Natalia Suchkova

Visual Hygiene on the Internet

Semiotic and Psychological Aspects

Elements of real and virtual space as the cause of ›suffering eyes‹

Dietmar Kamper, a German philosopher, social scientist and art historian, diagnosed ›suffering eyes‹ as the main disease of our time [Колесникова 2011:4]. According to him, one of the main causes of such a ›disease‹ is the impact of an adverse environment on the human visual system. The theory of saccade automaticity[1] of the Russian scientist V. A. Filin helped to experimentally prove that the modern urban environment abounds with objects negatively affecting the visual organs. These conclusions became the foundation for the development of *videoecology,* a scientific school that considers the visual environment as an ecological factor. According to videoecology, based on the study of human visual perception and, particularly, the mechanism of eye motion, the ›urban visual environment is polluted mainly by homogenous and aggressive visual fields‹ [Филин 2007].

1 Saccade automaticity is a feature of human oculomotor system to make rapid eye movements (saccades) involuntary in a certain rhythm with or without visual objects in the waking state or during the paradoxical phase of sleep.

A *homogenous field* is understood as either an area completely devoid of visual details or having very few. An insufficient number of elements for sight fixation after the saccade leads to surge in eye motion amplitude, that is caused by the need to stop and fix the gaze on a specific visible detail. In case where eyes ›seek‹ and ›fail‹ to find a fixation point, the desire to look away takes over. Some examples of homogenous fields, represented in the environment, include the end walls of buildings, roofs, large glass stripes, underground passages, uniform fencing, and other similar objects and surfaces with a pronounced absence of separate ›eye-catching‹ elements. Prolonged stay in a homogeneous environment has a detrimental effect on saccade automaticity and, subsequently, on both physical and psychological health.[2]

2 Moscow Center VIDEOECOLOGY: [Official website]: www.videoecology.ru/sc_videoecology.php (23.07.13)

A visual environment consisting of a wide variety of identical elements uniformly distributed across a plane is referred to as an *aggressive envi-*

ronment in videoecology. It also has a very negative effect on a person's visual perception channels as it contains too many contrasting edges. In this situation, photoreceptors of the retina are forced to operate in an elevated mode. Therefore, the flow of impulses that reach the visual centers of the brain exceeds permissible amounts by several times. If we take into account that all the perceived elements are identical, it appears that the flow of impulses is inversely proportional to the volume of the information received.

Unfortunately, the influence of an ›unnatural‹ visual environment created by homogenous and aggressive fields is not limited to the environment only. We can find plenty of objects on the Internet that produce a negative impact on the visual organs. There are not so many examples of absolutely homogenous fields in virtual space, because it is generally filled with textual and graphic information. Nevertheless, these may include web pages containing a search line in the ›emptiness‹ of the white background; network word processors and other similar features with a minimal number of noticeable visual elements. Objects with an aggressive effect can be found more often on the Internet: these include images with a great number of multicolored or black geometric figures, dots, stripes, as well as text set in a small, almost unreadable font size (in this case individual alphabetic items melt into one solid text field), and a great deal of underlining, and many other elements that stimulate the visual organs into having an adverse effect on the network user's perceptive mechanism.

Applying the basic principles of videoecology to virtual space will enable us to define and eliminate the elements of visual decoration that have a negative impact on the users' organs of vision and thus clean up the virtual environment, thereby making it more *ecofriendly* and favorable for visual perception.

Human, color and network space

›Vision initiates a number of different perceptual experiences that are linked to reflection on color, spatial, dynamic and figurative characteristics located in the visual field of the objects«.[3] The ›simplest‹ of the above characteristics is color perception, based on aggregate visible brightness, color tone and saturation of the light reflected by the surface [Яньшин 2006:140]. Afterall, color is one of the most important factors of perception of the environment.

At the earliest stages of cultural development, humans strove to acquire the ability to influence the colors of their mental and physical condition. According to the survey conducted by the American colorist F. Birren [Birren 1961], the earliest estimations of the influence of color on various systems of the human body and its condition in general are connected with

3 National Psychological Encyclopedia. [Electronic resource]: www.vocabulary.ru/dictionary/30/word/zritelnoe-vosprijatie (13.08.13)

4 First mentions of aura were found in treatises of Pythagoreans ca 2600 years ago.

the doctrine of aura[4] and possibility of contact between a patient and a healer. Later (in XVII-XVIII centuries) some doctors used the intended effects of color to treat wounds and parts of the body. In the 20th century such hypotheses have received scientific confirmation. In particular, according to the research conducted by a physiotherapist Sandy MacDonald [McDonald 1982:50], irradiation with a blue color significantly reduced the pain in joints affected by arthritis, and a French physiologist Charles Fere established experimentally that the color red has the greatest influence on muscular tension as compared to other colors. These data suggest that color may affect a person on a physiological level.

The foundation of color perception is *archetypes* or *kernel structures* of the »global picture« [Петухов 1984:304], which are engaged from the earliest stages of perception – in the senses. Color categorization takes place on the level of physiological responses of the body, thus enabling it to acknowledge a deep connection between the meaning of a color and the respective response of the organism to its impact. Certain laws can be applied not only to the physiological level of color perception, but also to that of more differentiated experiences manifested in the form of emotional states and object feelings. In other words, kernel structures of empirical perception also take place on the sensual and emotional, i. e. psychological, level of color perception.

P. V. Yanshin, a Russian psychologist and psychotherapist, in his experimental studies identified two sets (contexts) of interpretation of color meanings – subjective and objective – defined as different modi of the observer's conscience. At the same time, the author also connected the subjective set of unconscious color exposure with congenital physiological responses of the body as its basis, while the objective interpretation of colormeaning is comparable to the notion of a ›second power of paint,‹ described by V. Kandinsky, a Russian vanguard artist, or the ›sensual and moral level of the color effect‹ postulated by the great German poet and theoretician J. W. von Goethe *(Theory of Colours)*. The subjective meaning operates in the context of *subjective attitude and evaluation*, whereas the objective set produces effects in the context of *quality, expressiveness, symbol and idea*.

All this allows one to speak of two levels of color exposure, and two quality categories of such exposure: positive and negative. The negative impact of color can be attributed to the existing problems in the visual ecology perceived by human. Therefore, it is necessary to consider different aspects of the impact of color design on the surrounding space and the identification of specific patterns and consistencies between the goals of the color and the uses color effects received.

Goethe considered physiological, psychological and semiotic aspects of colors' impact in terms of their interdependence. Each color, in his opinion,

has some physiological and emotional-sensory effects. In this connection, colors are divided into »positive side colors« by their impression on the spectator (yellow, orange, yellow and red) causing a buoyant, lively and active mood, and »negative side colors« (blue, red-blue and blue-red). They evoke feelings of anxiety, gentleness and melancholy. In addition, each color or color combination bears a certain semantic meaning caused by cultural characteristics of different nations. Goethe provides the following examples of the semantic content of colors in different cultures: ›black was to remind a Venetian nobleman of the republican equality‹ or ›Emperor of China has orange clothing, embroidered with purple. His servants and clergy are entitled to wear lemon yellow.‹

Heinrich Frieling and Xaver Auer, German color psychologists, also point to the fact that ›each color is characteristic of its emotional function‹ [Фрилинг/Ауэр 1973:37]. Using color it is possible to create an impression of lightness or heaviness, height or width, fun or sadness. Frieling and Auer attempted to classify colors by their psychological effect. For instance, yellow gives inspiration and promotes muscular activity while blue inhibits excitement. In addition, according to the researchers, there is a relationship between age and gender characteristics of humans and their color preferences: with age darker, soothing colors – brown, olive, gray and black – are preferred. At the same time, men tend to prefer red and yellow, and women give preference to blue [Базыма 2001].

Russian scientists are also interested in its mutual influence of color, color preferences, the personal characteristics of an individual and his/her emotional state. L. N. Mironova, [Миронова 1984] the author of many scientific papers, articles and books on coloristic and color science, exploring the dependence of color preferences on age characteristics and educational level of the testees, has found that simple, clean and bright colors are most often preferred by children, teenagers, and people engaged in physical labor. This can be explained by the fact that such colors act as active stimuli and thus are able to meet the needs of people with unwearied nervous system. However individuals with a high educational level and intellectuals often give preference to non-saturated, diluted shades with a soothing rather than stimulating effect. During the study A. I. Berznitskas isolated 8 color profiles of intellectual emotions. Emotions associated with confidence, guesswork, or wonder were most often accompanied by the selection of red and yellow colors [Берзницкас 1980].

These theories, approaches and experimental data can be used to solve existing problems associated with insufficient, excessively inappropriate, or inharmonious uses of color. For example, one of the problems in modern cities is the superfluity of different shades of gray, brick and white we face when looking at the facades of buildings. According to Frieling and Auer, painting a building or premises in white contributes to rapid fatigue; shades of gray, in most cases, have a suppressive effect. In addition, such

color solutions evoke negative associations, feelings and emotions in the majority of urban dwellers due to their redundant replicability and excessive prevalence. The other extreme is the use of random color combinations and geometric forms with a complete absence of visual elements. Such buildings, widely spread amongst new construction projects throughout Russia, have just as negative an impact on individuals by creating a sense of chaos, disorderliness and panic. Similar problems can be resolved if the possible effects on the physical and emotional state of the others are taken into consideration when choosing a color composition.

Certain features of color perception are represented on the Internet and electronic media. First of all, they involve the very technology of color representation and ›readout‹ from the monitor. Each image, color element, text, really anything we may see on the screen, consists of numerous neat rows of dots or pixels. Color display becomes possible as each pixel represents a group of three dots of basic spectrum colors: red, green and blue. Since the size of each separate pixel is very small, color dots merge into one. Proportional combinations of these colors provides the whole color palette that can be represented on the screen. This variety of colors becomes visible as the electronic gun of the monitor emits three beams, each of them corresponding to one of the three main colors, and the specific saturation and luminosity parameters of each.[5] Hence the mechanism of color perception in this case is of artificial nature.

5 Technical means of the computer graphics. [Electronic resource]: www.school.xvatit.com/index.php?title=Технические_средства_компьютерной_графики (16.08.13).

Moreover, perception of the virtual environment and objects that populate it is limited to the screen and this influences color perception which has its own peculiarities in the planar composition. For example, the same color will be perceived differently on a dark or light background, therefore, bright, contrasting, warm combinations are typical for foreground and cold, dilute tones – for background [Калмыкова/Максимова 2010:24]. Lighting plays an important role in color perception, but it cannot exist in virtual space. For this reason, a graphic designer is forced to create both the shape of the object and its color transitions manually. Quite often this leads to incorrect, distorted perceptions of the entire composition of the web page, with its separate objects forming ›particular‹ level of network ›pollution‹.

All of the above peculiarities of color perception in virtual space, however do not prevent us from considering color as a factor affecting the physical and emotional state of web users. Today, on the World Wide Web, one can find numerous examples of how not to use color in graphic design. One can find green colored text on a black background, or a combination of deep red with equally rich purple, as well as inconsistencies of color, its impact clashing with the subject matter of the web site, for example when the color red, which has revitalizing and stimulating effect on people, is selected as the main color for a site dedicated to meditation techniques. Or when choosing color schemes for summer sports forums the preference is

given to soothing, cold blue. Such situations take place because of the fact that many web designers, ›builders‹ and ›architects‹ of the network having mastered software engineering, have forgotten to learn the basics of color perception, even though such knowledge would help to avoid many of the pitfalls leading to ›color pollution‹ of the Internet.

The author considers it possible to apply the knowledge of universal features of color perception. In addition, one should pay attention to the cross-cultural characteristics of color perception based on the semantic meaning of colors for representatives of different nations and nationalities. The practical guidelines developed by Frieling and Auer regarding color selection when decorating premises with different functionality can be used on the Internet, as each web platform involves the implementation a certain kind of action, followed by an emotional reaction. If designers of web pages analyze and predict possible expectations, emotions, actions taken by users within a particular network platform prior to deciding on color selection, the choice will be based not only on subjective desires of the resource ›designers‹, but also on objective facts, which, in turn, will improve the color scheme of virtual space as a whole.

Environments oversaturated with symbols

Color is not the only element bearing a code that is read and understood by the user in accordance with the so called kernel structure of a ›world view,‹ or archetypes, cross-cultural peculiarities of perception, as well as though the influence of personal, subjective factors. The Internet as a whole is a space comprised of codes, symbols and signs of various nature. Some of them are borrowed from the surrounding natural space. The other part is original and indigenous only to the network environment. A good example is the ›html language‹ — the set of codes, each containing a specific command or dynamic action. This is one of the specialized technical languages of communication between man and computer, which is not known and understood by the entire ›population‹ of the Internet space.

Much more universal is the system of *iconic signs*, presented on the Internet: these include graphic reflections of emotions – emoticons (or smiles) that the majority of network users are not only aware of, but actively use in the real life, as wel as icons that are called upon to simplify navigation, guide the user to relevant sections, denote functional capabilities in addition to the multitudes of other iconic signs based on the similarity of the symbol with the specific object.[6] Flexibility and variability of these semiotic systems in the network, as well as the absence of fixed, constant rules for depicting iconic characters leads to a huge number of interpretations of copyright representations of the same object. In addition, each character represents a code which, according to the Soviet expert in culturology and semiotics Yuri Lotman, is always open for ›possible new interpretations

due to the variety of traditions, contexts, matches – mismatches at different levels of the hierarchy of the coding structure‹ [Лотман 1996:98]. Therefore, iconic systems of signs do not only contain the numerical diversity of visual representation of the signified object, but also a wide range of interpretations of meaning of each sign element. If you take into account the huge number of the signs themselves, such a situation allows one to speak of a ›semantic contamination‹ of the Network.

A separate highly-developed semiotic system is *font graphics*. Representing a vital mechanism of cultural memory, the font may enhance image sensitivity of the text. Y. Lotman used to say that a reserve of information growth may emerge at the interface of verbal and iconic signs‹ [Лотман 1996:109], capable of increasing the semantic load of the text. This potential of font graphics is rarely used in the network environment. At the same time, one can speak of a spontaneous, erratic use of fonts that forms a new level of semantic infestation on the Internet.

The variety of semiotic systems, comprising a virtual space, is certainly not limited to these examples. However, they allow you to imagine a possible multi-level structure of such systems, as well a the qualitative and quantitative diversity of these constituent symbols and signs. Moreover, these sign systems suggest the existence of at least two aspects of the problem of visual ecology of virtual space. On the one hand, there is the problem of the excessive and indiscriminate saturation of space with different systems of signs, along with the lack of consistency in visual incarnations of expressed meanings. Another aspect of the problem is indicated by the utilitarian use of the existing diversity of characters in general.

According to concepts of virtual space formulated by the French postmodernist philosopher Jean Baudrillard, Internet is completely devoid of symbolic value and a connection with reality. Signs losing such a link, hypertrophy, proliferate and produce »metastases.« Value no longer exists, the epidemic of sign remains: it spreads out in all directions, with no indication of whatsoever [Бодрийяр 2012]. In accordance with Baudrillard's position, finding a solution to the above mentioned problems of visual ecology on the Internet with its unlimited developing ›metastases‹, is not possible with regard to the ›sign epidemic‹ or the ›expulsion of reality with its double‹ on the semiotic level of perception. Nonetheless, the Internet is becoming a space of permanent and often ›involuntary‹ stays for the person living in the information and communication society, and therefore, the search for solutions to create a comfortable and ›eco-friendly‹ visual communication space, is urgently required.

A. G. Rappoport, a Russian scientist, art critic and architect, considered a similar problem in the context of the natural environment:

> ›The industrial revolution, urban lifestyles, and thedevelopment of positive sciences have ruined what social scientists called the ›traditional lifestyle‹, bereaved the subject world of its mythological functions and thus depleted its spiritual and sensual sense. Things, buildings and their elements are viewed from purely practical and constructive point of view. […] In a modern urban culture, the symbolic values of life are expressed in a word, books and articles, speeches and reports, while the subject environment loses it ideological importance‹ [Раппопорт 1985:11].

The author considers the achievement of a harmony between practical and non-practical features of the virtual environment as one of the possible solutions to the problem of practicality in terms of the multitude of signs used in the network to ensure visual comfort and emotional full-value of perception of Internet as a whole. In addition, it appears necessary to create a system of constant visual representations of sign elements which in turn, will enable to resolve the problem of disorderly saturation of network space with variants of their representation.

Visual comfort indicators

So the problem of an ecology of specifically identifiable space is closely connected with a category of visual comfort, which is a direct indicator of friendliness within the visual environment. This category is rather subjective to some extent that as the sense of comfort is related not only to common laws of perception, archetypes, but also to purely personal views, and individual characteristics of each person. In addition, the elements comprising the visual space, whether they are color, graphics, or text, are perceived differently by representatives of different cultures, which also affects the feeling of comfort in the process of visual perception. Such cultural differences, in the author's opinion, also exist on the Internet given that the World Wide Web is a space where representatives of all existing cultures with sometimes diametrically opposite cultural codes are present. The *mental maps method* helps to build a complete concept of comfort of visual space, taking into account general laws, as well as cultural and individual characteristics of visual perception in their entirety.

The study of mental maps of cities made by the American urban planning specialist Kevin Lynch and other authors was focused on emphasizing ›anchor points‹ in the mentality of townsmen as core principles in perceiving a certain city or specific architectural object, by which the said object is identified and allocated to categories of ›city‹ and ›this specific city‹. At the same time a difference between the actual location of objects in the given space and inhabitants' mental maps was found. In addition, the significant distortion of urban environment and exclusion of certain objects from spa-

tial representation was observed. On the basis of the research conducted, we can conclude that most useful or advantageous objects fall within the visual perception of inhabitants which together form a common concept of the urban environment that differs from reality [Шныренков/Кофанов 2011:47]. Moreover, the study of mental maps of the urban space found the following regularity: the closer the mental map is to the actual geographical prototype, the more comfortable is the urban environment.

From the author's viewpoint, the use of such a method to investigate virtual space will enable us to understand which objects are identified by the user as useful and favorable in terms of visual comfort, given that stimulus objects are most frequently perceived outside the general context and, most likely, would not be included in a complete image of perceived space, thereby forming gaps or distortions. The lack of a large number of elements comprising the investigated space would allow us to estimate their negative impact on the user, whereas the most accurate picture corresponding to reality may be considered an indication of the lack of visual stimuli.

Conclusion

Our analysis of theories and concepts of Russian and international scientists that can be applied to solving the problems of visual ecology of the Internet, has demonstrated that:

— Problems of visual ecology on the Internet exist on at least three levels: physiological, psychological and semiotic.

— On the physiological level, the problem lies in the negative impact of the virtual environment on the user's visual organs. In order to define and eliminate elements of visual design on the Internet that have an adverse effect on the visual organs, it is necessary to use the basic principles of videoecology – a scientific school that treats the visual environment as an ecological factor.

— On the psychological level, the problem of negative effects caused by certain colors and color combinations on the sensual and emotional state of users was identified. The theories and approaches of Goethe, Frieling and Auer, as well as those of Russian researchers can be used to eliminate this problem.

— The problem of visual ecology on the Internet is represented on semiotic level in two aspects: firstly, the Internet is oversaturated with various systems of signs and variants of visual representation of certain character elements, and secondly, all the existing diversity of signs is invested with exclusively practical properties. Possible solutions that allow for creating a comfortable visual and communicative network

environment would include the establishment of a system of common and single rules for visual representation of character elements and the achievement of harmony between practical and non-practical features of the virtual environment.

— The category of visual comfort serves as an indicator of the eco-friendliness of the visual environment, including the Internet. This category represents the totality of culturally universal and particular visual codes; on the one hand, they are shared by the majority of people, while on the other they take into account peculiarities of visual perception of the specific target audience.

— The use of the mental map method that was practically applied for the first time by K. Lynch in the context of urban environment, would allow us to understand the level of visual comfort experienced by each network user within the specific web platform, and also define the ›stimulus objects‹ leaving a negative impact on the physiological and psychological state of the recipient.

— The theories and concepts of international and Russian investigations described in this article poses a great methodological potential for practical building communication within the Internet space that meet the criteria of visual comfort.

Biographical Notes

4th year student, Faculty of Psychology, National Research Tomsk State University (TSU), Major in Advertising. Interests related to future professional activity: integrated marketing communications in social media; new media; basics of management and promotion of corporate social media accounts; news online journalism; visual ecology of virtual space.

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