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О ВОЗМОЖНОСТИ ПРИМЕНЕНИЯ ПОНЯТИЯ «ИНТЕРФЕРЕНЦИЯ» ДЛЯ ОПИСАНИЯ ОБЛАСТИ СЛИЯНИЯ ЦИФРОВОЙ И ДОЦИФРОВОЙ СРЕД

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Статья посвящена теоретическому изучению процесса сближения, объединения цифровой и доцифровой сред. Предложены общие и отличительные особенности понятий «информационное общество», «информационная среда», «цифровая среда» с точки зрения влияния на личность и социальные группы. На основе психологических исследований различных направлений представлена авторская классификация этапов сближения цифровой и доцифровой сред. Раскрыто понятие «интерференция» и его применение в психологии и смежных дисциплинах, предложено авторское понимание интерференции для описания области слияния, объединения цифровой и доцифровой сред. Результаты исследования могут быть востребованы при изучении цифровых сред, в теоретических и эмпирических исследованиях, для объяснения цифровой трансформации субъекта.

Ключевые слова: цифровая среда, доцифровая среда, информационное общество, интерференция в психологии, интерференция цифровой и доцифровой сред.

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THE POSSIBILITY FOR APPLYING THE CONCEPT OF “INTERFERENCE” TO DESCRIBE THE AREA WHERE THE DIGITAL AND PRE-DIGITAL ENVIRONMENT MERGE

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The article is dedicated to the theoretical study of the process of convergence and integration of the digital and pre-digital environments. The general and distinctive features of the following concepts: “information society”, “information environment”, “digital environment” in terms of influence on an individual and on a social group are presented. Based on psychological research in various areas, the authors present a classification of stages where the convergence of the digital and pre-digital environment takes place. The concept of “interference” and its application in psychology and the related disciplines is revealed; the authors’ understanding of interference to describe the area of merging and integration of the digital and pre-digital environments is showcased. The results of the research can be of significance in the study of digital environments in both theoretical and empirical research, explaining the digital transformation of the subject.

Keywords: digital environment, pre-digital environment, information society, interference in psychology, interference of digital and pre-digital environments.

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Introduction

The modern, rapidly changing world creates new conditions for the functioning of individuals and different communities. This is mainly due to the convergence of pre-digital and digital environments [Voiskunskii; Soldatova et al., 2017; Zhuravliov, Nestik, 2016; Metag & Marcinkowski]. In practice, this means that an increasing number of activities (document management, access control, several types of communication, and purchasing) can only be successfully implemented using the tools of the digital environment, i.e. in the conditions of transformation of communicative, technological and other skills of the subject, and in some cases – in life activity as a whole.

Topicality of this research topic is conditioned by the need for a detailed study and psychological description of the process of not just convergence, but integration, and merging of the digital and pre-digital environments. It is a fundamentally new phenomenon, a new environment of life activity, which still has a high level of uncertainty. Therefore, **the aim** of the study is to provide a theoretical understanding of the convergence of the digital and pre-digital environments in terms of the influence on a subject and social groups, as well as a psychological description of the phenomenon of merging, integration of these environments. **The scientific novelty** of the research is represented by the novel use of the term “interference” in relation to digital and pre-digital environments.

The description of the process of convergence of the digital and pre-digital environments

If we consider the development of the information society in terms of convergence and subsequent mutual influence of the digital and pre-digital environments, we can classify the following stages.

The first stage can be attributed to the period of the 1940s–60s, which was a specific preparation for the formation of an information society. In this case, the information society is not yet identical to digital. In particular, Friedrich Eduard Machlup spoke about the advent of the information economy in the sense of possessing information and redistributing it. During this period, marketing ideas based on the modification of consumer behaviour by dosing of information or specific information delivery were developed. This period also includes the beginning of the era of attention to joint professional activities, where a large role was given to clear and operational transmission of information [Homans, Waterman, et al.]. The digital environment is still barely represented in the form of nascent cybernetics at this stage. In the Soviet Union at this time and earlier, research was conducted on machine “mathematics” in line with the teachings of

Russian mathematicians Pafnuty Chebyshev and Aleksey Krylov, but, unlike cybernetics, Soviet researchers clearly differentiated the person (personality) and the machine, focusing on the limited resources of the “machine”. This can be confirmed by the article of Mikhail Yaroshevsky “Cybernetics is a science of obscurantists”, which was published in 1952 [Yaroshevsky]. Even taking into account the enormous ideological pressure of that time, we can still mostly agree with the author of the article.

Using the language of the eco-psychological approach [Panov 2016], the information environment is still a quasi-subject of physiological and psychological influence. The methodological foundations of the study of society in this period mainly trace back to economic schools and cybernetics (for the West), “machine mathematics” (for the Soviet Union).

The second stage, which we can characterise as the beginning of the information era, started in the late 1960s, when psychologists, economists, philosophers noted and started to actively comprehend the process of the global transition of modern civilisation to a new qualitative state – the information society (henceforth information, digital are the terms that are often found as synonyms, emphasising that informatisation is a consequence of the development of digital methods of information transmission). In the studies of psychology in the Soviet Union, the main provisions of the “psychology of computerisation” – a logical continuation of the ideology of the information society were formulated by Oleg Tikhomirov in the late 1980s, but the first research was published in the early 1970s [Tikhomirov]. A significant contribution to the understanding of the information society was made by the postmodernist philosopher Alvin Toffler [Toffler]. The transformation of society to a new era, discussed by philosophers and psychologists, contributed to the introduction of new concepts into the philosophical discourse and psychological research: “information”, “information society”, “virtual environment”, “digital environment”, “informatisation”, etc., as well as a variety of their interpretations in line with various concepts and schools. In English-language research, the concept of informatisation has a rather wide range of connotations, while digitalisation has virtually always one range of similar concepts – an increase in the volume of activities realised in a “digital” form.

The third stage (it is mainly the last two decades) is characterised by a significant diversity and differentiation of approaches to understanding the information society and digital environments, their convergence, which is increasing. In general, Il'ya Garber notes [Garber] that the information society itself transforms the system of psychological knowledge. Today we have

a whole scientific direction – cyberpsychology – and we can distinguish the following research directions: philosophical and psychological aspects of the study of virtual environments and the information society as a whole [Asmolov, Turchin]; attitude to new technologies [Brosnan, Gilbert, Nestik]; the influence of mass media on the mentality of the rising generation [Aisina]; victimisation in the Network and the risks of the information society [Kuss & Griffiths, Soldatova 2014; Patrakov, 2019]; transformation of common communication [Voyskunsky, Rubtsova]; psychology of the information (in the meaning of digital – author notes) environment [Mdivani, Lidskaya, Panov, 2016]; transformation of education [Aismontas]. In general, if the second stage was characterised by the study of digital means as *additions of the subject*, the present time is characterised by approaches to the study of *a single subject* “human-technogenic devices” [Znakov 2017]. Separately, we can note the book “Information and communication technologies in education” [UNESCO], which shows that education in the field of information and communication technologies is the key competence of the modern person.

There is also a significant expansion in the subject of research, but if one goes up to the meta-level, there is one general tendency – the integration of pre-digital and digital environments is increasing, forming a fundamentally new area of life activity which is transforming the subject itself. Further transformation of the information society aims to differentiate the two most important concepts, “information society” and “information environment”.

Information society vs information environment.

Let us focus on the differentiation of the concepts of information society and information environment in order to analyze the following derivative concepts.

The main distinguishing feature of the information society (first of all, revealed in philosophical and sociological research [Biryukova, Bell, Baudrillard]) is the vast amount of information available to most people. Moreover, people themselves become generators of information and exchange it. The information society ideally provides any individual with access to any source of information. It is assumed that this is guaranteed (or will be guaranteed) by law and the level of technology.

In defining the environment, we proceed from an eco-psychological approach to the development of the psyche [Panov 2004, 2014], suggesting that the environment is the structuring of space by the *subject*. It means, if we take this approach, society will consist of numerous environments.

Within the framework of the eco-psychological approach to the development of the psyche, conceptual prerequisites for determining the information environment, its structure, and types of interaction between the components of the “individual-information

environment” relationship were also developed in the form of a summary [Panov 2016]. In the context of this approach to the development of the psyche, the structure of the information environment, as well as the structure of the educational environment [Panov 2007], must include at least four components:

1) spatial-subject component, i.e. a set of objects that store, process and transmit information and with which information interaction is carried out (indicators, books, newspapers, television, cinema, computers, phones, etc.);

2) communicative component, i.e. the set of subject-object and subject-subject communicative interactions that facilitate or hinder receiving, processing or exchanging of information and communicative actions;

3) technological component is a set of instrumental actions (methods, abilities, skills) that are necessary for receiving, storing, processing and exchanging of information (in pedagogic terminology: functional literacy and competency);

4) subjects of the information environment, i.e. agents of information impacts. These include quasi-subjects of information impacts, i.e. technical information and communicative means that perform the function of information impact on an individual or a partner in communication and other information and communicative actions (the Internet, a virtual interlocutor, etc.).

Thus, we will define the key concepts used in this study:

The pre-digital environment is the surrounding reality, where there are no information (digital) factors of influence on a subject, and interpersonal interaction is not arbitrated by information (digital) means.

The information environment is a set (or a system) of conditions and influences that provide a possibility to meet the human needs in various types of information interactions with the environment and with people (subjects) that are representing it [Lidskaya, Mdivani; Panov 2004, 2016].

The digital environment is a part of the information environment that provides an opportunity to meet the human needs in various types of information interactions with the environment and with people (subjects) that are representing it through digital resources (programmes, platforms, etc.).

The concept of **immersive virtual reality** is the closest to the digital environment; the immersive virtual reality is a non-material reality that is sensorially similar to the material, conditionally perceived as material, and has the properties that allow it to be clearly identified by various subjects [Kirik].

In our opinion, such definitions offer an opportunity to study pre-information, information, and digital environments in the context of merging in the conditions of intensive growth of their mutual influence and layering, integration, as well as the impact on an individual and social groups (table 1).

Table 1

Features of the information society, the information environment, and the digital environment as subjects of influence on an individual and social groups

Attributes	Information society	Information environment	Digital environment	Immersive virtual reality
Source of influence	permanently transformed and perceived information	subjects that mediate their influence with certain information and communication technologies in accordance with the goals	subjects that mediate their influence with certain digital technologies (means, programmes) in accordance with the goals	specialised programme and set of technical devices
Main activities of participants	most workers are engaged in the generation, storage, processing, and implementation of information, especially its highest form-knowledge	transformation of information to meet a group or individuals needs		teaching
Object of influence	<i>all</i> fields of human activity and society	life activity of the subject in conditions limited by a <i>certain</i> space-time continuum	life activity of the subject in conditions limited by a <i>certain</i> space-time continuum and the possibilities of digital resources	professional knowledge, abilities, skills, and sensations
Carrier of influence	1) the information obtained through unimpeded access, dissemination and use; 2) necessary material resources focused on the strategic dominance of informational and intellectual resources	informational content in any form (audio, visual, tactile)		informational content in any form (audio; visual; tactile) that can be broadcast using digital means
The main characteristics of resources	absolute inexhaustibility, environmental friendliness, social integration	individualisation of information according to preferences		information required to obtain an educational result or enjoyment, satisfaction

The “overlay” of pre-digital and digital environments is uneven, due to the characteristics of both the environments and the subject. For example, based on the materials of the Foundation “Public Opinion” [Foundation “Public Opinion”], a decade ago it was found that young people (generation Z) are two, three or several times more likely than their parents to prefer to work (choose a professional activity) using a computer (92% vs 34% among adults), use the Internet when communicating (82% vs 30% among adults), pay for goods and services using plastic Internet cards (50% vs 11% among adults), use the service for rating their home goods (27% vs. 6% among adults). Currently, this tendency is growing – according to “Levada Centre”, the share of Internet users among people aged 18–24 years reaches 90% [Russian media landscape].

Therefore, we believe that we have the right to raise the question of the formation of a new area – the area of the merger of two environments – pre-digital and digital, where it is already difficult or almost impossible to distinguish the influence of the two environments. In our opinion, such a term can be “interference”, primarily understood in physics as the layering, combining, superimposing, and merging of environments.

In the studies related to the human memory [Tomlinson, Sozinov], the phenomenon of

interference is that if skills or words are remembered with a short interval, they interfere with each other, so then the reproduction of words is worse than either of them or one of them. In cognitive psychology, this phenomenon was first shown within associative psychology in the study of remembering and forgetting in 1894 by Georg Elias Nathanael Müller and Friedrich Schumann [Sozinov]. Also, the phenomenon of interference is known in the study of switching and changing activities. The effect here is that when we abruptly change one activity to another, the previous activity seems to have some inertia [Leonova]. It is assumed that this switching involves Interference-related processes, so they interfere with each other due to the fact that these activities are close to each other. For example, after a long run or physical exertion, it is difficult to immediately engage in intellectual or calm work.

The second area of interference research is psycholinguistics, bilingualism, communication in a multilingual environment [Artemieva, Budrenyuk et al., Weinreich 1972, 1979]. For example, Ol'ga Zubkova shows that under the influence of multilingual environmental effects, there is a transformation of the cognitive system – in the field of professional efficiency; stereotyping (changing patterns of thinking, professional stereotypes); selectivity of information and subjective forecasting [Zubkova].

The term interference has already been used in philology since the 1950s, in particular, the work of Uriel Weinreich "Languages in Contact", in 1953, the author considers interference in the context of combining, layering of languages and bilingualism. The psychological aspect of Weinreich's research summarises the following – the researcher sees the reason for the "layering of languages" in the psychological perception of significant elements of grammar by speakers: it is not difficult to determine the psychological reasons why a more explicit, more consciously perceived model is easier to imitate. In his opinion, we can note that the transfer of morphemes is performed, probably, with greater ease also in cases when they are larger in their phonemic structure (i.e. more explicit) [Weinreich, 1976: 121]. In fact, we can interpret this – more information-rich, content-rich environments are able to absorb more "poor" environments.

Thus, from the analysis of previous studies of interference in philology, partly in psycholinguistics and cognitive research, we can draw the following conclusions.

Firstly, interference involves the area where two or more environments merge or overlay. Accordingly, this area has both the characteristics of "parent" environments and its own unique set of properties (for example, the transformation of speech behaviour). Based on this, methods for evaluating a single environment are unlikely to be fully applicable to the interference area. For example, the risks of the Internet and the possibilities of all types of "distant" learning have to be reviewed and understood.

Secondly, the area of interference transforms various types of activities, gradually making them ordinary, daily activities.

Thus, in the authors' understanding, information, and communicative (digital) conditions that mediate all spheres of human life by digital means of communication, i.e., they lead to the digital transformation of human life and its subjectivity become the area of interference between the pre-digital and digital environments.

The area of interference is growing more and more, requiring not just the formation of new skills, but transforming the life activity of the subject. By following this logic, we can expect that a radical transformation of *all* types of human life activity, including the system of education, personal and family life, consumption, upbringing, and morality will come next. Moreover, the next stage may involve not technical, but biotechnical unity of man and the digital environment, which will fundamentally change not only the life activity but also human nature, perhaps human as a species.

As the area of interference of information and "non-information" environments, we understand such a topical and real-life environment for the subject, in which the digital environment serves as a means for

an individual (group) to carry out social interactions of various types, including working with the content of the "pre-digital" information environment. The peculiarity of such an interference environment is that it provides optimal "digital" functioning of the subject, being implemented in educational, working, family, and other activities.

But there are factors of the "pre-digital" environment that are still difficult to change in the conditions of the information environment.

In communication: correlation of words, gestures, intonation; enrichment of intonation manner of speech, its expressiveness; difficulty in the completeness of reflection and feedback; use of open questions (despite the development of information resources, for many programmes it is still difficult to give a detailed assessment of texts).

In sensations: providing the opportunity to "feel" with one's own hands (for example, this is important in technical and medical education); combining tactile experience with a word (sound).

In education: while the delivery of educational material, focuses on all the sensory organs; it differentiates the impact taking into account the degree of severity of existing disorders (for example, when working with people with disabilities, the handicapped) [Patrakov 2015].

But the digital environment is also being transformed in the direction of the development of anthropomorphism, i.e., the possession of "human" features. In this, we see a long reaction to the ideas of cybernetics of the 1940s. Perhaps, this is the main task of the development of information environments – to be "humanlike".

In our understanding, **the anthropomorphism of the information environment** is a set of properties of an information programme that allows it to perform human functions in information interactions for individuals who have no special knowledge in the technical or informational field. In this regard, we find a dual understanding of anthropomorphism. For example, Marina Mdivani [Mdivani 2019] considers anthropomorphism in relation to technology, i.e. when the subject attributes human features and corresponding emotions to technical means. Therefore, to avoid ambiguity, we are talking about anthropomorphism of the information environment, i.e. the situation when engineers and programmers consciously strive to make artificial intelligence "external manifestations" (for example, the programme interface) extremely close to a human. For example, search navigation is increasingly developing – accessibility to the intuitive understanding of actions/algorithms (in fact, according to futurists, it will be possible to programme without special education in the upcoming years); "friendliness" and the presence of hint systems. For example, the appearance of samples when filling up documents, indicating errors, suggestions; the

presence of a feedback system, and administering barrier-free communication. For example, some web sites have a “chat” service with the operator, including voice communication with bots. So, if the service, in reality, offers only to record one's email and/or phone number instead of online communication, in order to get a response at some indefinite time, then such services significantly lose customers. The Internet lives here and now, such sites significantly lose their efficiency and quality of work with clients; the clarity of the informing system. For example, a system of hints, examples, and links to examples; availability of scales for completeness of filling up various forms (for example, 50% completed, 70% completed, etc.); preliminary recommendations for what one might need to have to work with an Internet product (for example, the wording “personal data” is not blurred from the consumer's point of view, specifically: passport).

An example can be also given in international education when the rating system is set not only in points, but also can be translated into smiles, and various actions (for example, a reminder for the timing of the test) are shown in the form of avatars that “remind” of the event with sounds, messages, etc.

In more detail, the interference area can be described as follows and its characteristics that differ from the information environment can be distinguished.

The subject's area of activity is determined by circumstances of force majeure or voluntary consent based on a sense of ease, accessibility, comfort, and other subjectively perceived characteristics, as well as pathological attraction and dependence. The area of interference also includes control situations of life activity, for example, the absence of a card/chip may restrict access to resources for certain types of employment. Also, when the chip is implanted, the interference area may become forced into submission.

The environment of “digital” influence is information content (product, programme, environment, device) or a fact, a situation in the “pre-informational” environment that is compulsory for ensuring any type of activity or life activity in general (for example, an electronic lecture synopsis may be obligatory for verifying the educational activities of a teacher, and on the contrary, ignoring the international etiquette will not allow a specialist to be adequately represented in international scientometric databases).

A subject that is characterised by a willingness to accept the area of interference as a condition and means of its life activity.

Conclusions

Thus, an attempt has been made to psychologically understand the process of development of “digital” and “pre-digital” environments in terms of their influence on the subject. The set of conclusions are as follows.

1. There is an intense convergence of pre-digital and digital environments. Three stages in this process have been identified, the last of which is not the final one.

2. From the point of view of the eco-psychological approach to the development of the psyche, which is key for our research, we distinguish the information society, which assumes people's access to an unlimited amount of information, and information environments, which we understand as a subjective structuring of space. And already within the information environment, we distinguish digital environments. This “nesting doll” model allows us, on the one hand, to see the subject in the context of its interaction with the environment, on the other hand, to clearly differentiate the types of environments.

3. The concept of “interference” in relation to the subject allows us to describe the environment and the subject-environmental interactions and transformation of the subject. The area of interference is not identical to a particular environment, it has both the characteristics of the “parent” environments and its own unique properties.

4. The tendency of the interference environment development is to increase it, to absorb those environments that are less effective from the point of view of the subject of information interactions.

5. The essence of interference is that various types of life activities can no longer be implemented outside of this area, or only potentially possible, but with very high costs.

6. In the area of interference, the digital environment “tends” to be anthropomorphic, i.e., to be similar in its functions to human functions. The area of interference is limited by the area of influence and the capabilities of the carriers of this influence.

Along with the conclusions, the study revealed a number of research lacunas.

1. What are the mechanisms of adaptation of the subject to *the area* of interference? Are they identical to the already systemically analysed mechanisms and laws of adaptation [Rozum], or in this case the question is if they obey other patterns?

2. Is it possible to transfer the understanding of the risks of the information environment (for example, content in line with the work of Galina Soldatova [Soldatova]) to the area of interference, or will it require a different classification model? In our opinion, there is a need for a different approach based on subject-environment interaction; another issue is on the same topic – generation X and partially Y had the experience of living outside the information environment, but generation Z had no such experience. In this case, can we talk about differences in perceptions of risks, for example?

3. What are the patterns of the transformation of various types of activity in the area of interference – games, training, work; also, what will be the patterns of deviation, for example, work behaviour identical to the “pre-digital” environment [Patrakov, Lobanova] or will they have other patterns?

4. What subjective qualities are most characteristic of the subject of digital interference in the social and professional life of a modern person?

In general, these research problems can be reduced to the fundamental task of describing the mechanisms of formation and development of the area of interference and transformation of the subject of the digital environment.

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