On the Impact of Visual Information on Religion, Culture and Art

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Abstract: In varying degrees the design of religious temples, premises, printed products, paintings, electronic media, TV shows use planar images. The paper continues the study of the possibility of space perception in the plane images (3D-phenomenon). An attempt to interpret the new features of visual perception in the analysis of eye movement is made. Selected experimental results using stationary and portable binocular eyetracker, as well as conditions proving the perception of three-dimensional attributes of planar images are given. To identify the depth and volume perception, 3D raster images are used. Studies using portable eyetracker conducted on a sample of about 17 respondents aged from 20 to 22 years (students). The teaching of students shows the possibility of enhancing the relief levels (the first levels of the 3D phenomenon development). The analysis of the spatial attributes perception is shown for paintings. However, any planar images, such as TV, computer screen, and various electronic scoreboards, etc. can acquire the depth and spatial perspective.

1. Introduction

Binocular depth perception is getting visual information in two eyes i.e. two observation points [1]. Two observation points create two slightly displaced projections of the visual field on the retina. Displaced projections form a three-dimensional perception of the habitat. On the other hand, they interfere with obtaining three-dimensional perception of any 2D images. Monocular signs used in the visual arts, design, etc. create only the illusion of depth and spatial perspective. Because on the plane it is impossible to get all the three-dimensional attributes of binocular depth perception. We can recall that up to 90% of the information is transmitted to us through the visual system.

In varying degrees, all the stated sections of this conference use planar images. This includes the design of religious temples, premises, printed products, electronic media. When conducting concert cultural events stage design uses 2D electronic visual support. The TV screen, computer monitor, electronic information and advertising boards of various sizes are all flat images, including the design elements of the premises.

The proposed work shows that today binocular depth perception limitations on perception of

perspective are overcome and it becomes possible to observe any 2D images with three-dimensional attributes (The first information about the new abilities of the visual system (3D phenomenon) in the perception of paintings was published in patent 2318477 RU). With the rapid development of both art and science, the competition of visual communication is growing fierce, religion, culture and art are living on transformation and innovation. The arts visual language power of expression make up visual information pattern and color, prevalence of substance information. How to use the reality and false imagination into art design and cultural creation? How to combine with the visual transmission of plane images to create new cultural and artistic works? How does the the possibility of space perception in the plane images (3D-phenomenon) affect religion, culture and art? These questions will be discussed below.

2. Methods

Objective indicators of the possibility the 3D phenomenon are obtained by eye movement registration using a binocular eyetracker [2]. Binocular eyetracker allows registering the X coordinates of the right and left eye gaze direction [3].

Let us consider on the registration the 3D phenomenon in planar perception of paintings (visual stimuli). In our studies, first, information on the depth perception of the color palette of 2D images for an experienced researcher was obtained [4,5]. Then, in the survey, about 80 students were from Kazan Federal University [6].

The reliability of the paintings depth perception obtained using raster technology. Raster technology encodes at least two projections using Adobe Photoshop (i.e., information from two observation points) on a single plastic plate made of cylindrical lenses. The perception of the visual stimulus spatial attributes occurs when a raster plate is placed in the field of view. In other words, at least two projections are fixed on one plate. As with binocular depth perception, the basis of the objective depth perception technique is comparing the indicators of eye movement in the perception of the 2D visual stimulus and its three-dimensional raster analogue.

When placing the visual stimuli on the monitor screen and recording X-coordinates of the eyes movements using eyetracker during a period of time ΔT according to the difference $\Delta X = X(Le) - X(Ra)$, a contour of the difference histograms (probability density distribution function) is obtained. Using the probability density distribution function, it is possible to determine the space region in which the perception of the visual stimulus on the screen occurs.

3. Results and Discussion

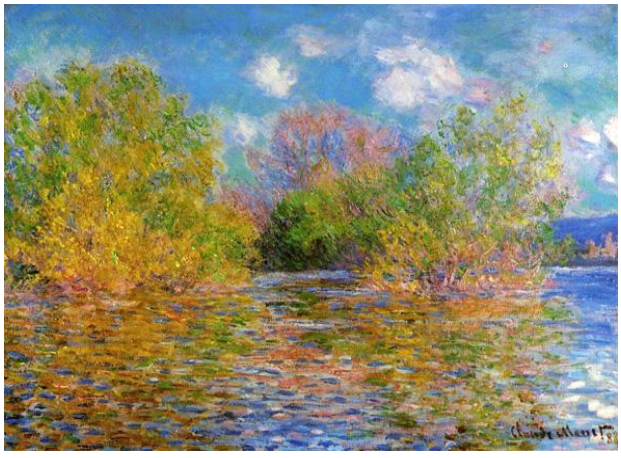

Figure 1: The stimulus image of Claude Oscar Monet's “The Seine near Giverny”.

Figure 1 shows the first stimulus image: “The Seine near Giverny” (Claude Oscar Monet). Figure 2a shows of the distribution function ΔX of 2D perception the first stimulus image obtained by one of the students (“A”) of the Institute of Physics of Kazan Federal University. Conventional values of ΔX are plotted on the horizontal axis, and relative values of the probability of ΔX are plotted on the vertical axis. Figure 2b shows the distribution function ΔX obtained by perceiving of the raster 3D image of the same stimulus.

The location of the maximum of the distribution function on Fig. 2a in the region of positive ΔX values demonstrates the perception of space located behind the eyetracker screen. Moreover, the distribution in Fig. 2b confirms the perception of the three-dimensional attributes of the 3D phenomenon. In other words, it is the distribution of the eye movement function for the raster 3D image. As you can see, the maxima of the distribution function are located in the general interval ΔX. Note that for about 40% of the 17 students participating in the survey, obtained similar results that coincide with the results of the experienced researcher.

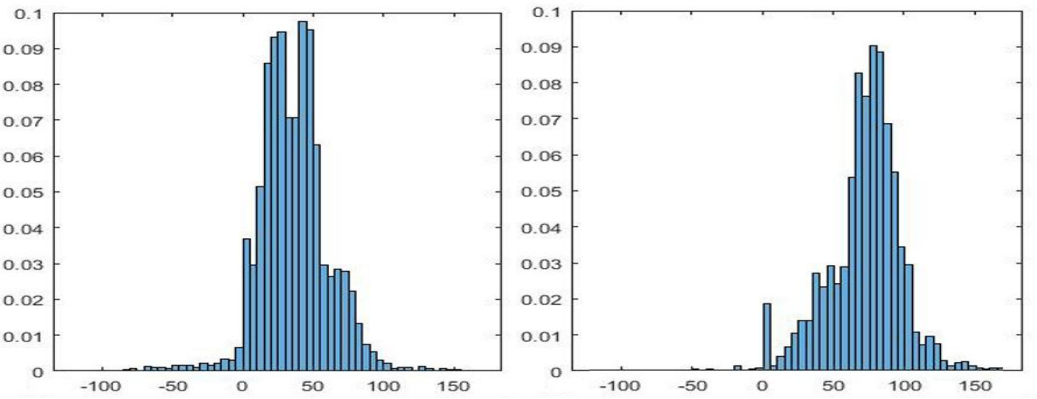

Figure 2: The distribution function of perception Fig.1 by the student “A”: the 2D image (a), the raster 3D projection (b).

Figure 3 presents the second stimulus image: "Waterloo Bridge" (Claude Oscar Monet). Figure 4a shows of the distribution function ΔX of 2D perception the second stimulus image obtained by student “A”. Figure 4b shows the distribution function ΔX of the raster 3D image.

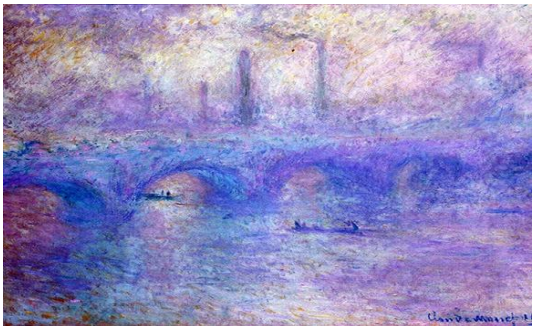

Figure 3: The stimulus image of Claude Oscar Monet's “Waterloo Bridge”.

Note that the ΔX values are in the range of positive and negative values. They demonstrate the spatial perspective perception, both before the monitor and behind it. Recall that the distribution function is the objective evidence of the spatial perspective perception. Both objective and subjective perception of space are the individual characteristics of each person. Objective perception of depth may be compared by the resulting distribution function.

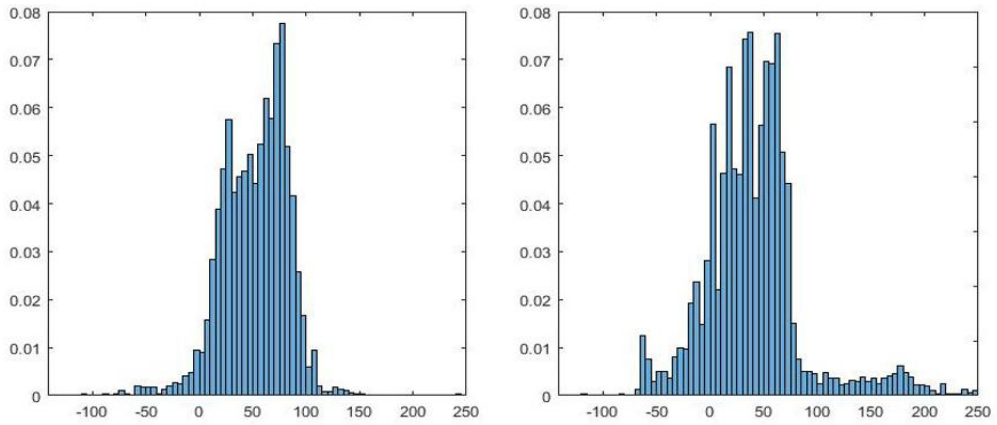

Figure 4: The distribution function of perception Fig. 3 by the student "A": the 2D image (a), the raster 3D projection (b).

These results show that the human depth perception is affected by both monocular and binocular cues at the same time. Therefore, it must consider their role in the performance of virtual reality and the objective depth perception technique to get the best visual effects.

4. Conclusion

The analysis of the spatial attributes perception is shown for paintings. Under certain conditions, it is possible to assert that the perception of the surrounding space under the conditions of the 3D phenomenon significantly expands the range of binocular depth perception. We assume that the formation of the perception of depth becomes dependent on the cognitive activity of a modern person. Moreover, it should be assumed that this is already the beginning of the formation of the phenomenon of collective cognitive unconscious visual perception (patent number 2553495 RU). In addition, it greatly expands the possibilities of the human psyche, the imagination, including in the cultural, historical, intellectual and creative being.

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