участников, который предусматривал проверку их способности понимать сложные синтаксические конструкции, метафоры и идиомы. Мы предполагали, что участники с более высоким уровнем

языковой компетенции будут лучше понимать нюансы перевода, выполненного в феноменологической установке. В ходе эксперимента участникам случайным образом предоставлялся один из двух переводов, который они должны были оценить по 7-балльной шкале (где 1 – “не понравилось”, а 7 – “очень понравилось”). Кроме того, участникам предлагалось ответить на открытые вопросы для более глубокого понимания мотивов их выбора. После оценки первого перевода, участникам предлагалось оценить и второй перевод, чтобы получить возможность для сравнения. Результаты эксперимента подтвердили нашу гипотезу. Процент участников, выбравших феноменологический перевод, был существенно выше, чем выбравших перевод в естественной установке. Это свидетельствует о том, что феноменологический перевод может восприниматься реципиентами как более интересный, выразительный и глубокий. Анализ открытых ответов показал, что участники, выбравшие феноменологический перевод, часто отмечали его эмоциональную насыщенность, образность и способность вызывать более сильный отклик. Это свидетельствует о том, что переводческая установка оказывает значительное влияние на восприятие текста реципиентами, даже в случае такого простого предложения.

В рамках исследования влияния переводческой установки на восприятие технического текста, мы предоставляем разным группам реципиентов, отличающимся уровнем экспертизы, два перевода одного и того же текста (фрагмент руководства пользователя, спецификация, научная статья и т.д.). Один перевод был выполнен в естественной установке, с акцентом на точность, терминологическую корректность и минимальные стилистические особенности. Другой перевод был выполнен в феноменологической установке, где переводчик, основываясь на своих личных переживаниях и философских ассоциациях, добавил в текст элементы субъективности, отклоняясь от строгого технического стиля. Для того, чтобы все участники понимали, что это именно технический текст, мы предоставили описание типа текста и его цели.

В качестве участников эксперимента были выделены четыре группы реципиентов:

- Менеджеры, т.е. руководители, которые принимают решения на основе технической информации, но не обязательно обладают технической экспертизой.
- Общие пользователи, т.е. люди, которые являются типичными пользователями технической системы или продукта, описываемого в тексте, но не имеющие специальной подготовки в данной области,
- Технические специалисты, т.е. люди, обладающие базовыми техническими знаниями в данной области и регулярно работающие с технической информацией.
- Технические эксперты, т.е. люди с глубокими знаниями предмета, включая “продвинутых пользователей программного обеспечения” и “специалистов по статистическому анализу”, имеющие опыт работы в данной технической области.

После прочтения каждого перевода, участникам предлагалось заполнить анкету, в которой они оценивали качество, понятность и предпочтительность каждого перевода, а также отвечали на открытые вопросы о причинах их выбора. При этом, порядок предъявления переводов (сначала естественный, потом

феноменологический, или наоборот) менялся случайным образом, чтобы избежать влияния порядка на предпочтения реципиентов.

Предполагалось, что менеджеры, общие пользователи и технические специалисты, скорее всего, будут отдавать предпочтение переводу, выполненному в естественной установке, из-за его ясности и точности. В то же время, технические эксперты могли бы проявить большую открытость к феноменологическому переводу, поскольку их глубокие знания позволяли бы им более критично оценить оба подхода.

Результаты, полученные в ходе исследования, показали, что распределение предпочтений между двумя переводами оказалось примерно 50 на 50, что говорит о неоднозначности влияния переводческой установки на восприятие технического текста. Однако, результаты показали, что существуют статистически значимые различия в предпочтениях между разными группами реципиентов.

Менеджеры и общие пользователи, как и ожидалось, чаще предпочитали перевод, выполненный в естественной установке, отмечая его понятность и точность. Технические специалисты, в свою очередь, также чаще склонялись к естественному переводу, хотя и с несколько меньшим отрывом. При этом, технические эксперты оказались более нейтральны в своем отношении к переводам, демонстрируя определенный интерес к феноменологическому подходу, хотя, и не отдавая ему явного предпочтения. Это может означать, что эксперты, обладающие более глубокими знаниями, способны оценить разные подходы к представлению информации, не привязываясь к какому-то одному из них.

Данное исследование показало, что влияние переводческой установки на восприятие технического текста зависит от уровня экспертизы и потребностей реципиента. В то время как для менеджеров, общих пользователей и технических специалистов важны точность и понятность, технические эксперты могут быть более открыты к различным подходам, включая и феноменологический.

Это позволяет заключить, что феноменологическая установка в переводе может оказывать значительное влияние на восприятие текста реципиентами, вызывая более сильный эмоциональный отклик и, возможно, способствуя более глубокому пониманию. Выбор переводческой установки оказывает существенное влияние на восприятие поэтического текста. Феноменологический подход, с его акцентом на субъективном опыте переводчика, может привести к созданию переводов, которые вызывают больший интерес и эмоциональный отклик у реципиентов. Дальнейшие исследования могут быть направлены на изучение влияния феноменологической установки на восприятие различных типов текстов, а также на выявление факторов, влияющих на предпочтение той или иной переводческой установки у различных категорий реципиентов.

ВЫВОДЫ

Описание перевода в феноменологической установке дает больше информации, чем описание в естественной установке. В феноменологической установке реципиенты переводят внимание с внешних аспектов перевода (таких

как грамматика и стиль) на их собственные переживания при его чтении. Это позволяет выявить глубинные эмоциональные и когнитивные реакции, которые могут не быть очевидны в естественной установке. Феноменологический метод подразумевает воздержание от суждений и суспензию предполагаемых знаний, что позволяет реципиентам рассматривать перевод без предубеждений и сосредоточиться на том, что они непосредственно ощущают. Феноменологическая установка признает влияние телесных и эмоциональных реакций на воспринимаемый опыт. Это позволяет учитывать не только когнитивные, но и чувственные и эмоциональные аспекты переживания перевода.

Феноменологическая установка может быть особенно полезной для реципиентов переводов травматических или вызывающих трудные эмоции текстов. Она позволяет им безопасно исследовать свои реакции на текст и получить поддержку для обработки своих переживаний. При чтении переводов с разных культур феноменологическая установка помогает реципиентам осознать собственные культурные предубеждения и развить более глубокое понимание и признание разных мировоззрений и переживаний. Фокусируясь на собственных переживаниях при чтении перевода, реципиенты могут лучше понять эмоциональный и когнитивный опыт автора и читателей исходного текста, что приводит к более глубокому и сопереживающему пониманию. Процесс описания своих переживаний в феноменологической установке способствует развитию когнитивных навыков реципиентов, таких как рефлексия, самоанализ и критическое мышление. Это может улучшить их способность к интерпретации текста и анализу его нюансов. Понимание собственных реакций на перевод позволяет реципиентам идентифицировать области, где перевод может быть более эффективным в передаче предназначенного сообщения или воздействия. Это может помочь переводчикам адаптировать свои переводы к специфическим потребностям целевой аудитории.

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Research article

The Problem of Translation of Discourse Markers (Based on the Russian and English Languages)

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Abstract
The article examines discourse markers as linguistically specific units and discusses the problems of their translation. Discourse markers are units that are capable of organizing a text and expressing different pragmatic meanings. This study examines discourse markers that express the degree of reliability (of course, certainly, obviously, naturally, etc.). The purpose of the study is to describe the semantic properties of discourse markers that determined their classification as linguistically specific units. Linguistically specific units are those that do not have an unambiguous lexical analogue in another language. The hypothesis of the study is that the linguistic specificity of the discourse markers of the studied group is primarily associated with their multifunctionality, that is, the ability to express different pragmatic functions depending on the context. The material for the study is the data from the English-Russian and Russian-English parallel corpora of the National Russian Corpus. The study established that the translation of these discourse markers is determined by pragmatic function in the text, individual authorial preferences and stylistic limitations. The semantics of discourse markers is flexible and is largely determined by the context. discourse markers perform two types of functions: the main functions associated with the expression of confidence in the reported, and peripheral functions involving dialogization of the text (introduction of a new topic, establishment of contact, attention management, etc.) and expression (amplification) of emotions. When choosing discourse markers, the influence of individual preferences of the translator is noted. Analyzed discourse markers have stylistic limitations that are taken into account during translation. This study confirms the presence of an intermediary mental system between the original text and its translation. The translator first creates an internal semantic representation of the text content, after which he conveys it by means of another language. Thus, the discourse markers of this group are complex words for translation, when working with which it is necessary to take into account the anthropocentric (cognitive) and functional aspects of translation.

Keywords: Discourse markers; Translation; Parallel corpus; Pragmatic functions; Linguistically specific words

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Научная статья

Проблема перевода дискурсивных слов (на материале русского и английского языков)

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Аннотация
В статье рассматриваются дискурсивные слова как лингвоспецифичные единицы и обсуждаются проблемы их перевода. Дискурсивные слова – языковые единицы, которые объединены на основе функционального критерия и способны создавать связность текста, управлять вниманием слушателя и выполнять другие прагматические функции и передавать модальные характеристики. В настоящем исследовании изучаются дискурсивные слова, выражающие степень достоверности (конечно, безусловно, очевидно, естественно, и др.). Цель исследования – описать семантические свойства дискурсивных слов, которые обусловили отнесение их в разряд лингвоспецифичных единиц. Лингвоспецифичными называют единицы, которые не имеют однозначного лексического аналога в другом языке. Гипотеза исследования связана с тем, что лингвоспецифичность дискурсивных слов изучаемой группы прежде связана с их полифункциональностью, то есть способностью выражать разные прагматические функции в зависимости от контекста. Материалом исследования стали данные англо-русского и русско-английского параллельных корпусов Национального корпуса русского языка. В ходе исследования установлено, что перевод данных дискурсивных слов зависит от выполнения ими прагматической функции в тексте, индивидуально-авторских предпочтений и стилевых ограничений. Семантика дискурсивных слов пластична и в значительной степени определяется контекстом. Дискурсивные слова этой группы выполняют два типа функций: во-первых, основные функции, связанные с выражением уверенности в сообщаемом, во-вторых, периферийные функции, предполагающие диалогизацию текста (введение новой темы, установление контакта, управление вниманием и др.) и выражение (усиление) эмоций. Также дискурсивные слова анализируемой группы имеют стилевые ограничения, которые учитываются при переводе. Настоящее исследование подтверждает наличие посреднической среды между оригинальным текстом и его переводом. Переводчик сначала создает внутреннее смысловое представление о содержании текста, после этого передает его средствами другого языка. Таким образом, дискурсивные слова данной группы являются сложными для перевода единицами, при работе с ними нужно учитывать разные прагматические (функциональные) и когнитивные факторы.

Ключевые слова: Дискурсивные слова; Перевод; Параллельный корпус; Прагматические функции; Лингвоспецифичные слова

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ВВЕДЕНИЕ

В теории и практике перевода особое внимание уделяется проблеме труднопереводимых единиц, которые не имеют однозначного эквивалента во втором языке (на языке перевода). Как правило, эта проблема рассматривается в аспекте безэквивалентной лексики и лакун, которые чаще всего связаны с наименованиями реалий и социокультурных феноменов (Ларина и Озюменко, 2013). Однако к труднопереводимым понятиям могут быть отнесены единицы разной семантической природы.

Для обозначения подобных явлений в лингвистике вводится понятие лингвоспецифичных слов, то есть единиц, не имеющих точного словарного эквивалента в другом языке и вариативные при переводе (Shmelev, 2020). Понятие лингвоспецифичных слов появилось во многом под влиянием идей Анны Вежбицкой о ключевых словах культуры, труднопереводимых единицах, отражающих образ жизни и мышления общества и имеющих большое значение для понимания культуры (Wierzbicka, 1997). Влияние работ Вежбицкой привело к тому, что анализ подобных единиц чаще всего проводился на словах, обладающих важным культурным значением. Например, рассматривались понятия *тоска, авось, друг, свобода* и пр. При этом круг единиц, относимых к лингвоспецифичным, достаточно широкий.

В настоящей работе обсуждаются дискурсивные слова (ДС) как лингвоспецифичные единицы. ДС называются языковые единицы, которые объединены на основе функционального критерия и способны создавать связность текста, управлять вниманием слушателя и выполнять другие прагматические функции и передавать модальные характеристики. Данные единицы не имеют денотативного (предметного) значения и не связаны с важными социокультурными феноменами (Aijmer 2004; Fuller, 2003; Taboada, 2006). От вводных слов они отличаются тем, что, во-первых, в категорию ДС относят другие части речи (частицы, междометия и наречия); во-вторых, выделение вводных слов как части речи основано на семантических, морфологических и синтаксических признаках, а для ДС актуален только функциональный критерий (выполнение функций связности в тексте). Свойствами ДС обычно называют следующие:

- отсутствие денотативного значения (Кобозева и Захаров, 2004);
- независимость от синтаксической структуры и пропозиционального содержания предложения, то есть от общего смысла высказывания (Aijmer, et al, 2006; Lewis, 2006; Shourup, 1999);
- зависимость значения ДС от контекста (Schiffrin, 2006);
- включение в число ДС единиц разных частей речи (преимущественно вводных слов, частиц, наречий, междометий и пр.) (Кобозева и Захаров 2004; Shourup, 1999);
- возможность пополнения (Lewis, 2006).

ДС встречаются во всем языкам мира, однако часто возникают трудности при их перевода (Beeching, 2010). Отмечается, что практика словарного описания ДС еще не сложилась: в словарях, как правило, представлено минимальное количество информации о слове. Например, в современном словаре Т. Ф. Ефремовой слово

естественно не характеризуется как вводное слово, а только как наречие, предикатив и частица, несмотря на то что функция вводного слова наиболее частотна в современном употреблении, по данным Национального корпуса русского языка.

Изучение ДС важно в аспекте обсуждения языковой личности переводчика: при работе с ДС как с единицами, не имеющими точного переводного эквивалента, наиболее ярко проявляются индивидуальные предпочтения переводчика. В целом настоящее исследование позволяет описать психолингвистические механизмы перевода с учетом новых корпусных данных.

МЕТОДОЛОГИЯ И МЕТОДИКА ИССЛЕДОВАНИЯ

Цель исследования – описать семантические свойства ДС, которые обусловили отнесение их в разряд лингвоспецифичных единиц. В качестве материала выступила группа ДС, выражающих уверенность в сообщаемом: *конечно, безусловно, естественно, очевидно, без сомнения, вероятнее всего, несомненно, действительно, бесспорно* и др. В эту группу ДС могут включаться сниженные единицы (*наверняка, вне сомнения, в натуре, не вопрос* и пр.), некоторые из них появились в языке относительно недавно. В рамках настоящей статьи ограничимся лишь наиболее частотными единицами.

Гипотеза исследования связана с тем, что лингвоспецифичность группы ДС, выражающих степень уверенности в сообщаемом, прежде связана с их полифункциональностью, то есть способностью выражать разные прагматические функции в зависимости от контекста.

В качестве материала выступили сведения Национального корпуса русского языка (НКРЯ), преимущественно использовались данные параллельного (под)корпуса НКРЯ (русско-английского и англо-русского корпусов).

Корпус – коллекция письменных или устных текстов, которая обработана компьютерными средствами и снабжена специальными исследовательскими инструментами (прежде всего разметкой). Параллельный корпус состоит из множества текстов и их переводов, причем тексты снабжены определенными техническими средствами. Параллельный корпус НКРЯ достаточно разнообразный и содержит тексты разных жанров: включает художественную литературу, публицистические, научные и небольшое количество религиозных и юридических текстов. Объём русско-английского и англо-русского параллельного корпуса НКРЯ составляет более 1500 текстов и 52 млн. слов. В параллельном корпусе представлены профессиональные опубликованные переводы без каких-либо изменений. Для анализа употреблений ДС в других стилях речи была проанализирована частотность в других корпусах НКРЯ – в основном, газетном, устном, поэтическом корпусах и в корпусе социальных сетей (см. Таблицу 3). Подобный анализ дает широкое представление о функционировании ДС в разных текстах.

Благодаря параллельному корпусу “создатели двуязычных словарей получают весьма простой и эффективный инструмент сбора материала и

эмпирической проверки своих гипотез, касающихся межъязыковой эквивалентности” (Добровольский, 2015, с. 415).

РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ

Как правило, одному ДС русского языка соответствует несколько вариантов перевода на английский язык. В Таблице 1 представлены основные переводные эквиваленты ДС, входящих в эту группу. Таблица составлена на основе данных параллельного корпуса НКРЯ, который включает тексты разных жанров.

Таблица 1. Основные переводные эквиваленты дискурсивных слов

Дискурсивное слово	Эквивалент в английском языке
Конечно	**(1) of course ;** **(2) sure,** **(3) right ;** **(4) obviously ;** **(5) certainly**
Безусловно	**(1) absolutely ;** **(2) certainly ;** **(3) clearly;** **(4) of course ;** **(5) to be sure ;** **(6) unmistakably surely**
Естественно	**(1) of course ;** **(2) naturally ;** **(3) eventually.**
Очевидно	**(1) obviously ;** **(2) clearly ;** **(3) evidently.**

Таким образом, ДС этой группы имеют достаточно много переводных эквивалентов, что подтверждает тезис о лингвоспецифичности этих единиц: у ДС этой группы сложно выделить один универсальный перевод.

В качестве гипотезы была выдвинута идея, что вариативность перевода ДС связана с разнообразием выполняемых ими прагматических функций и отсутствием четкого денотативного значения. Для того, чтобы подтвердить эту гипотезу, выделим и охарактеризуем основные функции этой группы.

У этой группы ДС выделяются следующие прагматические функции: (1) выражение уверенности, (2) диалогизация текста и управление вниманием слушающего, (3) реализация коммуникативных тактик и эмоций (иронии, агрессии, осуждения и пр.). См. об этих функциях в (Белова и Белов, 2022).

Таблица 2. Частотность дискурсивных слов в Национальном корпусе русского языка

Дискурсивное слово	Частность словоформы в основном подкорпусе (в тыс.)	Частотность словоформы в русско-английском подкорпусе (в тыс.)
Конечно	**217**	**12**
Действительно	**95**	**6**
Очевидно	**42**	**2**
Разумеется	**42**	**3**
Естественно	**27**	**1**
Несомненно	**20**	**1**
Безусловно	**12**	**0,5**

Функция выражения уверенности характерна для всех ДС этой группы, однако единицы различаются степенью уверенности. Например, наиболее высокая степень уверенности свойственна для ДС *безусловно*, меньшая степень – для слов *конечно* (см. пример (11), где ДС *конечно* имеет смягчающее значение, а в английском языке используется нетипичный эквивалент *while*) и *очевидно*.

Для выражения высокой степени уверенности чаще всего используются в переводе на английский языке единицы *of course, to be sure, certainly*. Приведем несколько примеров из параллельного корпуса НКРЯ:

(1) английский: *This, **of course,** is very close to the Christian ethics and belief in social justice inculcated in me by my parents, and the understanding of the importance of evidence and honesty that I learnt as a doctor.*

русский: *Такой подход,* ***безусловно****, не противоречил христианской этике и вере в социальную справедливость, которые привили мне родители, и не отрицал важности доказательной базы, что я усвоил, будучи медиком* [НКРЯ: Henry Marsh. Admissions: A Life in Brain Surgery (2017) | Генри Марш. Призвание. О выборе, долге и нейрохирургии (И. Чорный, 2017)]

(2) английский: *"You definitely won't be doing this forever, and* ***of course*** *you can quit.*

русский: *– Ты определенно не будешь заниматься этим всю оставшуюся жизнь, и ты,* ***конечно же****, можешь все бросить* [Meg Jay. (2021) | Мэг Джей. (перевод: Наталья Яцюк, 2021)].

Высокая степень умеренности также отмечается у ДС *действительно*, семантика которого связана с подтверждением того, что некоторые события (ситуация) развивались определенным образом. Часто на английский язык это ДС переводится как *really* (см. предложение (3)), *indeed* (см. высказывание (4)), но нередко возможно употребление нетипичных переводных эквивалентов: в примере (5) отсутствует непосредственный эквивалент этого ДС.

(3) английский: *We're going to* ***really*** *need to know how infectious kids are and how well they do when they get infected.*

русский: *Нам* ***действительно*** *нужно понять, насколько заразны дети, и как легко они справляются с болезнью* [НКРЯ: G. Benjamin, D. Biello, Ch.Anderson. (2020) | Дж. Бенджамин, Д. Бьелло, Кр. Андерсон. (перевод: Наталия Писемска)].

(4) английский: ***Indeed****, officials frequently use economic analysis simply to rationalize decisions that they have already made.*

русский: ***Действительно****, чиновники регулярно прибегают к экономическому анализу просто для рационализации уже принятых решений* [НКРЯ: J. Furman. (2022) | Дж. Фурман. (неизвестный переводчик, 2022)].

(5) английский: *'Oh, and the victim is 5 foot 3'. 'She is 5 foot 3,' he told me. 'How could you know that?'*

русский: *– Кстати, рост жертвы – 160 сантиметров. – Да,* ***действительно*** *160, — ответил он. – Как вы это поняли?* [НКРЯ: A. Gallop (2019) | А. Галлоп. (перевод: И. Чорный, 2019)].

Низкая степень уверенности характерна для ДС *очевидно*: интересно, что в Малом академическом словаре представлено толкование вводного слова как "вероятно, по-видимому"[1]. Это ДС достаточно часто употребляется для выражения предположений, домыслов и догадок особенно в публицистических текстах; для этой единицы характерна вариативность перевода, нередко используются нетипичные эквиваленты перевода. Так, в примере (6) в оригинальном тексте употребляется далекое по значению сочетание *an obvious idea*.

(6) английский: *And this is such* ***an obvious idea****, but it's amazing how many policies tinker around the edges.*

[1] Евгеньева А. П. (ред.) (1999). *Словарь русского языка*: В 4-х т. Москва, Русский язык, Полиграфресурсы.

русский: *И это **совершенно очевидно**, но на удивление многие меры являются по сути полумерами* [НКРЯ: J. Doerr, H. Harvey, 2020 | Дж. Дуерр, Х. Харви (переводчик неизвестный)].

ДС *несомненно* также преимущественно ориентировано на выражение мнения: говорящий пытается убедить слушающего, что у него не возникает сомнений в истинности сообщаемого. При этом нередко у говорящего не имеется доказательств достоверности сообщаемого. В переводе на английский язык часто используются эквиваленты *without doubt, no doubt, little doubt*, но отмечают и другие варианты перевода. Так, в примере (7) говорящий выражает свое мнение, доказательства достоверности невозможно представить.

(7) английский*: I called Emin and said,'This is **without doubt** the most embarrassing thing you've ever asked me to do.'*

русский: *Я позвонил Эмину и сказал: "**Несомненно**, это самая досадная вещь из тех, которые ты просил меня сделать»* [НКРЯ: D. Smith. [The Guardian] (2018) | (Inosmi.ru, 2018)].

Функции диалогизации и управления внимания реализуются единицами этой группы под влиянием контекста и общего смысла высказывания. ДС этой группы имеют разный потенциал к выполнению этой функции: чаще всего она отмечается у более частотных ДС, напротив, низкочастотные единицы ориентированы на реализацию основной функции, связанной с выражением уверенности. Данные о языковой частотности представлены в Таблице 2, которая составлена с помощью основного и параллельного корпусов. Наиболее активно в этой функции себя проявляет ДС *конечно*, которое может быть использовано для диалогизации (установления контакта, выражения эмоций, введения новой (под)темы и пр.).

Например, в высказывании (8) это ДС используется для диалогизации текста (здесь реализуется как попытка предугадать чужую точку зрения); в оригинальном тексте используется достаточно нетипичный эквивалент *obviously*. Схожую прагматическую функцию выполняет ДС *разумеется* в примере (9), где говорящий предугадывает сомнения слушающего; в английском тексте использует эквивалент *of course*.

(8) английский: ***Obviously**, I can't tell you about all the amazing people I got to know and wrote about, or all of the nine causes of depression and anxiety that I learned about, because they won't let me give a 10-hour TED Talk — you can complain about that to them*.

русский: ***Конечно**, я не могу рассказать вам обо всех чудесных людях, о которых узнал и написал, или обо всех девяти причинах депрессии и тревоги, потому что мне не дадут 10 часов на TED Talk — можете пожаловаться организаторам* [Johann Hari [НКРЯ: TED Talks], 2019 | Иоганн Хари (перевод: А. Шенцева)].

(9) английский: *Your Big Five won't match exactly, **of course**, but the more similar your personalities, the smoother things may be.*

русский: ***Разумеется**, ваша "большая пятерка" не может полностью совпадать с "пятеркой" другого человека, но чем больше сходство, тем гармоничнее будут ваши отношения* [НКРЯ: M. Jay. (2021) | М. Джей (перевод: Наталья Яцюк, 2021)].

Важно, что анализируемые ДС нередко становятся средствами ведения скрытого диалога со слушателем. Например, в высказывании (10) ДС *естественно* прежде всего употребляется для установления контакта с собеседником, а не выражения уверенности в сообщаемом (в английском оригинальном тексте используется слово *although*, лишенное семантики уверенности).

(10) английский: ***Although** you don't know it, the other participants are actually in league with the researcher. In other words, they're confederates*.

русский: *Вы, **естественно,** не в курсе, что остальные участники – подставные лица и действуют заодно с ученым* [НКРЯ: R. Karlgaard, 2019 | Р. Карлгаард. (переводчик: Кс. Свешникова, 2020)]

Прагматические функции часто реализуются синкретично. Так, ДС *конечно, безусловно, несомненно* в сочетании с союзом *но* способны переключать внимание на новую микротему (новый аспект проблемы или ситуации) и одновременно имитировать живой диалог и устанавливать контакт с собеседником, предсказывая возможную его реакцию и частично принимая его точку зрения. В высказывании (11) ДС *конечно* не выражает уверенности в сообщаемом, а переключает внимание собеседника на другой аспект проблемы, одновременно устанавливая с ним контакт (соглашаясь с ним в некоторых аспектах проблемы); в англоязычном оригинальном тексте употребляется нетипичный уступительный эквивалент *while*. В подобных случаях контакт с собеседником устанавливается за счет того, что говорящий частично принимает чужую точку, но в целом не разделяет общую позицию говорящего.

(11) английский: ***While** it's impossible to predict the future with certainty, mathematics, science and history can provide hints about the prospects of Western societies for long-term continuation.*

русский: ***Конечно**, точно предсказать будущее невозможно. Но с помощью математики, истории и некоторых других наук можно попробовать найти более или менее ясные намеки на то, каковы долгосрочные перспективы западного общества* [НКРЯ: R. Nuwer [www.bbc.com], 2017 | (перевод: bbc.com/russian)].

В высказывании (12) эта же функции реализуется при употреблении ДС *безусловно*, с помощью которого автор устанавливает контакт с собеседником и предлагает рассмотреть другой аспект проблемы.

(12) английский: *So, space debris is a concern, there's no question – not because it's so likely to happen, but the consequences of it happening are pretty devastating.*

русский: *Космический мусор, **безусловно**, представляет проблему, но не сам факт его появления – его последствия могут быть весьма разрушительными* [НКРЯ: G. Shotwell, C. Anderson (TED Talks), 2018 | Г. Шотвелл, К. Андерсен (перевод: А. Черных)].

Функция управления внимания адресата у этой группы ДС реализуется с помощью установления обратной связи между коммуникантами. Так как с

помощью подобных единиц говорящий выражает согласие с собеседником (подобные единицы называются реактивными репликами; см. подробно (Добрушина, 2000)), эти ДС становятся маркерами смены говорящего: коммуникант часто начинает свою реплику с употребления ДС этой группы. В диалоге (13) ДС *безусловно* выражает согласие с собеседником, являясь маркером обратной связи (в оригинальном тексте отсутствует переводной эквивалент), в примере (14) те же функции выполняет ДС *конечно*.

(13) английский: *Are they beneficial? Yes, they're that, too. And they're not all the same.*

русский: *Они полезны?* ***Безусловно****. Все они разные* [НКРЯ: M. Mitchell, 2017 | М. Митчелл (перевод: Мария Ригерт)]

(14) английский: "*You going to win?" "Oh sure." Adam sighed. "Liar." His hand relaxed.*

русский: – Вы выиграете процесс? – О, ***конечно****! Адам вздохнул – Врунишка… – Его пальцы разжались* [НКРЯ: M. Crichton, 2006 | М. Крайтон (перевод: А. Новиков, 2007)].

В высказываниях (15-16) ДС не только выражают согласие с собеседником, но и являются сигналом начала высказывания. Отметим трансформации при переводе: в примере (10) изменяется структура предложения, в (11) используется нетипичный эквивалент *Oh, yes*.

(15) английский: *To Morgan's Falls. 'If I wouldn't be in the way, I'd very much like to come. I believe Josie also wishes me to come.'* ***She certainly does****. Josie's become very fond of you. And if I may say so, so have I.' Thank you.'*

русский: К Морганс-Фолс. *– Если я не буду мешать, я бы очень хотела поехать. Джози, мне кажется, тоже этого желает. –* ***Безусловно****. Джози очень к тебе привязалась. И, позволю себе сказать, я тоже. – Спасибо вам* [НКРЯ: K. Ishiguro, 2005 | К. Исигуро (перевод: Л. Мотылев, 2021)].

(16) английский: *"I'm Perry Mason," he said. "I was talking with Mr. Banner on the telephone and — "Oh, yes," she interrupted, coming to life with startling alacrity. "Oh, yes, Mr. Mason!" She pushed back the secretarial chair, came around the desk, smiled over her shoulder and said, "This way, please".*

русский: *– Меня зовут Перри Мейсон. Я разговаривал с мистером Баннером по телефону и…* ***– О, конечно****! – воскликнула секретарь, мгновенно приходя в состояние человека, готового оказать помощь посетителю. – О, мистер Мейсон! Она отодвинула кресло, вышла из-за стола, улыбнулась через плечо. - Пожалуйста, проходите* [НКРЯ: E. St. Gardner, 1964 | Э. Ст. Гарднер (перевод: М. Кудрявцева, 1990)].

Интересным для анализа является диалог (17), где ДС *разумеется* является сигналом начала высказывания, но при этом говорящий не соглашается с предшествующей репликой. В этом случае говорящий с помощью этого ДС выражает некоторое согласие с собеседником и пытается установить с ним психологический контакт.

(17) английский: *None of it does." "****Of course*** *not," I said. "But look at Facebook! These are supposed to be my glory days!"*

русский: *Ничего нет. –* ***Разумеется*** *нет, – сказала я. – Но загляните на Facebook*[2]*! Такими должны быть мои лучшие дни!* [НКРЯ: M. Jay. (2021) | М. Джей. Важные годы. Почему не стоит откладывать жизнь на потом (Наталья Яцюк, 2021)].

Функция выражения эмоций проявляется в двух случаях: во-первых, для усиления положительных эмоций радости, удивления и пр.; во-вторых, ДС являются важным средством выражения иронии и сарказма в тексте. Так, в тексте (18) с помощью ДС *конечно* усиливаются эмоции радости и удивления в контексте повествования.

(18) английский: "*You don't use your fist, just your index finger, which you place across the seam of both halves, like this, and with the other hand you give it a firm tap. Voilà!" he said, offering the contents to his daughter this time. "You try," he said, handing me a new nut. And* ***sure*** *enough, I cracked one open just as he had done. to the kitchen.*

русский: *– Не нужно задействовать кулак, только указательный палец: положите его на шов между двумя половинками, вот так, а другой рукой сильно по нему постучите. Вуаля! – воскликнул он и на этот раз протянул ядрышко дочери. – Попробуйте. – Он вручил мне целый орех. И,* ***конечно****, я точно так же сумел его расколоть* [НКРЯ: A. Aciman, 2019 | А. Асиман (перевод: Н. Рашковская, 2020)].

В текстах из художественной речи (19-21) представлены примеры иронического употребления ДС, которые выражают негативные эмоции говорящего. В этих случаях дискурсивные слова создают ложное согласие: смысл высказывания оказывается противоположным. Это явление, названное энантиосемией, является одним из активных процессов современного русского языка (кроме дискурсивных слов, оно характерно для ряда единиц с выраженной положительной оценкой *мило, весело*) (Ермакова, 2008).

(19) английский: *On finding Coleman waiting in his office his first remark had been, "So you* ***really*** *meant what you said about starting right away".*

русский: *Когда в тот первый день Пирсон увидел ожидавшего его Коулмена, он не преминул иронически заметить: — Сказано — сделано, Вы* ***действительно*** *немедленно приступили к работе* [НКРЯ: A.Hailey, 1959 | А. Хейли (перевод: Н. Кузнецова, Д. Мишне, Т. Николаева, Т. Пельц, 1980)]

(20) русский: *– Фу ты черт, – неожиданно воскликнул мастер, – ведь это, подумать только, – он затушил окурок в пепельнице и сжал голову руками, – нет, послушай, ты же умный человек и сумасшедшей не была. Ты серьезно уверена в том, что мы вчера были у сатаны? – Совершенно серьезно, — ответила Маргарита. –* ***Конечно, конечно****, – иронически заметил мастер, – теперь, стало быть, налицо вместо одного сумасшедшего двое! И муж и жена.*

английский: *' Pah, the devil!' exclaimed the master unexpectedly.' But, just think, it's…' he put out his cigarette butt in the ashtray and pressed his head with his hands.' No, listen, you're an intelligent person and have never been crazy… are you seriously*

[2] Деятельность организации "Meta", правообладателя социальной сети "Facebook", запрещена на территории РФ.

convinced that we were at Satan's yesterday?' ' Quite seriously,' Margarita replied. ' ***Of course, of course****,' the master said ironically,' so now instead of one madman there are two* ***—*** *husband and wife!'* [М. Булгаков, 1929-1940 | M. Bulgakov (перевод: R. Pevear, L. Volokhonsky, 1979].

(21) русский: *– А за что их казнили? – спросил кто-то. – Кто их знает! Кто говорит – за измену, кто говорит — клад золотой царский запрятали. — Ну* ***конечно****, — иронически заметил Генка, — клад уж обязательно. Без клада не обойдется. Миша протянул руку по направлению к помещичьему дому: — Про этих графов ты рассказываешь? — Про них, — кивнул головой Жердяй, — про предков ихних.*

английский: *"What were they executed for? "somebody asked. " Nobody knows! Some say for treason, others — that they had concealed a hoard of gold from the royal treasury. "" I should have known there'd be treasure in this, "Genka observed ironically. " That's in the ordinary run. "" Were you telling us about the local counts? "Misha asked, waving his hand in the direction of the manor. " Yes, "Longshanks nodded, "about their ancestors* [НКРЯ: А. Рыбаков, 1956 | A. Rybakov (перевод: D. Skvirsky, 1956].

Так как “интерпретация иронии – сложная коммуникативная задача” (Шилихина, 2015, с. 12), для ее понимания важен широкий лингвистический и часто экстралингвистический контекст. Ироническое употребление, как правило, характерно для устной речи или ее имитации, где собеседники, находясь в общей коммуникативной ситуации, помогают друг другу правильно понять смысл; отмечается, что ирония часто употребляется в общении между близкими людьми (Jorgensen, 1996). Важным ключом для интерпретации являются особая интонация и определенные визуальные знаки (Attardo, et al, 2003), при этом ирония может быть как открытой, так и скрытой (Barbe, 1993). Дискурсивные слова чаще участвуют в создании скрытой иронии.

ВЫВОДЫ И ДИСКУССИЯ

Семантика ДС группы, выражающих уверенность, пластична и варьируется в зависимости от контекста и общего смысла высказывания. Указанная семантическая особенность определяет отнесение подобных ДС к разряду лингвоспецифических. При переводе ДС нужно интерпретировать целое высказывание с учетом контекста и общего замысла, а не просто подобрать эквивалент к одному слову.

На механизм перевода ДС оказывают влияние несколько факторов: реализация прагматической функции, индивидуально-авторские предпочтения, и стилевые ограничения. Кратко опишем выделенные факторы.

Во-первых, вариативность перевода значительно определяется характером выполняемых функций. Для ДС, выполняющих основную функцию выражения уверенности, свойственна меньшая вариативность. Так, ДС *конечно* в этой функции наиболее часто переводится единицами *of course, sure*. Существенная вариативность перевода отмечается для ДС, выполняющих периферийных

функций. Как было показано ранее, нередко для перевода ДС в подобных случаях выбираются нетипичные эквиваленты.

Во-вторых, для ДС и служебных частей характерна индивидуальность, что неоднократно обсуждалось в научной литературе. Например, для идиостиля Ф. М. Достоевского свойственно использование ДС *конечно*, а для Л. Н. Толстого – *разумеется*; напротив, И. С. Тургенев часто использовал слово *кстати* в функции наречия (*пришел кстати*)[3] (см. подробно (Баранов и Добровольский, 2021; Михеев и Эрлих, 2018).

В-третьих, ДС слова этой группы имеют некоторые стилевые особенности употребления. Данные корпуса позволяют выявить особенности использования единиц в разных стилях. Нами проанализирована частота употребления ДС этой группы в разных корпусах НКРЯ – в основном, газетном, устном, поэтическом корпусах и в корпус социальных сетей. Подобный анализ дает широкое представление о функционировании ДС (см. обобщенные данные в таблице 3). На основании проведенного анализа можно сделать следующие выводы о функционировании каждого ДС в разных текстах:

ДС *конечно* – высокочастотно во всех стилях речи, кроме научного и официально-делового;

ДС *безусловно* и *несомненно* – главным образом употребляется в письменных текстах, при этом редко в поэтической речи;

ДС *естественно* – используется как в письменных, так и устных текстах;

ДС *действительно* – употребляется в письменных и устных текстах, в том числе научных и официально-деловых;

ДС *очевидно* – преимущественно употребляются публицистических текстах, а также в научной и официально-деловой речи;

ДС *разумеется* – низкочастотное во всех корпусах, кроме социальных сетей, где оно достаточно часто употребляется.

Таблица 3. Употребление ДС в разных регистрах (подкорпусах); тысяч употреблений

Дискурсивное слово	Основной корпус	Газетный корпус	Устный корпус	Корпус социальных сетей	Поэтический корпус
Конечно	209	258	28	84	2
Безусловно	7	41	2	5	0,08
Естественно	14	44	4	11	0,07

[3] Подобные исследования проводятся за счет сравнения частотности употребления единиц с помощью корпусных инструментов. Сопоставление производится между словарями разных писателей, а также производится сравнение с корпусом языка эпохи. Возможно сравнение идиостиля отдельных произведений. Например, такие исследования показывают, что частота употребления слова *конечно* постоянна в разных произведений И. С. Тургенева (Михеев и Эрлих, 2018).

Действительно	27	28	9	35	0,2
Очевидно	29	19	0,003	0	0
Разумеется	0,6	0,07	0,7	8	0,09
Несомненно	20	13	0,3	3	0,1

В таблице представлена частотность леммы с применением грамматической разметки “Вводное слово” (как часть речи).

Анализ особенностей перевода ДС этой группы позволяет сделать некоторые общие теоретические выводы о психолингвистических механизмах перевода. В процессе перевода происходит переосмысление содержания текста из языка 1 (L1) в язык 2 (L2) не напрямую, а через посредническую среду, которую можно назвать условно языком смысла. Проблема подобного посреднического языка неоднократно обсуждалась в научной литературе: часто его называют интерязыком, существование которого доказывается невозможностью обратных переводов и языковой интерференцией (Angelis, 2005; Angelis & Selinker, 2001; Pan, 2021). В нашем случае переводчик в процессе работы над оригинальным текстом создает смысловое внутреннее представление о содержании текста, а уже после этого реализует это представление средствами другого языка. Такой механизм обеспечивает многообразие переводных эквивалентов ДС. В целом наличие посреднического языка хорошо согласуется с положениями о внутренней речи в отечественной психолингвистической школе (Л.С. Выготский, А.А. Леонтьев, А.Р. Лурия, А.А. Залевская и др.). См. подобные выводы о ментальных переходах при переводе (Yau, 2011).

В процессе перевода ключевая роль отводится языковой личности переводчика, который может в зависимости от некоторых индивидуальных особенностей выбирать разные языковые эквиваленты ДС. Указанная проблематика также активно обсуждается в современных работах; см., например, (Alves & Albir, 2012; Hubscher-Davidson, 2009). Однако изучение ДС в сопоставительном аспекте с привлечением параллельного корпуса дает богатый материал для дальнейшего анализа индивидуальных предпочтений переводчика.

ЗАКЛЮЧЕНИЕ

Вариативность при переводе группы ДС, выражающий уверенность, связана прежде всего с выполнением различных прагматических функций в контексте. Значение ДС пластично и в значительной степени определяется общей семантикой высказывания, а также влиянием контекста. При работе с ДС этой группы переводчик в соответствии со своим пониманием ситуации и смысла текста выбирает ДС.

Подобные исследования актуализируют антропоцентрический (когнитивный) подход к переводческой деятельности, в рамках которого объектом описания выступает языковая личность переводчика. Особенно эта проблема важна в контексте обсуждения достижений машинного перевода: автоматизированные системы будут испытывать серьезные трудности при интерпретации прагматических функций ДС.

Многообразие прагматических функций, выполняемых этой группой ДС в тексте, способно привести к неточному переводу из-за неверной интерпретации смысла высказывания и контекста.

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Research article

Linguacultural Artefacts for Translation Training

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Abstract

This paper explores the implementation of a "phygital" approach in Turkish-Russian translation training, using traditional Turkish folk songs, known as Türkü, as linguistic and cultural artifacts. Türkü carry significant layers of meaning, making them invaluable resources for training future translators and philologists. Despite extensive research on türkü, studies focusing on its translation are scarce. The paper advocates for a phygital approach, blending physical and digital dimensions to be implemented in the training process of translators and philologists. The study is grounded in cognitive theories of language, emphasizing language as a primary encoding system that shapes human perception of reality. The theoretical framework integrates onomasiological approaches to language and considers translation as a process of structural and semantic transformations between distinct encoding systems. The results of this and previous studies reveal the efficacy of generative models in capturing certain linguistic and cultural aspects but underscore the indispensability of human involvement, particularly in context-based interpretation and post-translation analysis. The research advocates for a balanced integration of artificial intelligence and human expertise in translation education, with educators serving as mentors to guide students through linguistic and cultural intricacies.

Keywords: Phygital; Translation Training; Turkish-Russian; Türkü; Artificial Intelligence

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Научная статья

Лингвокультурные артефакты для обучения переводу

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Аннотация
Данное исследование посвящено внедрению фиджитал-подхода в процесс обучения переводу с турецкого на русский язык на примере традиционных турецких народных песен-тюркю, выступающих в качестве лингвокультурных артефактов. В тюркю содержатся значительные пласты смысла, что делает их бесценным ресурсом для обучения будущих переводчиков и филологов. Несмотря на большое количество исследований тюркю в Турции, труды в области перевода их на русский язык отсутствуют. В рамках исследования фиджитал-подхода объединяются физические и цифровые измерения, которые должны быть реализованы в процессе обучения переводчиков и филологов. Исследование основано на когнитивных теориях языка с акцентом на языке как основной системе кодирования, формирующей человеческое восприятие реальности. Теоретическая основа включает ономасиологические подходы к языку и рассматривает перевод как процесс структурных и семантических трансформаций между различными системами кодирования. Результаты показывают эффективность генеративных моделей в передаче некоторых поверхностных лингвистических и культурных аспектов, но свидетельствуют о необходимости человеческого участия, особенно в контекстно-ориентированной интерпретации и постпереводческом анализе. Исследование показывает необходимость сбалансированного использования искусственного интеллекта и человеческого участия в процессе обучения переводу, в котором преподаватель выступает наставником, помогающим студентам разобраться в лингвистических и культурных тонкостях.

Ключевые слова: Фиджитал; Обучение переводу; Турецко-русская языковая пара; Тюркю; Искусственный интеллект

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INTRODUCTION

Linguacultural artifacts, which encode information about the linguistic and cultural landscape of a specific nation, play a crucial role in preserving and transmitting national values, traditions, and cultural concepts. Among these artifacts, oral or written texts stand out as the primary source for understanding the material and spiritual culture of a nation as it evolves over time. Folk songs are particularly noteworthy examples of such texts. In contemporary Turkish culture folk songs, known as "türkü," represent unique texts with multiple layers of meaning that require visualization to fully grasp the fragment of reality they depict. These songs encompass a variety of semantic dimensions that make them valuable educational resources for the professional training of future philologists and translators. They offer rich material for understanding of translating, pre-translation analysis, and teaching translation techniques. Furthermore, as linguacultural artifacts, folk songs hold significance in the context of research on human and generative artificial intelligence interaction. Given that LLM-driven generative systems have become integral components of the linguacultural space of Homo Sapiens, it is evident that this space will continue to undergo rapid evolution. Specialists, who have been working with texts, created by humans throughout history, must now deal with texts generated by artificial intelligence. This fact entails a number of questions, such as: Is a traditional approach enough to satisfactorily train philologists and translators? What is the best approach for the specialists of the future, who will very likely have to work with the texts, generated by generative AI and humans? Could generative AI be integrated into the process of training and education of future specialists? In response to these questions, this paper advocates for a "phygital" approach to foreign language and translation training.

LITERATURE REVIEW

In Turkey, there is a substantial body of scientific literature dedicated to the study of türkü. The database dergipark.org.tr indicates a total of 570 articles related to the keyword "türkü."These articles predominantly focus on specific aspects of various türkü, especially on cultural features shaped by history, geography or everyday life (Atmaca, 2023; Dinç, 2020; Mete, 2023; Mirzaoglu, 2012). Nevertheless, there is a shortage of articles addressing the linguistic analysis or translation of türkü into different languages (Karagöz et al., 2023). A search in the Turkish dissertation database tez.yok.gov.tr using the keyword "türkü" provides 302 dissertations (both master's and doctoral theses). The majority of these research concentrates on the unique characteristics of türkü as a musical genre, with some of them exploring the motifs and thematic content of the songs. However, none of these dissertations appear to address the linguistic analysis or translation of türkü into other languages. As for the monographs published in Türkiye, these works mostly contain selected songs and comments on their origin or topic.

There is a limited amount of research on türkü, particularly its translation into Russian in Russia. A brief overview was presented in a 2013 article, where the author introduced the concept of türkü within the context of Turkish folklore. Türkü was defined as songs that reflect Turkish culture, with love, sadness, grief, as well as joy and happiness being the main themes in the songs (Sadykova, 2013). Another article, titled "On the

Question of Poetry and Folk Songs about the First World War" explores the portrayal of World War II in Turkish folklore, highlighting its patriotic themes (Anikeeva, 2016). However, this article leans more towards literature than linguistics. In a 2021 article, Svetlana Vorobyova and Elena Oganova analyzed romantic motifs and corresponding poetic images in the works of the prominent Turkish poet "ashik" Karacaoğlan from the 17th century. However, this paper primarily focuses on literary analysis, exploring the typology and poetics of "ashik" poetry, both within folklore and the author's individual tradition within a single work (Vorobyova & Oganova, 2021). The most recent research on türkü, dated 2023, highlights some of the features of the songs and provides translation examples (Lojkina, 2023).

Three papers on Turkish folk songs were found in the Web of Science data base. In the framework of cultural studies, these articles deal with certain motifs (Mirzaoglu, 2012; Ugur, 2015) or metaphors (Görkem, 2021) in the songs.

As part of this study, an examination of both Russian and Turkish literature on the concept of "phygital" was conducted. According to the analysis of research results in elibrary.ru data base, it can be concluded that for the time being "phygital" is widely adopted in marketing, sport, and sometimes in digital technologies research. The key word "phygital" is included in 603 publications in the database. In Turkey, the concept "phygital" has been transliterated as "fijital" According to the dergipark database, it is used only in marketing research in a limited number of articles (Çelik et al., 2023; Köse & Yengin, 2018; Özatar, 2023).

The analysis of the Web of Science database using the keyword "phygital" revealed that this concept has been in use since 2007 and was initially applied in the field of computer technology (Nakazawa & Tokuda, 2007). The database analysis shows that currently this term is most frequently used in research papers in the category of Business (64 articles), Management (27 articles), and Economics (21 articles). The term is also used in Computer Science (12 articles) and Communication (11 articles). Two papers were detected in the category of Linguistics (Due & Toft, 2021; Lyons, 2019). The term was introduced by researchers as a synthesis of "physical" and "digital". Andrea Gaggioli (2017) attempts to approach the concept of phygital in a broader context, describing it as a "*neologism that results from the synthesis of the terms 'physical' and 'digital' – refers to a new concept of space that originates from the increasing convergence of the physical dimension and the virtual dimension.*"

THEORETICAL FRAMEWORK

The theoretical framework employed in this project is rooted in a cognitive approach to language (Boldyrev 2007; Kubryakova 2004; 2012) with the main idea of language being a primary encoding system (Lotman, 1998; Zaliznyak et al., 1962;), fragmenting and conceptualizing human's reality.1 The understanding of the relationship between reality and language is grounded in the onomasiological approach to language

[1] This paper presents the outcomes of the "Phygital Turkish-Russian Translation Workshop" project, conducted in the autumn semester of 2023-2024 at Ankara Haci Bayram Veli University within the Department of Russian Language and Literature as part of the Turkish-Russian translation course under the supervision of Assoc. Prof. Olena Kozan.

(Meshchaninov, 1940; Scherba, 1977), further developed in the theory of naming (Serebrennikov & Ufimtseva, 1977). According to this approach, language functions as a system that encodes information about reality through models of primary and secondary naming patterns, allowing for the representation of an infinite number of potential situations with varying structures.

The theoretical framework of this paper also encompasses the theory of translation, established within Russian linguistics as an independent scientific discipline with its own approaches, concepts, and research methods. Within the project framework, translation between two distinct information encoding systems is defined as a process of structural and semantic transformations, where the naming patterns must be duly considered. Pre- and post-translation analyses, as well as the process of translation itself, are conceptualized and implemented within the phygital paradigm. In this paper, we use the concept of phygital as an approach to translation training, which involves the use of AI-based applications and the analysis of their effectiveness during the pre-translation and post-translation stages. The main objective of this approach is to develop critical thinking, creativity and digital literacy in future translators. We consider the creation of a digital product by human intelligence (the translator) with the help of artificial intelligence as one of the goals of training within the phygital approach.

Key concepts within this paper are naming, defined as a process involving a specific correlation between a word and its referent (Akhmanova, 1966); primary naming pattern as a result of the naming process which can be understood through etymological or historical analysis (Yartseva, 1998); secondary naming pattern referring to the use of an existing name [primary naming pattern] for a new reality fragment (Yartseva, 1998); situation as a fragment of reality reflected in the language dimension. The main elements of the situation are subject, action, object, space and time (Zherebilo, 2016). Translation is then understood as a process involving analysis, aiming at a clear understanding of the real situation, followed by synthesis, which involves reframing of the situation in the target language through semantic and syntactic transformation models (Poluyan, 2005). Finally, the linguacultural artifact is a text which is produced within a particular linguacultural space and is highly transparent for the native speakers, and phygital designates a synthesis of the physical and the digital (Nakazawa & Tokuda, 2007).

Participating students were introduced to these key approaches and concepts necessary for the implementation of the project.

MATERIALS AND METHODS

Thirty final-year students participated in the “Phygital Turkish-Russian Translation Workshop.” All of the students were native Turkish speakers with Russian as their foreign language. The primary objective of this project was to visualize the translation process of linguacultural artifacts from the perspective of novice translators, using generative models in the process. The aims of the project were defined as developing an algorithm for pre-translation analysis of culturally significant texts and evaluating the potential and challenges associated with using artificial intelligence models, specifically ChatGPT, for novice translators in analyzing and translating culturally significant texts. Translation

problems encountered by novice translators using artificial intelligence models were to be categorized and a post-translation analysis algorithm was to be developed.

Eighty one türkü, representing 81 provinces of the Turkish Republic, served as the material for the project. Texts were selected based on their cultural significance. They reflect various aspects of human relationships, natural phenomena, everyday life, and historical events. Additionally, the selected texts are well-recognized within modern Turkish culture due to their frequent presence in Turkish media. The texts were selected from the türkü database repertukul.com, which is considered to be the largest collection in Turkey.

At the first stage of the project, the aim and tasks were presented to the students. The roadmap of the project included the following stages: 1) analysis of the original text based on the algorithm with focus on selecting a fragment of reality encoded in the text; 2) analysis with the artificial intelligence model ChatGPT, using different prompts; 3) comparison of human and AI analysis results; 4) translation of the text using artificial intelligence models; 5) post-translation analysis and working on a final translation; and 6) creation of a digital product.

Each stage of the project was carried out one-by-one with results discussed in class. Each participant provided analysis and translation data, as well as comments on the translation process. This study presents an analysis of the project results, focusing on the classification of problems encountered by participants during the analysis of the original texts and their translations. The students' errors which occurred during translation and implementation of techniques after post-translation analysis are analyzed and categorized.

RESULTS

The results of the analysis are represented according to the stages of the project implementation.

Participants encountered challenges during the pre-translation analysis, particularly in discerning the onomasiological structure of the text, despite its being in their native language. These difficulties stem from the intricate structure of the linguacultural artifact. The cohesion and coherence of türkü is not transparent to readers or listeners, requiring them to identify the fragment of reality condensed within the naming pattern. Initially, participants attempted to interpret the text solely based on numerous comments found in the various electronic and printed materials, rather than treating the text itself as the primary source of encoded information. This approach did not enable them to reveal semantic connections within the text, thereby impeding their ability to define an appropriate translation technique.

When participants approached the türkü as a source of information regarding fragments of reality, they employed onomasiological categories in their textual analysis. By discerning categories such as "the subject," "the object," "the action," "the state," "the feature," "the space" and "the time" along with their interrelations, they visualized the onomasiological structure of each song. Through the analysis of selected türkü, certain recurring structural elements of linguacultural artifacts were identified. Many türkü, irrespective of their regional origins, seem to follow a common pattern: [natural/artificial objects/phenomena → action/state of the subject]. In this model, references to natural or

artificial phenomena take precedence, while the subjects and their actions or states assuming a secondary role in the textual structure. Consequently, each quatrain adheres to this principle. Analyzing similar texts requires tracing connections between subjects and objects to ascertain the situation depicted in the text, which is often encoded across various segments without a discernible sequence. In other words, the "plot" of a türkü is not presented chronologically but is dispersed throughout the text, sometimes lacking explicit indications of time and space. This distinctive feature of türkü makes them challenging to comprehend and analysis in terms of the situation is required during pre-translation analysis.

The pre-translation analysis shows that türkü texts contain a number of various secondary naming patterns. These secondary patterns are "a layer" of the data, which have to be transformed into the information about the event, following the model [natural/artificial objects/phenomena → action/state of the subject]. This dual nature of secondary naming patterns, i.e. a correlation between natural/artificial objects at the surface level of the text (cohesion), and a reflection of deep connections in the structure of a situation (coherence) is also an obstacle, which makes it difficult to "read" the situation encoded in türkü. There are some examples in Table 1 of the original Turkish texts with literal translation into English in brackets and two versions of translation into Russian, made by the participant and by the editor.

Table 1. Comparison of the translations: *Halkalı Şeker* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	PARTİCİPANT'S TRANSLATION INTO RUSSIAN	EDITOR'S TRANSLATİON
Halkalı şeker şam fıstık, ***(Ring-shaped sugar)*** **Arpalar kara kılçık,** ***(Barley with black thorns)*** **Eğer beni seversen (aman)** ***(If you love me (oh my))*** **Al çeyizi yola çık.** ***(Take the dowry and hit the road).***	Круглый сахар, дамасские фисташки, Ячмень черный, остистый, Если меня любишь (аман) Бери приданое, отправляйся в путь.	Кругленькие леденцы, дамасские фисташки. Зреет рожь, на полях много белой кашки. Если любишь ты меня – не томи, С приданым навстречу мне выходи.
Halkalı şeker ***(Ring-shaped sugar)*** **Hasretlik çeker,** ***(Suffer from longing)*** **Çok sallanma sevdiğim,** ***(Don't sway too much my beloved)*** **Cahilim aklım gider (…)** ***(I am ignorant, I lose my mind).***	Круглый сахар, Испытывает тоску, Не колебайся, дорогая, Я невежественен, мой ум уйдет (...)	Кругленькие леденцы Ждут свой черед. Любимая, не томи, Мой покой пропадёт (...)

In the first quatrain structure, the emphasis is placed on "ring-shaped sugar," while in the second, the focus shifts to its "suffering from longing." However, the depiction of this sugar (which is actually a kind of sweets) is symbolic, linked to the tradition of presenting coloured sweets during engagement ceremonies. This scenario forms the backbone of the text. In this context, the protagonist is the young man (the fiancé) eagerly anticipating his wedding day. He urges his fiancée to swiftly prepare the dowry and embark on the journey, stressing the urgency by warning against hesitation, lest he "lose his mind." This underlying situation is metaphorically encapsulated in the "ring-shaped sweets," which literally appear to "suffer from longing." Essentially, the narrator (the young man in this instance) portrays the situation from a unique perspective, using the artificial object – a desire to offer these sweets at his wedding – to express his own subjective reality of longing.

During the pre-translation analysis, participants identified realia and images specific to Turkish culture, which could pose potential challenges to the translation into Russian. It was determined that while realia can be conveyed through translation transformations, their connotations and allusions will inevitably be lost in the translated text. While using ChatGPT in the process of pre-translation analysis, the participants found that the generative model effectively described the realia of Turkish culture, presenting the user with a unique "dictionary-type" description of reality. In this case, the logical structure of the query is not of particular significance. The simplest query in the form of "What is [realia name] in Turkish culture?" yields a positive result. However, when presenting the context in the form of a sentence, quatrain, or complete text and creating a query for realia analysis within this context, the model begins to generate descriptions of a general nature, which may not correspond to the situation in the text. In other words, the model generates text where these realia may be semantically connected to the Turkish language – but not in the specific context. The example is given in Table 2.

Table 2. Comparison of the translations: *Ak Koyun Meler Gelir* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	CHATGPT'S TRANSLATION INTO RUSSIAN	TRANSLATION IN RUSSIAN, EDITED BY HUMAN
Ak koyun meler gelir ***(The white sheep bleats, it comes)*** **Dağları deler gelir (Vay)** ***(It pierces through the mountains (oh dear))*** **Hakikatlı yâr olsa** ***(If it were a true lover)*** **Geceyi böler gelir (Vay)** ***(It would split the night (oh dear))***	Белая овца блеет, Горы пробивает (ой) Истинная любовь моя Ночь разрушает (ой)	Белая овца блеет, Горы преодолеет, ох, Если она меня искренне любит, Ночь, как преграду, тоже преступит, ох.

Analyzing the passage in Table 2, the generative AI interpreted “the night” as the time when the türkü could be performed. In the comment about the subjects in the text the generative AI suggested the idea that the addressee of the letter was someone, who had fallen in love. That person lived in a natural environment and was involved in animal husbandry, appreciating the nature. This comment is not relevant to the situation in the text where the narrator addresses his beloved reproachfully.

Table 3 provides an example of a literal translation by chat GPT. The original text serves as context for the model, enabling it to generate translations. However, as previously mentioned, the AI reproduces the semantics of primary nominations but does not replicate secondary nominations.

Table 3. Comparison of the translations: *Ak Gazan Kara Gazan* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	CHATGPT’S TRANSLATION INTO RUSSIAN	TRANSLATION IN RUSSIAN, EDITED BY HUMAN
Ak gazan kara gazan, ***(Earn white, earn black)*** **Yazmış yazıyı yazan.** ***(Written by the one who writes)*** **Eller düğün ediyor,** **(*Hands are celebrating the wedding*)** **Birazcık da sen özen.** ***(You should care more as well).***	Белый зарабатывай, Черный зарабатывай. Написал тот, кто написал. Руки устраивают свадьбу Немного, и ты будешь заботиться.	Кровью-потом заработай, Будь, что было суждено. Все вокруг играют свадьбы, Тебе ж как будто всё равно.

In the translation by ChatGPT, the omission of crucial semantic components that shape the situation is evident: the girl is urging her beloved to exert effort to ensure their wedding takes place, even if it means earning money through strenuous means. Despite their destiny being predetermined by a higher authority responsible for people's fates, the young man is urged to work harder. The girl reproaches him, lamenting that while everyone else is getting married, he is not putting in the necessary effort to do so.

In most cases, the participants of the project did not question the literal translations provided by ChatGPT. Literal translation involves surface transformations following the model [unit in the source language] → [unit in the target language], which poses challenges for beginner translators who struggle to move beyond the influence of form. Thus, errors stemming from native language interference are common, particularly in the initial translation drafts proposed by participants. For instance, in the example presented in Table 3, the translator appears to have been influenced by the form. For instance, in the expression “eller düğün ediyor,” where the word “el” (literally “hand”) in the original text is translated as “Hands are celebrating the wedding,” the broader meaning of the term “el” in the sense of “other people around” was not thoroughly analyzed. As a result, the generative AI reproduced the literal translation, leading to the error.

In addition to interference errors, onomasiological errors were identified, where the translator failed to analyze the fragment of reality, highlighting its key elements, thereby failing to visualize the reality reflected in the original text. As a result of such errors, cognitive dissonance could arise in the translated text. Examples of interference and onomasiological errors can be seen in Table 4.

Table 4. Comparison of the translations: *Şu Dalmadan Geçtin Mi* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	FIRST TRANSLATION BY PARTİCİPANT	EDITOR'S TRANSLATİON
Şu Dalmadan geçtin mi? ***(Did you pass through that Dalma?)*** **Soğuk sular içtin mi?** ***(Did you drink cold waters?)*** **Efelerin içinde** ***(Among the heroes)*** **Yörük Aliyi seçtin mi?** ***(Did you choose Yörük Ali?)***	Ты прошёл через Далама? Ты пил холодные воды? Ты выбрал Юрека Али среди бойцов?	Бывал ли ты в Даламе? Познал ли там вкус воды в роднике? Узнал ли ты Йорука Али, Среди героев-эфе?

In this example, the translator, upon seeing the image of water in the original text, concluded that it referred to a river named "Dalama" and its cold waters, which resulted in an onomasiological error. "Dalama" is the name of a small town where a spring, once the center of social life, is located. It was in this town that the renowned hero of the national liberation war, Yoruk Ali, started a resistant movement against the occupation forces.

In the initial translation drafts by participants, errors in the use of collocations and stylistic inaccuracies were also frequently encountered. An example of collocation errors can be found in Table 5.

Table 5. Comparison of the translations: *Mendil Aldım Bir Deste* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	FIRST TRANSLATION BY PARTICİPANT	EDITOR'S TRANSLATION
Mendil aldım bir deste, ***(I bought a bundle of handkerchiefs)*** **Meni anamdan iste.** ***(Ask for permission from my mother)*** **Eğer anam vermezse** ***(If my mother doesn't give permission)*** **Son cevap menden iste.** ***(Ask me for the final answer).***	Я взял пучок платков, Попроси меня у мамы. Если мама не даст, Последний ответ у меня.	Платочки есть уже у меня, Проси мою мать отдать за тебя, Если не выдаст- жди ответ от меня.

In this example, the original text uses the term “deste,” which serves as a collective unit (denoting a dozen, bundle, bunch, etc.) in Turkish. The translator reproduced the collective meaning based on the variant suggested by the generative model, without questioning the collocation of this word in the target language.

An example of a stylistic error can be found in Table 6.

Table 6. Comparison of the translations: *Çemberimde Gül Oya* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	FIRST TRANSLATION BY PARTİCİPANT	EDITOR’S TRANSLATİON
Çemberimde gül oya, ***(I have rose lace in my headscarf)*** **Gülmedim doya doya.** ***(I haven’t laughed to my heart’s content)*** **Dertlere karıyorum** ***(I am mixing with troubles)*** **Günleri saya saya.** ***(Counting the days)***	Розовые вышивки в моих руках, Я не рассмеялась на полную катушку. Я погружаюсь в беды с каждым проходящим днем.	Есть роза на моем платке Жизнь не улыбнулась мне. Беды мимо не прошли, Я не живу, считаю дни.

In this example, the original text employs a verbal reduplication construction (“doya doya ← doymak”), which conveys information about the intensity of the action or situation. Based on its database, the generative model suggested the variant “на полную катушку” (in full swing) which is colloquial in Russian compared to the neutral style in Turkish. In this case, the translator ignored the stylistic features of the construction in the target language.

During the post-translation analysis of the first translation draft, participants were introduced to the capabilities of the National Corpus of the Russian Language, particularly its “Word Sketch” function. Through independent work with the corpus, participants presented a second translation variant along with justifications for their translation decisions. Analysis of these decisions revealed that participants successfully identified collocations, thereby correcting collocational errors, and they also determined connotations or stylistic nuances of linguistic units in the target language using the corpus. The first draft of the translation and the version after the post-translation analysis are presented below.

Table 7. Comparison of the translations: *Armut Dalda Dik Durur* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	FIRST TRANSLATION BY PARTİCİPANT	SECOND TRANSLATION
Armut dalda dik durur ***(Pear stands upright on the branch)*** **Dibinde yiğit durur** ***(A brave man stands beneath it)*** **Benim sevdiceğim kiz** ***(My beloved girl)*** **Karşimda gülüp durur (kara gözlüm aman)** ***(Stands in front of me, laughing (my dark-eyed one, oh my)***	Груша стоит на ветке, Внизу стоит герой, Девушка, которую я люблю, Передо мной смеется (черноглазая моя, ой)	Висит груша на ветке, Молодец под ней. Моя любимая с улыбкой Смотрит на меня, Черноглазая моя, ой!

In this example, the original text employs a term with broad semantics ("durmak" – to stand, to be, to lie down depending on the context). The translator initially reproduced the spatial relations of the source language, but after consulting the corpus and verifying collocations he found a functional equivalent.

Table 8. Comparison of the translations: *Ah Gidin Benden Söyleyin O Yara* folk song

ORIGINAL TURKISH TEXT (with literal translation into English)	FIRST TRANSLATION BY PARTİCİPANT	SECOND TRANSLATION
Ah gidin benden söyleyin o yara, ***(Go and tell my beloved from me)*** **Ben de düştüm elden ayaktan.** ***(I have also fallen from hands and feet)***	Иди и скажи этой любовнице от меня. Я тоже заболел.	Ах, скажите скорее любимой моей, Я слёг от любви, от любви только к ней.

In this example, the translator used the term "любовница" (mistress) in the translation text. However, after determining the connotations of this term using the corpus, an appropriate alternative was found.

DISCUSSION AND CONCLUSION

Employing generative AI as a tool has become indispensable in handling diverse textual materials. However, the user should be aware that the generative AI is just an auxiliary instrument and not a final product. Such awareness can be cultivated through practical engagement with generative AI. It seems essential to begin cultivating this

experience during education, thus introducing the phygital concept to the training of translators and philologists. This concept signifies the synthesis of physical and digital dimensions, not their opposition, which proves to be functional and effective in translation training. In this context, educators can act as moderators and mentors, while students have the opportunity to utilize all available resources for professional development while cultivating an awareness that it is the human intellect that creates the final product.

In the project described in this paper, the phygital approach was applied to the analysis and translation of linguacultural artifacts using türkü as an example. Students were encouraged to combine the capabilities of human (natural) and artificial intelligence and to evaluate the potential of phygital concept in philology and translation. The results of this project indicate that at the stage of pre-translation analysis, the generative model (ChatGPT) effectively describes certain realia of Turkish linguaculture, with the language of the prompt (Turkish, Russian, or English) not affecting the quality of the information generated by the model. In this context, it can be concluded that these models can be used in education as a source of information about linguaculture. This function is particularly relevant because, as of now, there is no printed or electronic dictionary reflecting the realia, precedent facts, allusions and connotations of Turkish linguaculture. Given the current scenario where generative AI may produce factual errors, often referred to as “hallucinations,” novice translators and philologists must develop the skill to verify factual information. However, it is plausible that over time such errors may become less pertinent, particularly as generative AI systems are trained in Turkish.

Considering the relevance and effectiveness of analyzing separate realia taken out of context, it is necessary to note the ineffectiveness of the generative model in analyzing the deep structure and coherence of the text. The responses provided by the model contained incorrect interpretations of secondary naming patterns within the context of türkü. Moreover, the model interpreted the text based on collocations in the source text, which often did not reflect the reality described in the situation. In this context, it appears that it is the human immersed in time and space and interpreting reality, who can effectively work with context, especially linguacultural ones.

The process of translation using generative models showed that primary naming patterns are transferred, while secondary naming patterns are not reproduced by the model. However, novice translators often do not notice these errors because they are influenced by their native language, leading them to prioritize form. Additionally, novice translators may overlook collocational shifts or stylistic errors in their translations made with the generative AI. In such cases post-translation analysis becomes necessary, during which the instructor acts as an editor, explaining each translation error in detail but not providing a ready-made solution, instead guiding the student to search for a functional equivalent. In most cases, working with the Corpus of the Russian language during the post-translation analysis helped students to find a more adequate and acceptable solution. Furthermore, it is worth noting that participants attempted to interact with the model by providing comments on its translation option. In this context, it should be emphasized that with such a unique form of training, the model presented more successful translation options. However, the adequacy of its responses needed to be verified by a human. Thus,

at this stage of the development of generative models, humans remain active both at the starting point, as creators of the data on which models are trained, and at the endpoint, when creating a final product.

The translation process was visualized by students through the final product "Türküler: Go Phygital" on the Bookcreator platform. Digital products, developed within the phygital approach, are available for public access (Kozan, 2024a). The project was presented by the students in a panel discussion. A video trailer in Turkish is also publicly accessible (Kozan, 2024b).

The project results allow for discussion regarding the introduction of the phygital concept into the training process of philologists and translators. In this context, it is necessary to emphasize the role of the instructor as a mentor who does not prohibit the use of artificial intelligence but guides the students, fostering an awareness necessary for the adequate analysis of reality with the aim of working further with information or transforming data in the system of another linguaculture. It is this awareness, inherent in humans, that will enable us to utilize all the capabilities of artificial intelligence while retaining the right to shape and control the process of creating the final philological product.

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Research article

Flipped Instruction of English as a Foreign Language: Effects on Reading Comprehension and Speaking Skills

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Abstract

This study investigates the development of reading comprehension and speaking skills through flipped instruction of Iranian intermediate EFL learners. The current study adopts a quasi-experimental design: 50 female students at Koosha institute in Langarud were selected. Their age ranged from 11 to 16 years. The group of participants was homogenized using the Nelson proficiency test. Participants were then assigned to the experimental and control groups. Each group consisted of 25 students. Both groups were taught by the same teacher. Moreover, the same syllabus and textbook were used for both groups. After that, the pre-tests of speaking and reading skills were administered to both groups to test students' reading comprehension and speaking level before the flipped instruction. Then the experimental group was exposed to flipped instruction for 8 sessions while the control group received a placebo. Finally, the post-tests of reading comprehension and speaking skill were administered to both groups in order to find out significance differences between them. The results showed that the experimental group outperformed the control group in reading comprehension ($p = .004$, $p < .05$) and speaking skill ($p = .003$, $p < .05$). Furthermore, we found that the experimental group demonstrated greater improvement in speaking skills compared to reading during flipped instruction.

Keywords: EFL Learners; Flipped Instruction; Language; Reading Comprehension; Speaking Skill; Technology

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Научная статья

Перевернутое обучение английскому языку как иностранному: Влияние на понимание прочитанного и навыки говорения

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Аннотация
В этом исследовании изучается развитие навыков понимания прочитанного и говорения посредством технологии перевернутого обучения у изучающих английский язык как иностранный на уровне Intermediate в Иране. Текущее исследование использует квазиэкспериментальный дизайн: было отобрано 50 студенток института Куша в Лангаруде в возрасте от 11 до 16 лет. Группа участников была гомогенизирована с помощью теста на уровень владения языком Нельсона. Затем участники были распределены на экспериментальную и контрольную группу, каждая из которых состояла из 25 студентов. Обе группы обучались у одного преподавателя, использовались одна и та же учебная программа и учебник. Группам были предложены предварительные тесты навыков говорения и чтения, чтобы проверить понимание прочитанного и уровень говорения учащихся перед перевернутым обучением. Затем экспериментальная группа обучалась в формате перевернутого класса в течение 8 занятий. Наконец, обеим группам были предложены последующие тесты навыков понимания прочитанного и говорения, чтобы выяснить значимые различия между ними. Результаты показали, что экспериментальная группа превзошла контрольную группу по пониманию прочитанного ($p = .004$, $p < .05$) и навыкам говорения ($p = .003$, $p < .05$). Кроме того, мы обнаружили, что экспериментальная группа во время перевернутого обучения продемонстрировала большее улучшение навыков говорения по сравнению с чтением.

Ключевые слова: Изучающие английский язык как иностранный; Перевернутое обучение; Язык; Понимание прочитанного; Навык говорения; Технологии

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INTRODUCTION

New forms of instruction have emerged that are now influencing education positively as they induce students to learn independently. Nowadays, the trend is toward using more technology in education. Indeed, technology in education is an ever-evolving process and demands that students and instructors adapt to the emerging technologies in education. By utilizing various technological devices, the learners can study in different locations and times through collaborative distance learning. Therefore, living in a digital age and using various technological tools, many learners know how to work independently and collaboratively before coming to the classroom. This positive impact of technology has influenced the development of instructional technology in education and replaced the blackboard by online video lectures (Evans, 2011). Moreover, the traditional learning approach which focuses on the instructor at the center of knowledge-transmission is irrelevant in today's digital age (Wang & Heffernan, 2010). The recent pedagogical trend of flipped classroom instruction shifts direct instruction from the group space (face-to-face learning) to individual learning (online individual learning). Moreover, it provides students with direct access to video lectures, slides, and other teaching resources on online educational platforms. Therefore, students are given more opportunities to apply the knowledge they have acquired in the real-life situations of a collaborative learning environment which results in more learning interactions, improving students' achievement and boosting critical thinking. Indeed, blended learning is one of the prominent applications so far that creates a learning environment which affords better achievements (O'Flaherty & Philips, 2015). It can be said that the flipped classroom is a part of blended learning in which students have control over 'time, place, path and/or pace' during the learning-process (Staker & Horn, 2012). Besides, they are active participants in that process (Hamdan, et al, 2013). However, flipped learning is different from "Distance Learning" or "E-learning." While students learn contents completely online in Distance Learning and E- learning, students in a flipped learning environment deliver the learning materials or video lectures online, and they dedicate classroom hours to feedback and collaborative learning with teacher and peers. Flipping the classroom reinforces the idea that learning is not restricted to 'brick-and-mortar location' establishments (Staker & Horn, 2012).

Although flipped instruction was a good alternative to face-to-face instruction during the COVID-19 pandemic, it is not common in the Iranian educational system. Both teachers and students are accustomed to face-to-face methods of teaching and learning. Moreover, the speed of the internet is low in some especially rural areas which makes online teaching difficult. In addition, classrooms for teaching English have a number of limitations including incompetent teachers, insufficient time, sources, and materials, lack of technology, and anxiety in EFL learners (Hashemifardnia et al., 2018). Irrespective of all these problems and perhaps as part of their solution, this study focuses on the effectiveness of using flipped instruction in respect to Iranian intermediate EFL learners'

reading comprehension and speaking skills. Although. there have been numerous studies that provide evidence for the benefits of flipped instruction, many of these suffer from a questionable methodology (e.g. inference from a small number of student responses). Despite difficult external conditions, this research aims to establish the effect in a rigorous controlled experiment. It affords conclusions about the impact of flipped instruction on student engagement, comprehension, and overall academic performance in diverse learning environments. Thus, this research poses the following questions:

Q1. Does flipped instruction have a statistically significant effect on intermediate EFL learners' reading comprehension?

Q2. Does flipped instruction have a statistically significant effect on intermediate EFL learners' speaking skill?

Based on these questions and the ensuing research, the following hypotheses are to be evaluated.:

H01: Flipped instruction does not have a statistically significant effect on intermediate EFL learners' reading comprehension.

H02: Flipped instruction does not have a statistically significant effect on intermediate EFL learners' reading comprehension.

If the observed effects are statistically significant, these negative hypotheses can be rejected and the opposite assumed to hold:

LITERATURE REVIEW

Flipped instruction is a pedagogical model in which traditional lecture, homework elements, and roles are reversed. Through flipped instruction students are immersed in responsive learning environments that are designed to prepare and motivate them to confidently undertake assessment tasks. They do so interactively by way of feedback loops that are strategically embedded at all stages of the learning process. Tareq Mitib Murad (2009) was one of the pioneers of using flipped instruction in teaching language skills. He investigated the effect of flipped learning for improving the speaking ability of Palestinian secondary learners and their attitudes towards English. His statistically significant findings showed that flipped instruction noticeably improved the speaking ability of the learners in the experimental group; also, their attitudes towards English were affected positively.

Jamie Betry, as cited in Tran Thi Thanh Quyen and Nguyen Van Loi, studied the use of technology in preparing EFL students for oral presentations. The students in the experimental groups had to go to the school's computer lab to search for information on their presentations' topics. When the content was prepared and ready, they learned to work with the program 'Audacity', which allowed them to hear their own voice. Then, they used flip cameras to prepare for their presentations. By this way, the partners recorded each other and reviewed the video clips so that they could comment and learn from one another. Meanwhile, the control group followed the traditional instructional method. The outcomes revealed that the use of technology during preparation made

presenters more confident (Quyen & Loi, 2018). The study by Mireille Farah (2014) showed that the flipped classroom was an effective instructional method to improve twelfth-grade Emirati female students' IELTS (International English Language Testing System) writing performance. He also examined their perceptions of the flipped instruction in a writing setting for ESL (English as a Second Language). The results indicated a significant difference between the mean scores in favor of the experimental group, and students' positive attitudes towards this model. Marion Engin (2014) carried out research in which the researcher combined flipped instruction with second language writing skills. The researcher expected students to create their own videos on how to learn second language writing skills. The aim of the research was to make students active participants in the learning process. The study showed that student-created videos promoted learning and accuracy in English.

Arash Hashemifardnia, Ehsan Namaziandost and Sajad Shafiee investigated the impact of the flipped classrooms on reading comprehension among Iranian secondary school students. Researchers placed an experimental group of respondents in a flipped classroom. The flipped classroom was fully equipped with internet, computers, and projectors. Students had to read each text and discuss it with their classmates before coming to class. The control group, on the other hand, was taught in a traditional classroom. Results showed that the experimental group significantly outperformed the control group in the post hoc test ($p < 0.05$). Similar to this research, Uraiwan Sae-Ong 's (2010) and Shakiba Zarinfard, Mehrak Rahimi and Ahmad Mohseni (2020) also claimed that the flipped classroom had significant effect on the development of English reading comprehension. In related research Sabahattin Yeşilçınar (2019) examined the effect of the flipped classroom model (FCM) on the English-speaking skills of adult EFL learners who were not majoring in English. It was concluded that the participants were positively affected both in their speaking skill and in their attitude towards learning English. Mohamad Yahya Abdullah, Supyan Hussin and Kemboja Ismail also probed whether flipped classrooms have a significant impact on English-speaking performance. In a paper entitled "Implementation of Flipped Classroom Model and its Effectiveness on English Speaking Performance" they reported that FCM allowed for a more significant development than that of peers who received traditional instruction (Abdullah et al., 2019). They argued that flipped classrooms play a very positive role in the development of speaking skills.

Despite these positive findings, Manal Al-Ghamdi and Abdullah Al-Bargi (2017), found that flipped classrooms had no significant effect on the speaking skills of EFL Saudi learners. They mentioned that it may be because the population of their study was small. Mojdeh Shirvani, Ahmad Mohseny and Gholamreza Abbasian (2022) also investigated the impact of flipped instruction on EFL students' conversational skills and attitudes towards flipped learning. Four intact classes of 60 EFL students were divided into control and experimental groups. The results showed that flipped instruction had a

positive effect on the conversational skills of EFL students. It was also found that the attitude of the participants in the experimental groups towards inverted flipped classroom changed in a positive direction.

The review of the literature thus indicates that flipped classrooms have a significantly more positive impact on learners' achievements than traditional classrooms. This study adds to this literature with respect to Iranian EFL students' reading comprehension skill and speaking ability. It seeks to solidify previous results by showing how one can overcome problems of self-selection and small populations through the rigorous and transparent experimental design and significance testing.

METHODOLOGY

Research Design

Quasi-experimental design was used in the current study. The rationale behind using such a design residesin the fact that there was no random selection of subjects. The design includes the following main stages: 1) subject selection via administration of the Nelson Placement Test, 2) exposing participants to the pre-tests, 3) treating the experimental groups of the study to flipped instruction 4) conducting the post-tests. The design of the present study is diagrammatically illustrated below in figure 1:

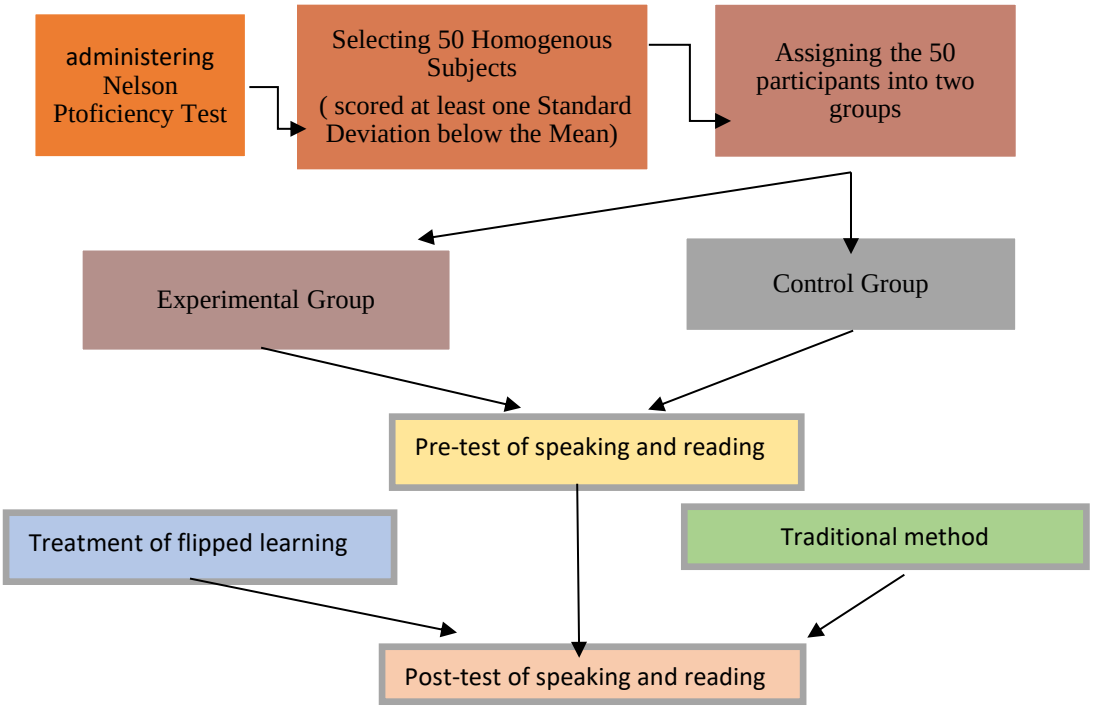

Figure 1. The Diagram of the Design of the Study

Participants

The participants of the study were 50 female students at "Koosha Institute" in Langarud, Guilan, their ages ranging from 11 to 16 years old. The teacher selected the participants based on her prior acquaintance with them. Therefore, the participants were already familiar with the procedure of the classes. The participants first took the Nelson proficiency test, then were assigned to the experimental and control groups. There were 25 students in the experimental group and 25 students in the control group. Both groups were taught by the same teacher and used the same syllabus and textbook.

Materials

To investigate the research questions of the present study, a few instruments were used. First, the Nelson proficiency test was used in order to homogenize the learners. After dividing the participants into experimental and control group, they had 8 „treatment sessions." Having finished these sessions, the Preliminary English Test (PET) of speaking (pre-post) and the TOEFL reading comprehension (pre-post) were administered.

Nelson Test

The Nelson Test was developed by William Fowler and Norman Coe. The test was constructed to measure the language proficiency of students. The Nelson English language proficiency test (400 A) (Fowler & Coe, 1976) consists of 50 multiple-choice items organized in four parts: grammar (two sections), vocabulary, and reading comprehension. The time allotted is 40 minutes. The reliability of the Nelson proficiency test (1976) was reported to be 0.87. The researchers selected participants based on non-random convenience sampling. They participated in a homogeneity test (Nelson) and participants whose scores were one standard deviation above and one standard deviation below the mean were selected. From the 50 participants that were selected as the result of this test for homogeneity, 25 were assigned to the control group and 25 served as the experimental group.

Speaking (Pre-/Post-Test Preliminary English Test)

PET is a test which has four parts including reading, speaking, writing and speaking. It includes; 35 items in 5 sections for reading comprehension, 7 items in 3 sections for writing, 25 items in 4 sections for listening, 25 items in 4 sections for speaking. In the present study only speaking sections was utilized. The researchers got help from two raters to evaluate speaking ability of EFL learners. The speaking section of PET consists of four parts. In part 1, each candidate interacts with the interlocutor which takes 2-3 minutes. In part 2, the candidates interact with each other. Making and responding to suggestions, discussing alternatives, making recommendations and negotiating agreement. Part 3 is the extended turn, and the candidates respond to photographs and mange discourse in a longer term. And finally, part 4 is a general conversation where

candidates talk about their likes/dislikes, preferences, experiences, habits, etc. The raters awarded a mark for the performance as a whole, using the Global Achievement scale. The assessor awards marks based on for four criteria:
- Grammar and Vocabulary
- Discourse Management
- Pronunciation
- Interactive Communication.

Reading comprehension (pre-/post-test)

For reading tests, two articles from “In-a-flash: Reading for the TOEFL Test,” (Broukal, 2002) were selected and used. The aim of the pre-test was to test students‘ reading comprehension level before the flipped instruction. The pre-test consisted of 20 multiple-choice items. Items 1 and 11 were designed to test the main idea and topic. Items 2, 3, 10, 14, 15, 17, and 19 are detailed questions. Item 4, 5, 6, and 14 are inference questions. Items 7, 8, 9, 16, and 18 were designed to test students' abilities to guess the meaning of a new word in English. Item 12 is designed to test students' abilities to understand the author’s intention. Item 20 is designed to test whether students can recognize the writing pattern used in the text. As for the post-test, another two articles from " In-a-flash: Reading for the TOEFL Test " were chosen. The aim of the reading comprehension posttest was to analyze if the students make any improvement after the flipped instruction. The post-test consisted of 20 multiple-choice items. Items 5 and 13 were designed to test the main idea and topic. Items 2, 3, 4, 16, 17, 18, and 20 were detailed questions. Items 1, 12, and 15 were inference questions. Items 6, 8, 10, 11, and 19 were designed to test students' abilities to guess the meaning of a new word in English. Items 7, 9, and 14 were reference questions. Only the multiple-choice questions were selected as test questions in order to enhance the objective comparability of pre-test and post-test.

Procedure

At the beginning of the experiment, the Nelson proficiency test was administrated by the teacher, and it would be completed by the experimental and control groups to exclude that there were significant differences between them regarding their proficiency levels in L2 reading and speaking. The 50 students were assigned into two groups, experimental and control groups. During the implementation of the research process, the experimental and control groups were instructed through reading procedures and conversation using the same teaching schedule and textbook. Two groups were assigned to be taught in either the flipped learning method (Experimental group) or a traditional way of teaching (Control group). In flipped classes, the teachers taught the materials through video calls at home. The teachers delivered lessons via video conferencing from students‘ homes. This means that students could engage with the teachers live during these sessions, allowing for real-time interaction, questions, and discussions, while still having the flexibility to learn the content at their own pace. This approach combines

online learning with personal instruction, making it a hallmark of the flipped classroom model. In online classes, they also learned to prepare materials, listened to audio clips, watched and summarized videos, and played games. In particular, they played the "Call of Duty“-game online which helped them have some conversations in English. In addition, the teachers assigned short videos on relevant speaking topics (e.g., pronunciation, conversation starters) for students to watch before class. This could involve watching videos of native speakers, listening to dialogues, or practicing pronunciation exercises. In class, they practiced speaking on chosen topics. During face-to-face sessions, students engaged in discussions, pair work, role-plays and collaborative learning.

In the same way reading comprehension practices were carried out during treatment sessions. The teachers provided students with reading materials (articles, short stories, or digital texts) to read at home. This also included videos prepared by the researchers that had summarized key concepts or discussed the themes of the texts. The teachers also introduced some online games or apps related to the reading material. For example, students could play a vocabulary-building game (Quizlet) or a comprehension quiz (Kahoot) to reinforce their understanding. Besides, students were asked to create video responses to their readings, discuss themes or characters. These were shared in class to promote further discussion. During the class, students took turns reading sections of the text aloud and summarized what they had read. They chose characters from the reading and acted out scenes.

In traditional classes, the students followed the conventional routines of the institute which was the common instruction and practice in class and there was only homework. For speaking class, the teachers assigned and introduced some topics for students to research and present to the class, focusing on organization, clarity, and engagement. Similarly, in reading class, teacher-centered instruction was applied to systematically build foundational reading skills. The instructors, read texts to the students, focused on the meaning of words and the comprehension of texts. Students then completed exercises and worksheets to practice reading skills and reinforce vocabulary and comprehension through repetition.

After the experiment, the students completed a post-test to evaluate whether and to what extent flipped instruction has impacted the experimental group’s speaking and reading skill.

DATA ANALYSIS

Quantitative methods were used to evaluate the students’ scores in tests. The data obtained from the scores of pre-tests and post-test were analyzed through the Statistical Package for Social Sciences (SPSS). An independent samples t-test was used to compare the results of the control and experimental groups. This test was used since the groups

were normally distributed. The final results are shown in the tables and their interpretation provided.

Reliability Statistics

As Table 1 shows, the reliability index for the Nelson test consisting of 50 items was assessed at 0.91 using KR-21. Moreover, the reliability values for the pre- and post-Speaking-Test were assessed to be 0.82 and 0.83 respectively using the Pearson correlation coefficient (inter-rater reliability). In addition, the reliability values for pre and post reading tests were assessed at 0.85 and 0.86 respectively using Pearson correlation coefficient (inter-rater reliability). Therefore, all three instrument used in this study have acceptable reliability index.

Table 1. Reliability Statistics of the Instruments

Instruments	No. of items	Reliability Method	Reliability Index
Nelson Test	50	KR-21	0.91
Speaking Test (Pretest)	25	Cronbach's Alpha	0.82
Speaking Test (Posttest)	25	Cronbach's Alpha	0.83
Reading Test (Pretest)	20	Cronbach's Alpha	0.85
Reading Test (Posttest)	20	Cronbach's Alpha	0.86

As mentioned, the researchers applied convenience sampling in the present study, thus the Nelson test was given to both experimental and control groups to check whether both groups were homogeneous regarding English language proficiency or not. Table 2 manifests the results of descriptive statistics for both groups' Nelson scores.

Table 2. Descriptive Statistics and Normality Test of the Two Groups' Nelson Scores (N = 50*)*

Group	Mean	*SD*	Skewness	Std. Error	Skewness Ratio	Kurtosis	Std. Error	Kurtosis Ratio
Experimental	31.43	5.237	.343	.427	0.803	-.324	.833	-0.388
Control	30.67	4.787	-.121	.427	-0.283	-.467	.833	-0.560

Table 2 shows the mean score and standard deviation for the experimental group ($\bar{x}$ = 31.43, *SD* = 5.23) and the control group ($\bar{x}$ = 30.67, *SD* = 4.78). Moreover, Table 2 notifies that the Nelson scores for both experimental and control groups have normal distribution, as the skewness ratios of the two groups' scores over their respective standard errors do not go beyond the ranges of +/- 1.96. An independent sample *t*-test was performed to compare the Nelson scores of both experimental and control groups (Table 3).

Table 3. Independent Samples T-test for Two Groups' Nelson Homogeneity Test Scores

Levene's Test for Variances			T-test for Means			
	F	*Sig.*	*T*	*Df*	Sig. (2-tailed)	Mean Diff.
Equal variances assumed	.130	.720	.592	58	.556	.767
Equal variances not assumed			.592	57.539	.556	.767

Table 3 indicates that the hypothesis of equality of variances is confirmed, as the significance level of .72 from Levene's test exceeds the selected significance level of .05 for this study. On the basis of the results in Table 3, an independent sample *t*-test failed to find any statistically significant difference (*t* (58) = .59, *p*= .55, *p*>.*05*) in the Nelson measures for the experimental ($\bar{x}$ = 31.43) and control ($\bar{x}$ = 30.67) groups, in which the *t*-observed is lower than the *t*-critical of 2.00. That means the students in the experimental and control groups have very similar levels of English language proficiency. Figure 2 depicts the English Nelson results for both groups. The figure demonstrates the students' performance on the Nelson test was nearly identical for the two groups.

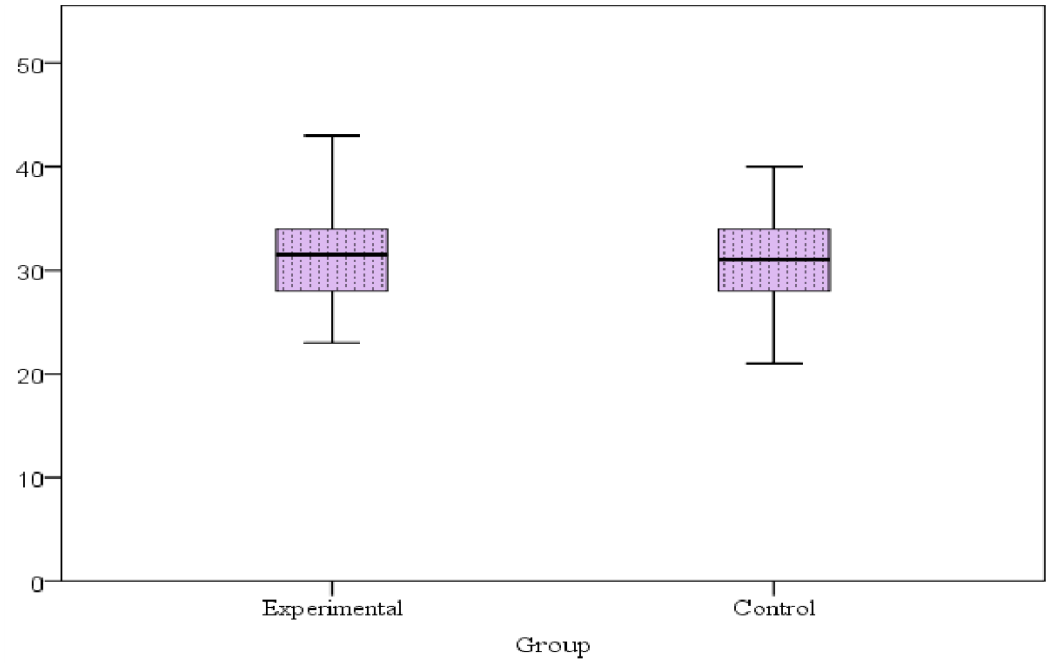

Figure 2. Two groups' Nelson test means

Investigation: First Research Question

The purpose of the first research question was to find out whether and to what extent flipped instruction affects reading comprehension of Iranian EFL learners. The researcher conducts an independent sample *t*-test for investigating this research question.

The assumptions of interval data, independence of subjects, normality and homogeneity of variances were met before the researcher applied parametric tests (independent samples and paired-samples *t*-tests). The first assumption was not violated because the present data were measured on an interval scale. Further, the assumption of independence of subjects is satisfied as the performance of any given individual is independent of the performance of other individuals. Finally, the assumption of normal distribution of the data was checked using the one-sample Kolmogorov-Smirnov test (Table 4).

Table 4. One-Sample Kolmogorov-Smirnov Test of Normality for Reading Comprehension Scores

Time	Group	N	Kolmogorov-Smirnov Z	Sig. (2-tailed)
Pre-test	Experimental	25	.529	.921
	Control	25	.399	.967
Post-test	Experimental	25	.805	.536
	Control	25	.613	.844

According to Table 4, the two reading comprehension pre-test scores for both experimental group (p = .92, p > .05) and control group (p = .96, p > .05) have normal distribution. Moreover, the reading comprehension post-test scores for both experimental group (p = .53, p > .05) and control group (p = .84, p > .05) exhibit normal distribution. Hence, the researcher was justified to apply independent samples *t*-test and paired samples *t*-test as two parametric statistical tests in this study. The related descriptive statistics were prepared (Table 5) before discussing the *t*-test results.

Table 5. Descriptive Statistics of Two Group's Reading Comprehension Scores (Pre-test)

Group	*N*	Mean	*SD*	Std. Error Mean
Experimental	25	2.664	.323	.059
Control	25	2.594	.295	.053

As Table 5 represents, the mean and standard deviation of the experimental ($\bar{x}$ = 2.66, *SD* = .32) and control ($\bar{x}$ = 2.59, *SD* = .29) groups on the pre-tests of reading comprehension skill. Table 6 below demonstrates the independent *t*-test results comparing the experimental and control groups' reading comprehension skill scores on the pre-test.

Table 6. Independent Samples T-test for Reading Comprehension (Pre-test)

Levene's Test for Variances			*T*-test for Means			
			T	*Df*	*Sig.* (2-tailed)	
Factor	*F*	*Sig.*				Mean Diff.
Equal variances assumed	.950	.334	.871	58	.387	.069
Equal variances not assumed			.871	57.541	.387	.069

According to Table 6, the equality of variance assumption holds since the significance level (.33) for Leven's test is above .05. Also, the table indicates that there was no statistically significant difference (t (58) = .87, p = .38, p> .05) in reading comprehension scores for experimental ($\bar{x}$ = 2.66) and control ($\bar{x}$= 2.59) groups on the pre-test, in which the *t*-observed was less than the *t*-critical (2.00). So, the researcher came to the conclusion that the students in the two groups have the same level of reading comprehension at the outset of the study. In addition, the researcher performed another independent *t*-test (Table 7) to compare experimental and control groups' reading comprehension scores on the post-test.

Table 7 Descriptive Statistics of Two Group's Reading Comprehension Scores (Post-test)

Group	*N*	Mean	*SD*	Std. Error Mean
Experimental	25	2.833	.215	.039
Control	25	2.643	.268	.049

Table 7 represents the mean and standard deviation of the experimental group ($\bar{x}$ = 2.83, *SD* = .21) and control group ($\bar{x}$ = 2.64, *SD* = .26) on the post-test of reading comprehension. According to Table 8 below, the significance level (.29) associated with Leven's test is less than.05, so the assumption of the equality of variance holds.

Table 8. Independent Samples T-test for Reading Comprehension (Post-test)

Levene's Test for Variances			*T*-test for Means			
Factor	*F*	*Sig.*	*T*	*Df*	*Sig.* (2-tailed)	Mean Diff.
Equal variances assumed	1.125	.293	3.035	58	.004	.19067
Equal variances not assumed			3.035	55.399	.004	.19067

As seen in Table 8 above, the independent *t*-tests found a statistically significant difference (t (58) = 3.03, p = .004, p < .05) in reading comprehension scores for experimental ($\bar{x}$ = 2.83) and control ($\bar{x}$ = 2.64) groups on the post-test, in which the *t*-value of 3.03 is below the *t*-critical value of 2.00. Subsequently, the first null hypothesis of the study that says "Flipped instruction does not have an effect on reading comprehension of Iranian EFL learners" was rejected, and thus the researchers can claim that flipped instruction influences Iranian EFL learners' reading comprehension.

In order to show the results more clearly, the researchers draw a box plot (Figure 3). As the figure shows, the students in the experimental group have expressed extensively higher stage of English reading comprehension than those in the control group on the post-test in the condition that the two groups showed almost similar reading comprehension level at the onset of the course.

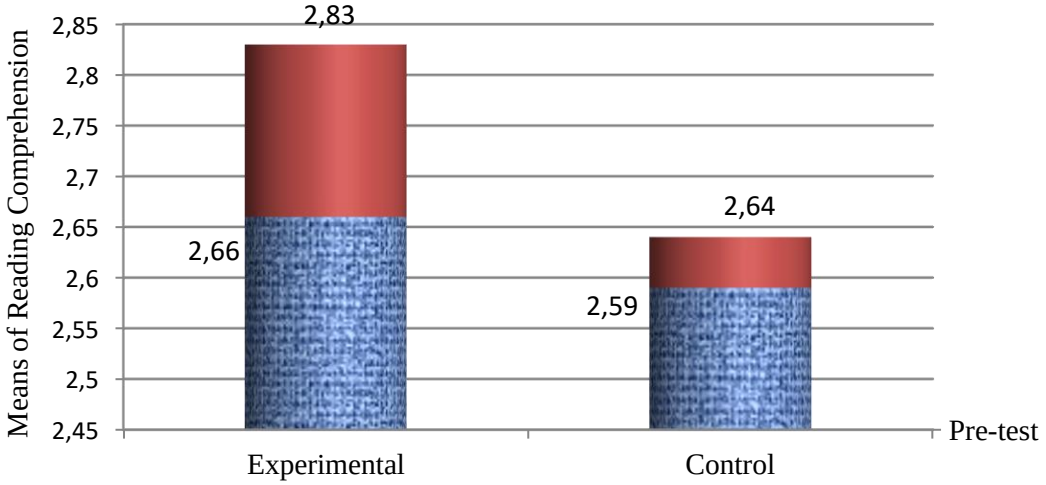

Figure 3. The two Groups' Means on Reading Comprehension (pre-test &post-test)

For further analysis, a paired samples *t*-test was run comparing the reading comprehension means on the pre-test and post-test in each group. The results are laid out in Table 9.

Table 9 Paired Samples Test for Pre-test and Post-test of Reading Comprehension in Two Groups

	Gained Score	*SD*	95% Confidence Interval of the Difference		*t*	*Df*	Sig. (2-tailed)
Group			Lower	Upper			
Experimental	.169	.351	.038	.301	2.641	29	.013
Control	.048	.335	-.076	.174	.794	29	.434

Table 9 clarifies that paired samples *t*-test detected a statistically significant increase (t (29) = 2.64, p = .01, p < .05) in reading comprehension scores from pre-test ($\bar{x}$= 2.66, *SD* = .32) to post-test ($\bar{x}$ = 2.83, *SD* = 21) in the experimental group. Here, the gained score in reading comprehension was 0.16 (out of 4), with a 95% confidence interval ranging from 0.038 to 0.301." Inversely, the *t*-test failed to find any statistically significant increase (t (29) = .79, p = .43, p > .05) in reading comprehension measures from the pre-test ($\bar{x}$ = 2.59, *SD* = .29) to post-test ($\bar{x}$ = 2.64, *SD* = .26) in the control group. In other words, here the gained score was only .05 (out of 4) with a 95% confidence interval ranging from -.076 to .174.

Investigation: Second Research Question

The second research question of this study aimed at seeing if flipped instruction affects Iranian EFL learners' speaking skill. In order to investigate this research question, an independent sample *t*-test was conducted.

Table 10. One-Sample Kolmogorov-Smirnov Test of Normality for Speaking Skill Scores

Test	Group	*N*	Kolmogorov-Smirnov *Z*	Sig. (2-tailed)
Pre-test	Experimental	25	.690	.728
	Control	25	.698	.714
Post-test	Experimental	25	.505	.943
	Control	25	.692	.724

Table 10 shows that the two speaking skill pre-test scores for the experimental group (p = .72, p > .05) and the control group (p = .71, p > .05) are normally distributed. Besides, as observable in the table, the speaking skill post-test scores for both experimental group (p = .94, p > .05) and control group (p = .72, p > .05) have normal distribution. This legitimitates utilizing the independent samples *t*-test and paired samples *t*-test as two parametric statistical tests.

Table 11 shows the mean and standard deviation of the experimental and control groups on pre-test of speaking skill.

Table 11. Descriptive Statistics of Two Group's Scores on the Speaking Pre-test

Group	*Time*	*N*	Mean	*SD*	Std. Error Mean
Experimental	Post-test	25	13.033	1.804	.329
	Pre-test	25	15.467	1.4735	.3521
Control	Post-test	25	12.650	1.468	.268
	Pre-test	25	14.267	1.5588	.2874

Table 12 below reflects the result of the independent *t*-test that was carried out to compare the speaking skill scores of experimental and control groups on the pre-test of speaking skill. As is evident from the table, the significance level (.17) associated with Levene's test was more than .05, implying that the assumption of equality of variance is met.

Table 12 Independent Samples Test for Two Groups' Scores on Speaking Skill Pre-test

Levene's Test for Variances			T-test for Means			
			t	*df*	Sig. (2-tailed)	
Factor	*F*	*Sig.*				Mean Diff.
Equal variances assumed	1.925	.171	.902	58	.371	.383
Equal variances not assumed			.902	55.703	.371	.383

As a glance at Table 12 shows, *t*-value and significance level (t (58) = .90, p = .37, p> .05) are indicative of no significant difference in speaking scores for experimental ($\bar{x}$ = 13.03) and control ($\bar{x}$ = 12.65) groups on the pre-test. In fact, the *t*-observed value is below the *t*-critical value of 2.00; thus, the students in the two groups had approximately the same level of speaking skill at the beginning of the study.

Table 13 reflects the mean and standard deviation of the experimental ($\bar{x}$ = 14.66, *SD* = 1.42) and control ($\bar{x}$ = 13.48, *SD* = 1.50) groups on the post-test of speaking skill.

Table 13 Descriptive Statistics of Two Group's Scores on the Speaking Skill Post-test

Group	*N*	Mean	*SD*	Std. Error Mean
Experimental	25	14.667	1.428	.260
Control	25	13.483	1.499	.273

The results of the independent *t*-test that was performed to compare experimental and control groups' speaking skill scores on the post-test are set forth in Table 14.

Table 14 Independent Samples Test for Two Groups' Scores on Speaking Skill Post-test

Levene's Test for Variances			T-test for Means			
Factor	*F*	Sig.	*T*	*Df*	Sig. (2-tailed)	Mean Diff.
Equal variances assumed	.006	.939	3.129	58	.003	1.183
Equal variances not assumed			3.129	57.862	.003	1.183

A cursory look at Table 14 indicates that the assumption of equality of variance holds (p = .93, p > .05). Additionally, an independent *t*-test found a statistically significant difference (t (58) = 3.12, p = .003, p< .05) in speaking skill measures for the experimental group ($\bar{x}$ = 14.66) and control group ($\bar{x}$ = 13.48). Also, the *t*-observed value was below the *t*-critical value of 2.00. Accordingly, the second null hypothesis was rejected that states, "Flipped instruction has no significant effect on developing Iranian EFL learners' speaking skill" and thereby accepted that flipped instruction enhances Iranian EFL learners' speaking skill. A bar graph (Figure 4) was drawn to illustrate the results of both pre-test and post-test. Figure 4 shows that the experimental group's average score in speaking skills is significantly higher than the control group's one.

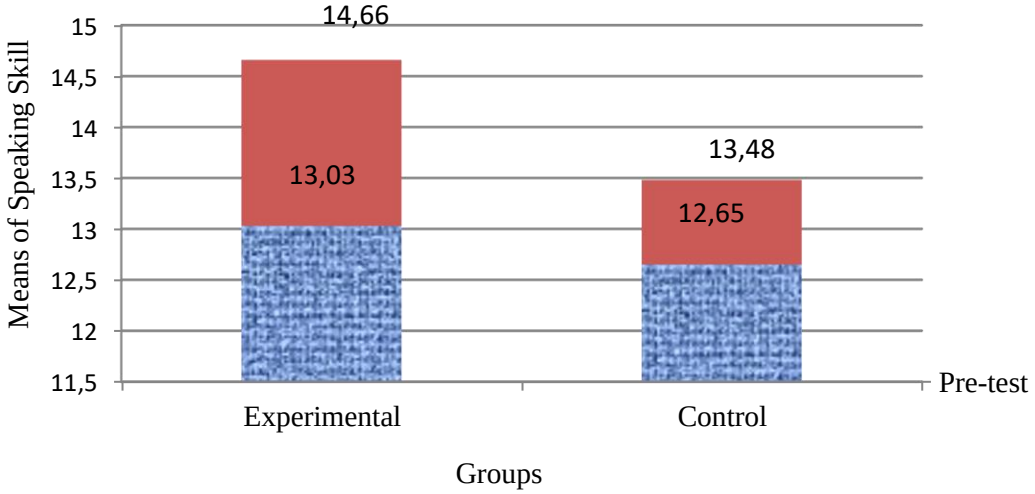

Figure 4. Mean Scores of the Two Groups on Speaking Skills (Pre-test and Post-test)

For more exploration, the researchers conducted a paired samples *t*-test (Table 15) comparing speaking skills on the pre-test and post-test in each group.

Table 15 Paired Samples Test for Pre-test and Post-test of Speaking Skill in Two Groups

	Gained Score	*SD*	95% Confidence Interval of the Difference		*t*	*Df*	Sig. (2-tailed)
Group			Lower	Upper			
Experimental	1.633	1.580	1.043	2.223	5.659	29	.000
Control	.833	1.713	.193	1.473	2.663	29	.012

As observable in Table 15, the paired samples *t*-test detected a statistically significant increase (t (29) = 5.65, p = .000, p < .05) in speaking skill scores from pre-test ($\bar{x}$ = 13.03, *SD* = 1.80) to post-test ($\bar{x}$ = 14.66, *SD* = 1.42) in the experimental group. The gained score in speaking skill scores was 1.63 (out of 20) with a 95% confidence interval ranging from 1.043 to 2.223. Also, as it is evident from Table 15, *t*-test results indicated that there is a statistically significant increase (t (29) = 2.66, p = .01, p < .05) in speaking skill scores from pre-test ($\bar{x}$ = 12.65, *SD* = 1.46) to post-test ($\bar{x}$ = 13.48, *SD* = 1.50) in the control group as well. In fact, the gained score was .83 (out of 20) with a 95% confidence interval ranging from .193 to 1.473. Generally, the two groups promoted the development of speaking skill, however, the gained score in the experimental group (1.63/20) was considerably higher than in the control group (.83/20).

DISCUSSION

The obtained results reveal that flipped instruction enhances EFL learners' reading comprehension and speaking skill. Based on the evidence presented in the tables, the experimental group in reading had a pre-test and post-test score of (2.6<2.8) as shown in Figure 3. Regarding speaking skills, also, there was a significant increase in the score (13.03<14.66) as shown in Figure 4, it also became evident that the observed improvement was greater in speaking skills than reading.

In contrast to Al-Ghamdi and Al-Bargi's (2017) study which asserted flipped classrooms had no significant effect on the speaking of EFL Saudi learners, we found that FCM affects students' speaking fluency. Thus, the findings support the investigations of Murad (2009), Yeşilçınar (2019), and Shirvani et al., (2022) which claimed that FCM improves English learners' speaking ability and their attitudes towards learning English. Thus language teachers can employ different types of strategy in their teaching of speaking skills. In fact, teachers need to be aware of different learning preferences and move from their current teaching methods towards more student-centered methods. By

shifting students from passive to active learning, flipped learning provides opportunities for developing speaking skill since it affords more opportunities for communicative exercises among learners or between educator and learners. Also, class time can be utilized more fruitfully and inventively (Teng, 2018; Fulton, 2012). Regarding reading ability, the findings corroborate some studies (Sae-Ong, 2010; Hashemifardnia et al., 2018; Zarinfard et al., 2020) in that using flipped learning improved students' reading and comprehension skills. At the same time, this method was more suitable for strengthening reading skills and understanding the general content and meaning of texts, with less focus on smaller reading units such as vocabulary and grammar. The learners were able to effortlessly grasp the theme of the reading which includes recognizing the subject, key concept, and supporting details.

By utilizing technologies such as video calls, games, and recorded videos, the flipped classroom method can enhance understanding and engagement. These technologies also provide opportunities for practice and real-time feedback, which can be helpful for the development of skills such as speaking. Making it easier to express oneself, video calls may reduce anxiety in learners compared to in-person interactions. Applying these technologies also makes learners more autonomous or independent because they study learning topics before coming to class.

Since flipped instruction appeals to students' curiosity, it encourages activity. Furthermore, students are taught critical thinking, team work, communication skills, creative and also innovative thinking (Arif Rahman Hakim et al, 2023). Flipped learning allows teachers and students to explore the deeper knowledge dimensions inside the classroom, because the basic knowledge a student needs is already reached in anticipation of the in-class face-to-face session. Therefore, technologies like visual learning and online games can aid understanding and retention and motivate individuals to read more by introducing them to new topics or genres. They prompt students to engage with various texts or quizzes which can enhance comprehension. Overall, this research affirms that the flipped classroom is based on the constructivist model in which learning is an active and social process.

The main objective of this study was to investigate developing reading comprehension and speaking skills through flipped instruction on Iranian intermediate EFL learners. The findings proved the positive influence of flipped instruction on reading and speaking ability. Our research has two specific limitations as well as two related research suggestions for future work. The first limitation of the study was the small number of participants at hand for conducting the study. The rigorous control of homogeneity so as to achieve significance does not fully compensate when it comes to generalizability from small samples of participants. The second limitation was the choice of female participants only. Since there were not enough male students to create a balance between genders, the researchers chose females only. This limitation can influence the result and restrict generalizability as well. Further studies need to be conducted with larger sample sizes and gender distributions in different educational settings.

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Research article

Ethical Reflections on Persuasive Technology

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Abstract

Persuasive technology arose as a new kind of interdisciplinary field of arts and science. Techniques and technologies of persuasion traditionally involved oral or written language, be it for the presentation of arguments or for rhetorical strategies and seductive slogans. In contrast, the term now refers to a human-computer interaction technology that has the ability to influence or even to change people's perceptions, attitudes, or behaviors. There is a wide range of applications with significant social impact. However, the novelty, concealment, polymorphism, and other characteristics of AI products with persuasive functions will conceal their intentions, limit the free choice of their users, put their users in a disadvantaged position, and might even prove to be addictive. In order to avoid or mitigate these problems, it is necessary to conduct an ethical examination of the development and application of persuasive technology. At the same time, the indeterminacy or uncertainty of data-driven algorithmic systems and the multiple moral agents associated with computing products have made traditional assessments difficult. We can't cope with these challenges, until we have gone beyond the dichotomy between theoretical and applied ethics, expanding the semantic and pragmatic scope of the concept of responsibility. Regarding the ethics of technology we need to effect a shift from an emphasis on the responsibility for passively conceived users to their actively taking responsibility, and establish a new conceptual framework of ethics for the human future.

Keywords: Human-computer interaction; Data-driven algorithmic systems; Accountability; Ethics about the future of humanity

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Научная статья

Этические размышления о технологии убеждения

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Аннотация
Технология убеждения возникла как новый вид междисциплинарной области искусства и науки. Методы и технологии убеждения традиционно включали устную или письменную речь, будь то для представления аргументов или для риторических стратегий и соблазнительных лозунгов. Напротив, в настоящее время этот термин относится к технологии взаимодействия человека и компьютера, которая способна влиять или даже изменять восприятие, установки или поведение людей. Существует широкий спектр приложений, оказывающих значительное социальное воздействие. Однако новизна, скрытность, полиморфизм и другие характеристики продуктов искусственного интеллекта с функциями убеждения будут скрывать их намерения, ограничивать свободу выбора пользователей, ставить их в невыгодное положение и даже могут вызывать привыкание. Чтобы избежать или смягчить эти проблемы, необходимо провести этическую экспертизу разработки и применения технологий убеждения. В то же время неопределенность алгоритмических систем, управляемых данными, и множество моральных агентов, связанных с компьютерными системами, затрудняют традиционную оценку. Мы не сможем справиться с этими вызовами, пока не выйдем за рамки дихотомии между теоретической и прикладной этикой, расширив семантический и прагматический охват концепции ответственности. Что касается этики технологий, то нам необходимо сместить акцент с ответственности за пассивно мыслящих пользователей на активное принятие ответственности и создать новую концептуальную основу этики для будущего человечества.

Ключевые слова: Взаимодействие человека и компьютера; Алгоритмические системы, управляемые данными; Ответственность; Этика будущего человечества

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INTRODUCTION

Many computing products or AI systems are now developed on the basis of a deep integration of computer technology and persuasion theory. They are increasingly fostering new possibilities for our life and new breakthroughs in societies driven by science and technology. These computing products, due to their persuasive capabilities, have been widely applied to many fields such as education, sports, gaming, advertising, finance, social networking, social governance, healthcare, e-commerce, environmental protection, disease management, platform management, and personal self-management – as such achieving significant social impact. The problem is that persuasive activities used to consist in one person or group persuading and inducing another person or group to change their attitude or behaviors, whereas these applications now enable such persuasive activities to be carried out through human-computer interaction systems. In view of this, one urgently needs to strengthen ethical governance and conduct an ethical examination of the development, implementation, and use of persuasive technology, so that developers and designers are guided to choose what is good in their design. This paper attempts to expound briefly the significance of persuasive technology, to reveal the ethical challenges and ethical problems caused by application of persuasive technology, and to explore the corresponding ethical governance principles, so as to deepen our ethical understanding of human-computer interaction systems.

THE SIGNIFICANCE OF PERSUASIVE TECHNOLOGY AND THE NECESSITY OF ITS ETHICAL EXAMINATION

The concept “persuasive technology” was proposed in the 1990s by B. J. Fogg who was a social scientist and the founder of the Behavior Design Lab at Stanford University. It refers to a human-computer interaction technology that can influence or even change people’s perceptions, attitudes, values, or behaviors. In other words, it refers to human-computer interaction technology that can influence and guide users' perceptions, attitudes, or behaviors, orienting them towards specific goals desired by designers, businesses or institutions. “Human-computer interaction” here refers to the interaction between people and computer systems or AI systems, rather than to the manual operation of conventional machines by people. In his book *Persuasive Technology: Using Computers to Change What We Think and Do*, published in 2003, Fogg further codified the term “Captology” to describe a new interdisciplinary field in which traditional persuasive design and computer-based techniques overlap where the word “Captology” is an abbreviation for “Computer as Persuasive Technology.” The goal of this book is to study how computer-based technology can be made more persuasive and better at changing users’ attitudes or behaviors (Fig. 1).

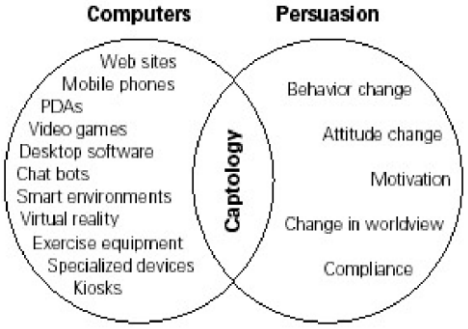

Fig. 1. Captology describes the area where computing technology and persuasion overlap (Fogg, 2003, p. 11)

Fogg entered Stanford University in 1993 as PhD student. He used the way of experimental psychology to prove that computers could change people's perceptions and behaviors in predictable ways during his doctoral studies. The title of his doctoral thesis was *Charismatic Computers: Creating More Likable and Persuasive Interactive Technologies by Leveraging principles from Social Psychology* (Fogg, 1998). Fogg founded the Persuasive Technology Lab (later renamed the Behavioral Design Lab) at Stanford University after obtaining his Ph.D. degree in 1997. He prospected in detail the research findings regarding human behavior and persuasion, and how they can be combined with computers to create a new field of persuasive technology (Fogg, 1998). His book, *Persuasive Technology: Using Computers to Change What We Think and Do*, shares experiences and provides a theoretical summary of the first decade of his laboratory research. In 2005, he received a grant from the US National Science Foundation for a project "Experimental Work Investigating How Mobile Phones can Motivate and Persuade People."[1]

Researchers from the United States, the Netherlands, Denmark, Finland, Italy, Austria, Canada. and other countries held an annual international conference about the development of persuasive technologies since 2016. The 18th conference took place in 2023. Obviously, these conferences not only extended the influence of Fogg's work, they also deepened the scope of invention and application of persuasive technologies. After attending the second conference held by Stanford University in 2007, Aaron Marcus was inspired to apply the concept design of persuasive design theory with information design/visualization theory to the software and hardware development of mobile devices. Two years later, he started a five-year (2009-2014) project to develop mobile devices in his company. Each sub-project was set a clear goal to change users' attitudes or behaviors for specific problems and application scenarios. Designers used the design techniques of "user-centered" and persuasive design. The specific design process and operational details of this project, as well as the experience of designers constitute the main content of the book *Mobile Persuasion Design: Changing Behaviour by Combining Persuasion Design with Information Design* (Marcus, 2015).

[1] https://peoplepill.com/people/b-j-fogg

Persuasive theory, which can be traced back to Aristotle's rhetoric, describes how one person influences or even changes another person's mind. Captology is the study of how these technology developers, designers, and researchers embed the findings of rhetoric, psychology, cognitive science, behavioral science, and social dynamics, such as persuasion, information extraction, behavior change, user experience, and the way of behavioral incentive, into human-computer interaction systems. This approach enables computing products to influence subtly and guide their users' behaviors to change toward specific goals favored by designers or businesses during the process of serving their users more proactively and enhancing the convenience of interaction. In fact, the various social media recommendation systems we are using currently, such as website recommendation systems, e-commerce systems, smartwatches, smartphones and other computing products, have persuasive functions.

In terms of the significance of persuasion, persuasion means that one person accepts voluntarily the opinions of another person. This voluntary acceptance stems from one's internal motivation. Persuasion is different from coercion, deception, brainwashing, etc. Coercion means exerting external pressure on a person in order to force them to change their attitudes or behaviors. Coercion may fall within the realm of education or it may be a crime. For example, the coercion of parents who force their children to change bad habits belongs to education, while criminals who force children to steal act immorally and even illegally. Also, all forms of deception are immoral or illegal. By brainwashing one indoctrinates and imposes one's values on. Rather than persuade someone to understand the truth from a standpoint of justice, brainwashing makes people change their believes of values for cultural or political purposes. Fogg defines persuasion as "an attempt to change attitudes or behavior or both (without any coercion or deception)" (Fogg, 2003, p. 16). According to Fogg, this means that the designers of persuasive technology have good intentions for the sake of their users and then embed persuasive intentions into human-computer interaction computing products in order to induce users to change their attitudes or behaviors. This kind of persuasion is internal to the products.

There are many different design ideas and approaches to developing computing products or AI systems that incorporate persuasion technology. Such as, first of all, simplification or making products simpler, that is, breaking down or simplifying complex tasks or activities, improving the benefit-to-cost ratio of users' behaviors, so that the usage of products or features becomes easier and more convenient. For example, the step counting and sorting functions of the social media platform WeChat is supposed to better motivate its users to exercise. Secondly, catering to users' preferences, that is, making computing systems to automatically predict and meet users' needs. These include, for example, algorithmic systems which automatically provide relevant information based on users' interest, consumption habits, and even geographical location. Thirdly, persuasive technologies can simulate experiences, that is, modify and improv existing design plans through vivid and visible simulation effects, such as simulation experiments for urban planning. Fourthly, there is interactive experience, that is, making users enjoy the best experience by improving their environmental perception at least in interactive computing environments. Here, for example, the computer system may always play games at a level comparable to the player so as to attract players to continue playing in e-sports games.

Finally, there is the principle of similarity, that is, increasing the user's sense of identification with a product by making the function of interactive products adapt to the user's personality This is to "persuade" users to more willing keep buying these products which can also be utilized, however, for online education tools that are designed to meet the psychological characteristics of different groups of people (Fogg, 2003, see Chapter 4 and Chapter 5).

In his book *Tiny Habits: The Small Changes That Change Everything*, published in 2019, Fogg argued the viewpoint that "behavior designs can change everything." He offered a large number of concrete examples, and elaborated on the "Fogg behavior model" for people to develop permanent habits. This model is represented by the formula B=MAP, where B represents Behavior, M represents Motivation, A represents Ability, and P represents Prompt (Fogg, 2019). This formula indicates that changes in human behavior depend on the convergence of motivation, ability, and prompt. In 2011, for example, the World Economic Forum Alliance for Occupational Health chose the "Fogg Behavior Model" as the framework for health behavior change. With the development in recent years of embedded algorithms or data-driven machine learning algorithms, the persuasive functions of persuasive technologies have become more diverse and embedded in our daily lives in a more hidden way.

Although Fogg emphasized that the initial intention of developing persuasive technology is to make human life healthier, more environmentally friendly, convenient, and enjoyable, etc., and although its overall goal is to improve human experience in every aspect and to meet people's needs, these intentions and goals imply, epistemologically speaking, a paternalistic way of thinking. They are based on the belief that users generally lack the ability to make correct choices and handle affairs, and need to be guided, reminded, or even controlled. Methodologically, persuasive technology presupposes a worldview of techno-solutionism, which gives priority or assigns special importance to the use of technology when it comes to solving human problems. At he same time, persuasive technologies are not always objective, transparent, impartial, just and so on. There have been many worrying social consequences such as racial hatred, gender discrimination, recruitment of terrorist organizations, cybercrime, privacy violations, and increased social inequality in practical applications (Noble, 2018).

These circumstances have required us to be vigilant and evaluate critically the development and applications of computing products or AI systems which include persuasive technologies. Therefore, we need to monitor and exam in the values optimized or disseminated by automated decision-making systems, so as to guide developers or vendors to lay a solid ethical foundation for the development and application of persuasive technology, and especially to prevent misuse and abuse.

Although there is a lot of discussion about the ethics of technology and governments have introduced corresponding governance principles, there are still many gaps between theory and practice. On the one hand, the stakeholders or moral agents are not trained in ethics and even do not have any systematic ethical knowledge. On the other hand, extant ethical training and ethical examination are mostly conducted in fields related to medicine, and largely neglected in technical fields based on AI. Most designers and engineers still believe that the question of value is a topic of discussion for

philosophers, sociologists, political scientists, or policy makers, and that the goodness or badness of technology lies with the users, not the inventor. According to the standard example, the invention of knives and guns does not involve value judgments, only the ways of using them does involve such judgments. Accordingly. many ethicists consider ethics of technology as applied ethics.

However, persuasive technology challenges not only this view of the neutrality of technology and the dichotomy between theoretical and applied ethics. It also challenges the corresponding conceptual framework, because the persuasion of persuasive technology products is active and context-sensitive or intrinsic: The good or evil of persuasive intention is related not only to the motivation of the designers and their methods of persuasion, but also to the technical limitations of the algorithmic systems and their path-dependencies. This concerns, for example, the question of information interaction in the human-computer interaction process, but also the addiction or gamification effects of programs that override human nature by changing users' attitudes or behaviors through automatic rewards. Therefore, revealing the ethical challenges and ethical problems brought by persuasive technology or AI systems has become a necessary aspect to regulate its development.

ETHICAL PROBLEMS CAUSED BY PERSUASIVE TECHNOLOGY AND THE ETHICAL PRINCIPLES FOLLOWED BY DESIGNERS

From the perspective of ethics, what is related to ethics is not Captology but the developmental motivations of designers, the marketing of applications and the social consequences of persuasive technologies. This is akin to the study of nuclear physics having nothing to do with ethics, in contrast to the study of atomic bomb technology. In terms of content Captology is a theoretical study, including the software architecture of persuasive systems, technical infrastructure, the design of persuasive systems, visualized interactions between human and the persuasive systems, tailored personalized persuasion and gamified persuasion, a digital marketplace which carries persuasive functions, the creation of smart environments (e.g., internet of things), and so on. In a nutshell, Captology is a specific discipline that studies how to make computer-based technology better perform its persuasive function; "Captology focuses on planned persuasive effects of technology, not on side effects" (Fogg, 2003, p. 18). In contrast persuasive technologies are to develop specific products with persuasive functions. Therefore, the relationship between Captology and persuasive technology is one in between theory and practice. The relationship among ethics, persuasion, technology, computer-based technology, Captology, and persuasive technology can be illustrated as follows (Fig. 2):

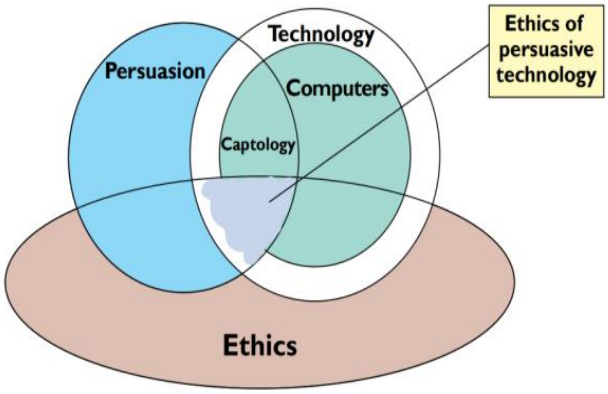

Figure 2: Convergence of ethics, persuasion, and technology. Ethical concerns extend beyond persuasive computers to all forms of persuasive technology – from the simply structural to the complex and cybernetic (Berdichevsky & Neuenschwander, 1999, p. 53).

The figure above indicates that persuasion activity based on human-computer interaction is still a value-laden activity, although persuasive technology transforms persuasion from an interpersonal relation to an interaction between human and computer or AI systems. The persuasive ways of AI system is so variable that users without specialized knowledge may not feel the persuasion activities that are carried out by increasingly intelligent algorithmic systems driven by data. The persuasive intention of the AI systems is enduring enough to make their users resonate emotionally. The persuasive process of AI systems is so adaptable as to dominate the choices of their users. The problem is, however, that these features of persuasive technology are its advantages, but at the same time they also raise some unprecedented ethical questions.

Firstly, persuasive technology may disguisedly hide or weaken its persuasive intention. The AI products that perform the task of persuasion are both a provider of method and an executor of method in the human-computer interaction system. On the one hand, this dual identity, leads to synergies with their users by the form of graphics, audio, video, animation, simulation models, hyperlinks, etc., so as to achieve the best persuasive effects. On the other hand, because of the novelty of persuasive technology, they may hide their persuasive intention and distract the attention of their users, so as to make their users accepting the information delivered by without carefully reviewing the content. In most cases, their users have no choice but to accept many of the default settings offered by the designers when they use AI products. Therefore, in the process of human-computer interaction, the choices of users are not only affected by the information content advanced by the AI system, but also depend on the presented way of content and unconscious acceptance of implicit settings (Fogg, 2003, pp. 213-215).

Secondly, persuasive technologies may potentially limit their user's right of free choice. The AI products have controlled the process of interaction in the human-computer interaction system, because their users only have the right to choose whether or not to continue an interaction, but not the right to debate or ask the AI system for clarification or explanation. When technological persuasion is applied to a person, the success of

persuasion does not depend on his or her logical reasoning ability, but on the guidance of his or her emotion. When persuasive technology is applied to a group, it is difficult for individuals to make a free choice about the persuasive purpose of the AI system, in other words, individual actions are no longer the result of voluntary choice, but are constructed. For example, a "health code" was widely used in China during the COVID-19 epidemic, in order to control the epidemic effectively. The company encourages employees to use fitness software (such as Fitbit) or persuasive activity tracking systems in the form of company benefits, in order to pay a lower insurance for each employee.

Thirdly, persuasive technology may prove so addictive so as to become a new "opium of the people." A digital environment with persuasive features not only automatically adjusts its interactive action according to the digital information about its users, but abolishes altogether the dichotomy between passive materiality and active mind. Its user has been placed in a state of being "interpreted" and "fed." Especially, the popularity of smart phones and their many apps with persuasive functions have caused many adults to become addicted to mobile phones. For children and teenagers whose emotional controls have not fully developed, their addiction, obsession, or indulgence are no longer the consequence of being weak-willed, but rather created by the designers of persuasive technologies who are exploiting their developmental weaknesses and psychological vulnerabilities. Thus, the psychological manipulation used by persuasive technologies is likely to put their physical and mental health at risk, so that we may be caught in a new type of Opium War.

Fourthly, the emotional cues of AI systems may put people at a disadvantage. In the process of person-to-person persuasion, both will often achieve a fairer and more ethical persuasion effect due to empathy. However, in the persuasive process of human-computer interaction, the emotional cues provided by AI systems will affect people's choices and judgments, because they are context- sensitive by way of picking up cues from the users and adapting to their behaviors However, the AI systems do not have real emotional resonance, because they are a material system. This asymmetry will leave their users at a disadvantage. For example, when a social interactive toy uses emotional words – such as expressions of friendship – to communicate with children, this may affect the children's feelings and actions. Whether this kind of influence is moral or not has become a focus of debate. At present, the emotional expression of AI system is a moral gray area of human-computer interaction (see Fogg, 2003, pp. 217-222, p. 105). This urgently requires that we systematically study the ethical problems caused by smart toys.

Although the four ethical problems raised by persuasive technologies are not exhaustive, they have indicated at least that one of the effective ways to avoid these problems in practice is to proactively conduct an ethical examination of the designer's design intention, the persuasive methods, the foreseeable social consequences, and the unexpected circumstances caused by the application of AI products. That is, we need to comprehensively evaluate the ethical nature of AI products by judging whether each step or aspect of it is ethical. In particular, the designers of persuasive technology should abide by the following four ethical principles of an ethics of persuasive technologies (see Berdichevsky & Neuenschwander,1999, pp. 52-58):

1. The Principle of Dual Privacy

Designers of persuasive technology must at least ensure that the privacy of their users is respected as much as their own. When a user's personal information is transferred to a third party through persuasive technology, privacy settings must be strictly examined. Persuasive technology is able to collect personal information of its users in the process of human-computer interactions, and to make persuasion more targeted. Therefore, designers must comply with the principle of dual privacy when they design AI products or systems that collect information from their users.

2. The Principle of Disclosure

The designers of persuasive technology should disclose their motives, methods, and expected results to the public unless it would seriously undermine other moral objectives. This is because the motivations behind designing a AI systems should never be unethical, even if they employ traditional means of persuasion. No result foreseen by persuasive technology should ever be immoral, even if there are socially beneficial results independently of the means of persuasion. Designers of persuasive products must take responsibility for the consequences of their products that can reasonably be expected in practical applications.

3. The Principle of Accuracy

The designers of persuasive technology must not provide misinformation in order to achieve their persuasive goals. Most users have seen technology as something reliable and honest in the majority of cases. They cannot have any awareness of the deceptiveness of technology in their use of technologies. Therefore, the designers of persuasive products must abide by the principle of accuracy and avoid abuse in order to ensure the credibility of AI products.

4. The Golden Principle

Like the principle of dual privacy, the golden principle also invokes the idea of reciprocity which means that the designers of persuasive technology should never seek to make anyone believe or do things that even the designers themselves would not want to be persuaded to believe or to do. This principle is also supported by John Rawls's consideration of the ethical issues behind the "veil of ignorance" in his famous book *A Theory of Justice.* Rawls designs the "veil of ignorance" to ensure that the choices made by participants or stakeholders are guaranteed not to be distorted by their special interests and benefits. Therefore, the golden principle may minimize the possibilities for ethical harm caused by persuasive products.

Taken together, these four design principles provide the bottom line for the development and application of persuasive technologies, they are also the basic principles for ethical review of the entire process.

ETHICAL CHALLENGES CAUSED BY PERSUASIVE TECHNOLOGY; AND AN ETHICAL RESPONSE

The ethical principles obeyed by the designers of persuasive technology are only for the design and application of computing products. They do not concern the specific technical details. For this, one has to consider the three kinds of inevitable bias when designers develop data-driven algorithmic systems. The first one is the preexisting bias,

which is caused by the social culture and customs which form the cognitive background of the designers. This bias is similar to Heidegger's concept of pre-supposition, pre-understanding and pre-existence, because everyone is a person in a specific environment, and his or her values must imperceptibly include the background concepts of the society and culture in which they live. So the preexisting bias is also an unconscious background idea or exists in the subconscious of the designers. The second one is data bias, which is caused by the incomplete data of the algorithm systems while they are being trained and by the way the data are selected, because whether it is a completely data-driven algorithm system or a data-driven algorithm system with knowledge embedding, it needs to be trained based on a specific dataset so that it can acquire "expertise" or "advantage." The third one is emergent bias, which is caused by the fundamental features of machine learning algorithms that are currently in use or emerge from algorithmic systems in the process of human-computer interaction.

These three biases of the algorithmic systems and the particularity of the persuasive function of computing products have given rise to the ethical challenges that cannot be solved within the original ethical conceptual framework or according to traditional ways of thinking. The most obvious ethical challenge is the "attribution of responsibility"-problem. In traditional moral philosophy, accountability is the assignment of responsibility to all relevant moral agents according to the causes and effect of an event that occurred, including the moral condemnation or other punishment for moral agents who have caused harm to users due to their bad motives and intentions or negligent actions. The moral agents are those who can bear moral responsibility and have the ability to compensate. However, a persuasive technological system is a computer-based technological system and as such a novel device that intervenes between the designers and their users. The complexity and interconnectedness of AI systems makes it difficult to trace responsibility by traditional ways. It has led to the following four "dilemmas of accountability," which are distilled from the works of Cooper et al. (2022).

Firstly, there is the causal dilemma of accountability. The development and application of human-computer interactive computing products involve cooperation or collaboration among multiple moral agents, such as scientists, engineers, designers, trainers, evaluators, decision makers, managers, regulators and other diverse or decentralized experimental groups. Both hardware and software production are done in company settings. It is extremely difficult to find a moral agent to take a responsibility for all developmental decisions and every detail of the technology, because the entire computing system is composed of multiple modules. In most cases, these modules are developed by multiple engineering groups as is the case, for example, in the development of machine learning models as a multi-level process. Open-source software, databases, multi-target toolkits, and other products developed by other groups come together. Some control systems have the capacity of interoperation. Some AI products may continue to be used on the Internet and never disappear from the market, although the companies that produced them have gone out of business, or the person responsible for the project has been changed. In these cases, finding a morally accountable person among multiple interconnected groups is no longer an easy task after harm has occurred.

Secondly, there is the dilemma of accountability when there is a bug in the operating system. The data-driven algorithmic systems have necessarily relied on some specific abstract assumptions about a phenomenon. The statistical nature of algorithmic systems and the incompleteness of training data can lead to misclassifications, statistical errors, and uncertain outcomes. When machine learning experts describe these "bugs" as features of machine learning, it is possible for the developers to attribute the resulting damage to these features or "bugs" of the algorithmic system, rather than to the mistakes resulting from human negligence or insufficient ability to generalize and predict. In this way, the currently inherent statistical characteristics of the algorithmic system, – which are at the heart of persuasive technology – may become an excuse for moral agents to shirk their responsibilities, so that their users have to passively bear the resulting losses. The existence of this phenomenon implies that an intangible "treaty of inequality" was signed between technology providers and their users.

Thirdly, there is the ownership dilemma of the disclaimer. The two concepts of ownership and responsibility are important ethical and legal concepts with rich meanings and a long history. However, the trend in the computing industry is towards greater property rights and less liability. Consider, for example, the overlord clauses established by shrink-wrap and click-through licenses used for software copyright authorization; or consider the disclaimers set forth in the terms of service for web services, mobile apps, IoT devices, content moderation decisions, etc. There is also the refusal of third-party providers of algorithmic systems to submit their products to ethical review, on the ground of protecting their intellectual property or keeping their trade secrets. At the same time, manufacturers and owners of cyber-physical systems (e.g., robots, IoT devices, drones, autonomous vehicles) can shift responsibility to environmental factors or human-machine loops and so on. The strengthening of the sense of ownership and the weakening of a culture of accountability will lead to many new social challenges, because these trends grant technology companies more and more control of the rules such that users' losses appear to be just bad luck.

Fourthly, there is the dilemma of accountability caused by artificial agents. With the improvement of the degree of intelligence of algorithmic system, the capacity and agency of computational products will be increasingly similar to that of human beings and will increasingly embody a tendency to personify. Developers and critics describe these systems as intelligent. This means that AI products should be held responsible for the mistakes they make in some complex cases. However, computing systems, even if they have the ability of action, do not become a moral agent like a human being within the traditional framework of accountability. In this case, when we have to track the users' losses caused by AI products back to the human moral agents related to them – such as designers, developers, owners and trainers etc. – accountability becomes downgraded to the inspection of the quality of AI products, rather than serving as a normative concept associated with ethical responsibility.

For the purpose of taking responsibility and punishment, an algorithmic or AI system is a material system. Although the original persuasive intention of the material system is designed or provided by its designers and coaches, the ability of environmental awareness and knowledge discovery undercuts the traditional dichotomy of matter and

the environment being passive, of consciousness and mind being active. Their interactivity, autonomy, and adaptability in the process of human-computer interaction not only turn users imperceptibly to a state of being "interpreted" and "fed," also changing their "factory settings." Therefore, damages caused by complex algorithmic systems cannot necessarily be attributed to the fault of the people involved, because these damages may be related to the bias and randomness of the algorithmic system itself. In addition, the inputs of data-driven algorithmic systems are digital or discontinuous, while the causal tracing of accountability is based on assumption of continuity and linearity. As a result, the way of thinking that retraces causality to assign responsibility among human moral agents loses its applicability in a persuasive technology system. This inapplicability is also manifested in two ways. The one is that it makes no sense to punish a material system, because it is not a human moral agent. The other is that the material system itself does not have the capacity to bear liability.

Given all this, the effective approach to get out of the above four dilemmas of accountability may consist in moving beyond or abandoning the way of thinking which considers accountability only among human moral agents. This approach would expand the semantic and pragmatic scope of the concept of responsibility, it would propose a new conceptual framework for ethics and conceive a new kind of accountability which can be applied to the development and application of AI systems. It would then establish a compensation mechanism that is does not require accountability as a condition of punishment. Thus we need to distinguish between the responsibility taken by the material system and the punishment delivered by the material system by preparing a pool of funds for each complex intelligent system so that a user's loss can be compensated to a certain extent. This might involve, for example, binding human moral agents together to form a new collective personality. This discussion began more than 30 years ago (Solum, 1992) and has now become a hot topic of concern in philosophical and legal circles. It should be emphasized here that this article advocates that the material system should be held responsible, neither to reduce people's responsibility, nor to shift responsibility to the material system so as to avoid the accountability of persons, but as a proposal for an effective mechanism for victims to obtain financial compensation in cases where the responsible person cannot be found.

CONCLUSION: BUILDING A NEW CONCEPTUAL FRAMEWORK OF ETHICS ABOUT THE FUTURE OF HUMAN BEING

Techniques and technologies of persuasion traditionally involved oral or written language, be it for the presentation of arguments or for rhetorical strategies and seductive slogans. In contrast, the persuasive function of persuasive technology is based on the automated decision-making capabilities of intelligent systems. One of the reasons why users prefer to adopt automated decision-making is that they generally believe that automated decision-making based on massive data is not only faster and more reliable than human decision-making, but also able to provide decision-making suggestions beyond human imagination. This ignores, however, the biases which are intrinsic to the algorithmic system and the decision-making errors owing to the randomness of algorithm

systems. Therefore, when designers construct AI products with persuasive functions, they need to provide the choice of giving informed consent, so that the persuasive intention, methods, and social outcomes of the algorithmic system are aligned to the values and interests of users. They also need to respect the autonomy of users so that they can eliminate paternalistic persuasion assumptions. In short, there is an urgent need to raise ethical awareness, strengthen humanistic education, and coordinate the relationship between interests in maintaining security and promoting technical innovation. Ethicists need to expand their traditional conceptual framework to ensure that there can be compensation for the damages caused by intelligent systems. This includes a shift from an emphasis on being passively responsible to actively assuming responsibility, that is, a shift to a new conceptual framework of ethics for the future of humanity. Legal scholars and legislators need to create new mechanisms which can solve the problems caused by an intelligent algorithmic system or an intelligence machine. In order to ensure the healthy working of an intelligent society, regulators need to create a set of new rules to guide the process of developing and applying AI systems with persuasive functions.

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