



A VALUABLE RESOURCE OF THE 21ST CENTURY: PSYCHOLOGICAL CHARACTERISTICS OF HUMAN ATTENTION IN THE DIGITAL ENVIRONMENT (SCIENTIFIC REVIEW)

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Abstract. *This article analyses the psychological characteristics of human attention in the digital environment. It substantiates that, amid the sharp expansion of access to information and the widespread adoption of digital technologies, the significance, scope and content of attention are changing. It shows that the growth of information flow has turned attention into a limited and valuable resource. The influence of the digital environment on the stability, distribution and switching of attention is examined from a theoretical perspective. The article also considers psychological approaches aimed at preserving and developing attention.*

Keywords: *attention, digital environment, attention economy, cognitive load, multitasking, digital hygiene.*

INTRODUCTION

Today people encounter dozens of applications, hundreds of messages and thousands of units of information every day. Access to information has never been so broad, yet this abundance has a downside: the more information there is, the scarcer the human attention that receives it becomes. As early as 1971 Herbert Simon pointed out that in an information-rich world the attention of the recipient becomes scarce (Simon, 1971:37–72). For this reason contemporary researchers call attention the most valuable resource of the twenty-first century. Social networks, video platforms, mobile games and messaging applications compete for users' attention, and their revenue often depends on

how much time users spend in front of a screen. Because attention is a basic condition of perception, memory, thinking and learning, its weakening affects the quality of study, work and even interpersonal communication. The problem is especially important for students, who are among the groups that use digital devices most intensively: they listen to a lecture, check their phones and answer messages at the same time. The aim of this article is to analyse theoretically the psychological characteristics of human attention in the digital environment and to substantiate ways of preserving it.

MAIN PART

In psychology attention is defined as the direction and concentration of consciousness on a particular object or phenomenon (Shamshetova et al., 2018). Attention is usually regarded not as an independent process but as a state that ensures the effective functioning of perception, memory and thinking; that is, in order to remember or understand something well we must first direct our attention to it (G'oziyev, 2002). Three types of attention are distinguished: involuntary, voluntary and post-voluntary attention, following N. F. Dobrinin. Involuntary attention arises independently of a person's wish or purpose under the influence of a strong or novel stimulus: for example, a notification flashing on a phone screen draws our attention involuntarily. Voluntary attention is connected with a conscious goal and requires volitional effort, as when a student forces himself or herself to read a textbook despite being tired. Post-voluntary attention is observed when an activity that began with volitional effort becomes interesting and continues without strain.

The roots of the idea of the “attention economy” go back to Simon's observation cited above (Simon, 1971:37–72): the more information there is, the more valuable the attention capable of processing it becomes. T. Davenport and J. Beck, in turn, described attention as the main “currency” of modern business (Davenport & Beck, 2001). Indeed, for many digital companies user attention has become the product being sold. This economy relies on certain psychological mechanisms. First, notifications trigger involuntary attention and bring the user back to the application. Second, “infinite scroll” and autoplaying videos leave no natural stopping point: a person does not finish the content but has to decide to stop. Third, likes, comments and new followers serve as a social reward that arrives at unpredictable moments. The variable-ratio reinforcement

studied by B. Skinner shows that when the timing of a reward is unknown, behaviour is reinforced in its most stable form; therefore many authors explain the habit of “refreshing the feed” on social networks by precisely this mechanism.

Collective attention dynamics are also changing. According to the analyses of P. Lorenz-Spreen and colleagues, collective interest in topics on social networks shifts more quickly, and each topic holds public attention for a shorter time than before (Lorenz-Spreen et al., 2019). This may reduce the capacity not only of individuals but of society as a whole to attend to deep and long-term issues. Because topics change so fast today, an issue that attracts public attention today gives way to another tomorrow. As a result many problems cannot retain their urgency for long, and the stable collective attention needed to resolve them fails to form. An ethical question also arises here: where is the line between attracting a user’s attention and undermining the user’s free choice? This question is currently a subject of debate among psychologists, designers and lawyers.

The most noticeable consequence of the digital environment is the fragmentation of attention. In an experiment conducted by G. Mark and colleagues, participants who performed an office task, namely answering e-mails, and were interrupted tried to complete the task faster, but at the cost of experiencing more stress, strain and time pressure (Mark, Gudith & Klocke, 2008:107–110). In other words, people adapt to interruptions, but the “price” of this adaptation is psychological fatigue. In subsequent years G. Mark has written, on the basis of her own observations, that the duration of attention directed at a single task in front of a screen has shortened considerably (Mark, 2023). Although these figures depend on the research conditions, the general direction is clear: attention is becoming increasingly interrupted and self-interrupted. Importantly, it also takes considerable time to return fully to the original task after an interruption. In the experiment by A. Ward and colleagues, the mere presence of a smartphone on the table or near the participant reduced cognitive capacity, even when the phone was switched off and silent (Ward et al., 2017:140–154). The authors called this “brain drain”, because part of attention is spent on “not looking at the phone”. Thus, even when it is not actively used, a device can occupy part of the attentional resource.

Many people consider themselves capable of doing several things at once. However, data from cognitive psychology suggest otherwise: in complex tasks attention works sequentially rather than in parallel. What is called multitasking is in fact rapid

switching between tasks, and each switch entails a “switching cost”: time is lost, errors increase and the quality of work declines. The study by E. Ophir, C. Nass and A. Wagner showed that participants who frequently engaged in media multitasking had difficulty separating relevant from irrelevant information (Ophir, Nass & Wagner, 2009:15583–15587). Of course such results should be interpreted primarily as correlations rather than causal relationships: people with scattered attention may themselves be more prone to multitasking. The shiftability of attention, in turn, reaches a very high level in the digital environment. The format of short videos, reels and stories offers a new stimulus every few seconds, so involuntary attention is constantly “exercised” while voluntary attention is used less. As a result it may become harder to be patient with long, slow and complex texts; however, research on this issue is still ongoing and its results are not always consistent.

C. Newport understands “deep work” as full concentration on a cognitively demanding task free of distractions, and notes that this ability is becoming rare and valuable today (Newport, 2016). Deep work requires prolonged concentration, and the digital environment undermines precisely this. This is especially important for students: understanding a complex scientific text, taking notes or analysing a lecture requires sequential thinking, and interruptions break this chain. At the same time it would be one-sided to evaluate the influence of the digital environment as purely negative. Some studies have found that playing action video games improves visual selective attention, that is, the ability to find relevant objects on a screen quickly (Green & Bavelier, 2003:534–537). In addition, digital tools make the educational process more convenient: they make it possible to find the needed information quickly, set reminders, plan tasks and study remotely. Thus the problem lies not in technology itself but in how and how much we use it.

The state of deep work is close to the experience of “flow” described by M. Csikszentmihalyi: a person becomes fully absorbed in a task whose difficulty matches his or her abilities, loses track of time and derives satisfaction from the activity (Csikszentmihalyi, 1990). This is a vivid manifestation of post-voluntary attention. Importantly, entering a flow state usually requires several minutes of uninterrupted work, and a notification disrupts precisely this stage. As a result a person constantly remains at the “starting” stage, while genuine satisfaction from the activity arises only rarely. In this sense digital distraction may affect not only productivity but also the enjoyment people derive from their own work.

The influence of the digital environment on attention is not the same for everyone. In children and adolescents voluntary attention is not yet fully formed; therefore they are more susceptible to bright content that attracts involuntary attention. At the individual level, factors such as self-regulation, impulsivity, stress resilience, sleep quality and motivation play an important role: under the same conditions some people barely pay attention to notifications, while others respond to every signal. Therefore, when studying the problem of attention, it is necessary to take into account the individual characteristics of each person alongside general conclusions.

In the digital environment attention changes not in a single direction but through several interrelated processes, and these changes affect other areas of the human psyche as well. The first process concerns memory and learning. Attention is the first condition for encoding information into memory; therefore, if attention is divided while information is being received, the information is not firmly transferred into long-term memory. People who know that information can be found on the internet later tend to remember it less. This phenomenon is called the “Google effect”: memory is oriented towards storing where information can be found rather than the information itself. Thus constant reliance on search engines may lead to superficial retention of information instead of deep mastery of it. The second process concerns emotional state: constant notifications, the expectation of responding to messages immediately and the pressure of being continuously “online” increase cognitive load. When prolonged, this may manifest itself as psychological exhaustion, irritability, poorer sleep quality and reduced productivity; in practice this is called “digital fatigue”.

A. Przybylski and colleagues defined the fear of missing out as anxiety about not taking part while others are having rewarding experiences, and showed its connection with the intensive use of social networks (Przybylski et al., 2013:1841–1848). Such anxiety pushes users to check their phones frequently and further intensifies the fragmentation of attention. As a result a vicious circle emerges: scattered attention increases anxiety, and anxiety in turn leads to even more scattered attention. The third process involves changes in social relationships: the scattering of attention also affects the quality of communication between people. Looking at one’s phone during a conversation and ignoring the interlocutor is called “phubbing”, and in such a situation the interlocutor may feel disregarded. Thus attention is not only a cognitive process but also an important condition of social relationships: paying attention to a person signals

recognition of his or her worth. For students attention is directly related to learning outcomes. Using a phone during lectures, getting distracted by social networks during independent work and being unable to concentrate for long before examinations are practical manifestations of this problem. On the one hand the digital environment offers enormous opportunities for learning, such as electronic libraries and online courses; on the other hand the likelihood of distraction is highest precisely when these opportunities are being used.

The fourth process concerns creativity. In the past, while waiting in a queue, travelling or feeling bored, people were left alone with their own thoughts. Today these moments are almost always filled with the phone. Some authors consider such “empty” pauses useful for daydreaming, self-awareness and the emergence of creative ideas. Therefore constantly staring at a screen may also narrow the opportunities for creative thinking, although the evidence on this issue is still insufficient.

Let us consider an example from student life. A student working on an independent assignment opens the necessary article on a laptop, but after a few minutes notices a message in the group chat, replies, then moves on to a social network, and, on returning to the main task, has to recall again from the beginning what he or she had been reading. From the outside the student seems to be “working”, but in fact attention has been interrupted several times, and each return has required additional mental effort. Therefore, even when the same amount of time is spent, the learning outcomes of a student who works without interruptions are usually likely to be higher.

Completely abandoning the digital environment is both impossible and unnecessary; what matters is learning to use it consciously. Based on an analysis of the scientific literature, several recommendations can be singled out. First, limit notifications: keep them only for essential applications and turn off the rest or use the “do not disturb” mode. Second, during serious work or study leave the phone in another room or in a bag; this recommendation rests on the “brain drain” effect discussed above (Ward et al., 2017:140–154). Third, follow the one-task-at-a-time rule and close other windows before starting a complex task. Fourth, divide time into blocks; for example, the “Pomodoro” technique of twenty-five minutes of work and five minutes of rest can help increase the stability of attention gradually. Fifth, set aside device-free time during the day, especially before going to bed, and maintain sufficient sleep and physical activity, since these are the main factors that restore attentional resources. Sixth, strengthen

voluntary attention through exercises such as slow, deep reading, handwritten note-taking and focusing on the breath.

Another simple exercise for training attention is the “dot” exercise. In this exercise a dot is chosen – for example, a mark on a wall or a small dot on a sheet of paper – and one looks at it for two minutes. When various thoughts arise during the exercise, which is natural, they are not attended to, and attention is returned to the dot. The essence of the exercise is to develop the skill of sustaining voluntary attention and consciously returning it when distraction arises. Over time the duration of the exercise can be increased gradually. Such exercises are believed to strengthen voluntary attention in the way a muscle is strengthened. Mindfulness exercises are also frequently mentioned in connection with training attention; their essence consists in consciously directing attention to the present moment, for example to the breath or bodily sensations, and gently returning attention when distraction arises.

One should not limit oneself to personal effort alone. It is important to teach media literacy in educational institutions and to introduce clear rules on the use of devices during classes. In the family, regulating children’s screen time and adults following the same rules themselves set a good example, because voluntary attention is formed through communication and example. In addition, programmers and designers should promote the principles of “ethical design”, that is, designing in order to benefit users rather than to retain them. At the level of educational institutions the following may be useful: jointly establishing rules on the use of devices in lectures and seminars with students, dividing lessons into short but uninterrupted blocks, and familiarising students with the basics of digital hygiene. From a psychologist’s point of view, what matters most is not to prohibit students from using devices but to develop the skill of observing and managing their own attention, because a habit formed on the basis of internal motivation alone is sustainable.

CONCLUSION

On the basis of the considerations discussed above it can be concluded that in the digital environment human attention has become both the most valuable and the most vulnerable resource at the same time. The growth in the volume of information has given rise to the “attention economy”, in which applications and platforms compete for user

attention. This competition relies on involuntary attention and narrows the conditions for voluntary attention. The main characteristics of attention, particularly stability and distribution, undergo the greatest changes in the digital environment: constant interruptions, multitasking and short-form content may lead to the fragmentation of attention, increased cognitive load and stress, and a decline in the quality of memory and deep reading. At the same time many studies demonstrate correlations, and additional research is needed to establish causal relationships. To preserve attention it is important to follow the rules of digital hygiene, to improve media literacy in educational institutions and to develop a culture of conscious use. Thus the problem of attention in the digital environment is not a simple matter that ends with a single cause or a single solution; only by examining it comprehensively through personal, educational and technological factors can an effective solution be found. In future research an empirical study of the relationship between attention and the use of digital devices among Uzbek youth, particularly students, may be a promising direction.

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