Study of the comfort of urban visual environments in the city of Cheboksary

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Abstract. The current research highlights the problem of ecology of the urban visual environment of a large city on the example of the capital of the Republic of Chuvashia, the city of Cheboksary (Cheboksary). Given the saturation of the city with complex geometric forms and objects of architecture of different styles and epochs, the authors considered it important to study the issue of the perception of the city by the population as a generator of natural influences on the visual sense organs. The subject of the study is the influence of architectural forms of buildings of urbanized space on the psychophysiological comfort of a person, as well as the level of noise pollution by vehicles of the city under study. As the objects of research the authors defined the buildings and architectural ensembles of the city. As a research method, the authors used testing with systematically selected formulations of questions to assess the general perception of aesthetic beauty in cities by residents. The main task of the authors was to define recommendations for creating visual and psychological comfort in the artificial urbanized environment of Cheboksary, as well as to develop a system for identifying irritants and factors of "urban stress".

Keywords: urban stress, urban visual environment, saccade, visual field, visual environment

1 Introduction

A person was formed in conditions of natural influences on the sense organs (sensory influences). Its habitat was characterized by the visual impact of beautiful natural landscapes, as well as the impact of favorable natural sounds. For a long time, man sought to surround himself with beautiful objects, to place his home in beautiful locations.

As a result of spontaneous urbanization, the sensory environment surrounding a person had gradually become "aggressive" for the senses [3]. In urban ecology, new directions of...
The issue study have appeared in recent years. The field of knowledge about human interaction with the visual environment is called Video Ecology or Visual Ecology [4, 5]. Its main task is to develop the scientific basis for creating visual and psychological comfort in an artificial urbanized environment.

The main signs of aesthetic "pollution" are: monotonous, homogeneous and monochrome architectural environment; inexpressiveness of buildings; disharmonious disproportionality of volumes; lack of harmonious compositional unity with the natural environment. In addition to architecture, the number of strong visual stimuli should include transport on the streets of the city. All dynamic stimuli have a great influence on sensory systems.

The endless stimuli of the urban environment led to "urban stress", defined as "the experience of negative, uncomfortable sensations of a physiological and mental origin." Based on the foregoing, we have put forward the goals and objectives of the current research.

The purpose of the work: to assess the urban visual environment in the city of Cheboksary (Cheboksary).

Tasks:
- To assess the visual environment of Cheboksary; identify homogeneous and aggressive video fields, as well as elements and methods of forming a comfortable urban visual environment.
- To determine the coefficient of aggressiveness for modern architectural buildings in Cheboksary, and its changes when repainting buildings; on the basis of this, to reveal the influence of architectural forms of buildings of urbanized space on the psychophysiological comfort of a person.
- To assess the influence of the shape of national architectural ensembles on the psychophysiological comfort of a person.
- To conduct testing of residents of Cheboksary to assess the general perception of aesthetic beauty in cities.

The object of research: the buildings and architectural ensembles of Cheboksary.

The subject of the study: the influence of architectural forms of buildings of urbanized space on the psychophysiological comfort of a person, as well as the level of noise pollution by vehicles of Cheboksary.

The human eye is designed in such a way that for the normal functioning of vision, it must make short chaotic movements in orbit with a frequency of two times per second, the so-called saccades [7]. Saccade (from the French word saccadé, which means "to pull", "to make a sharp movement") is a jerky, jump-like movement of the eyes of an observer who quickly shifts his gaze from one object to another.

The researchers have long been concerned with the analysis of eye movement in the process of visual perception [1, 2].

Scanning the constant visual environment, our eye fixes the most noticeable element. At this time, the image of the object is in the region of the central fossa (fovea centralis) of both eyes. In this position, we hold the eyes for a short time (3 seconds), then the eye moves to a new position with another saccade and fixes a new element. During fixation, the amplitude of the saccades decreases sharply, and the jump from one part to another is carried out by a saccade of a greater amplitude. The idea of the automation of saccades made it possible to consider the visual environment as an ecological factor.

Architecture affects a person constantly and subconsciously for the most part. Homogeneous visual environment is an environment in which there are no visual elements at all, or their number is sharply reduced. According to V.A. Filin [4, 10], the automation
of saccades cannot fully work in a homogeneous environment, since after the next saccade the eye does not find details for fixation. This leads to a sharp increase in the amplitude of saccadic eye movements, but this mode does not lead to the desired result. Prolonged work in this mode at first leads to a feeling of discomfort, and then to a violation of the automation of saccades, which in turn violates visual perceptions.

In a homogeneous environment, the nerve cells of the brain do not work properly. This means that when looking at the transverse face of the building, at a large glass plane, at a bare door that has no visual details, the nerve cells of the brain will not react in any way. This leads to a feeling of "visual hunger", a long stay of citizens in a monotonous visual environment leads to pronounced psychological discomfort, similar to that experienced by polar explorers. Thus, the homogeneous visual medium is characterized by:

- insufficient saturation of elements of modern buildings;
- many straight lines and right angles in modern building;
- the presence of one large plane;
- a simplified silhouette in a modern building, instead of which there is just a straight line without a single element.

A visual environment in which a large number of identical elements is dispersed is called an aggressive environment (Fig. 3) [4]. The aggressive visual environment causes a small number of saccades and large oscillatory eye movements. With a large number of identical, evenly distributed objects in the field of view, a person cannot define on which object he fixed his eyesight before and after the saccade. Due to the automaticity of the saccade, the eye easily loses the object that it was just fixed at. As a result, a person quickly loses interest in looking at such a visual field.

Forest, mountains, seas, rivers, clouds can be attributed to a comfortable environment. All the mechanisms of vision there work in optimal mode. Consider this on the example of the work of the saccade automation. When a person is in the forest, then at any amplitude of saccades, at any orientation and any interval, there will always be a sufficient number of elements for fixation. When the eyesight stops at some element, the amplitude of the saccades decreases to a minimum. In the formation of a comfortable visual environment of the city, decorative elements are of great importance: portal, order, column, arcade. A modern citizen can see all these elements only in the old part of the city.

Repainting buildings is the most affordable means in the formation of a comfortable urban visual environment of the city. A well-chosen color is able to relieve eye strain, optimize conditions for visual work.

2 Methods

We carried out the research work in 2021 – 2022 Cheboksary (Chuvash Republic).

1. To study the features of visual perception of urbanized spaces, a technique for identifying aggressive, homogeneous and comfortable fields was used (was developed by Filin V.A., 2006) [5] with our additions. For a visual analysis of the urban environment, we viewed 334 buildings on 10 streets in Cheboksary.

2. The method of the "eight-color Lüscher test". For the correct testing of residents to identify the degree of aggressiveness of buildings, it was necessary to select the respondents with normal psychophysiological characteristics. For this purpose, the technique developed by M. Lüscher in 1970 was used.

M. Lüscher suggested that the preferences of some colors to others are in a certain way related to the psychophysiological personality characteristics of the subject. This was the
basis of preliminary testing. The Lüscher test determines the subject's ratio to the four primary and four complementary colors. Primary colors include: No. 1 – blue; No. 2 – green; No. 3 – red; No. 4 – yellow. Additional colors include: No. 5 – purple; No. 6 – brown; No. 7 – black; No. 0 is grey. Each color has its own symbolic meanings. The main colors symbolize psychological needs (satisfaction, affection, the need for self-affirmation). Additional colors symbolize negative trends: anxiety, stress, fear and grief.

As the norm of color preferences, Lüscher adopted the following sequence of colors:

No. 3 – red, No. 4 – yellow, No. 2 – green, No. 5 – purple, No. 1 – blue, No. 6 – brown, No. 0 – gray, No. 7 – black. This sequence is the standard of psychophysiological well-being.

The current experiment involved 200 respondents from Cheboksary aged 20-55 years. They were asked to lay out 8 colors in order of preference, while evaluating the color without associating it with any subjects. After completing the selection of the first eight cards, it was necessary to re-select the cards with the colors they liked. In the process of performing the second step of testing, without trying to remember the choice from the first step, it was necessary to choose the color they liked most, relying on their feelings.

3. Methods of analysis of the urban visual environment to identify the degree of aggressiveness of buildings

To assess the urbanized space, we used the method of analyzing the urban visual environment to identify the degree of aggressiveness of buildings, developed by V.A. Filin.

According to this technique, the respondents were offered several tests at the same time, according to which they were asked to answer the question: "Do you like this picture?". The respondent then rated the attractiveness of each test on a five-point scale [5].

First, the coefficients of aggressiveness of modern architectural buildings were determined and, on the basis of this, the influence of architectural forms of buildings of urbanized space on the psychophysiological comfort of a person was revealed. Secondly, the task was set to determine changes in the coefficient of aggressiveness when painting these buildings, as well as to identify the influence of color as a psychophysiological characteristic on the formation of a comfortable urban environment [10].

The experiment involved 100 respondents from Cheboksary aged 20-55 years, who in most cases do not have visual impairment and differ in professional characteristics, temperament, as well as in place of residence. The criterion for the degree of aggressiveness of the visual environment of Cheboksary was the psychophysiological sensations of the respondents on the photographs offered, as well as the assessment of the influence of color as a psychophysiological environment-forming characteristic. As a result, the degree of aggressiveness of these architectural buildings in the above-mentioned cities, and changes in this characteristic with the help of color, were revealed. On the basis of psychophysiological testing, an assessment was made of the comfort of visual perception of individual buildings of modern architecture on a black and white scale: from 1 (very bad), to 5 (very good). Then the respondents were asked to evaluate the same buildings, but according to color images on the same principle. In addition, it was necessary to answer the questions:

Do you like this architectural building?
Describe how you feel when you look at it?

After that, the aggressiveness coefficient of each building was calculated according to the formula:
Kagr = (1/P)*100,
where P is the average number of points.

The same methodology of V.A. Filin [5] was used to assess the forms of national architectural ensembles.

The influence of the shape of national architectural ensembles on the psychophysiological comfort of a person, as well as the change in their influence during painting, was evaluated. The experiment involved 100 respondents aged 25-55 years.

3 Results and their discussion

3.1 General characteristics of the urban visual environment of Cheboksary

Cheboksary - the capital of the Chuvash Republic, an architectural monument of Russia; administrative, industrial and cultural center of the Chuvash Republic, with a population of 464,940 thousand people.

What is the city of Cheboksary from the point of view of a video ecologist? On the one hand, it consists of historical architectural objects, on the other, it is an example of the architecture of the functional style.

The central streets of the city, the "sleeping" (residential) areas of the city, industrial zones are completely different in terms of visual environment. Along Lenin Avenue, objects related to the performance of administrative functions (administrative and executive bodies of the Chuvash Republic) and representative functions of the city, shops, clubs, cafes are the examples of a comfortable visual environment. Decorative framing of windows, balconies with balustrades, arches, pilasters on the facades of buildings, decorative cornices give buildings a special expressiveness. It is in this part of the city, including the historical one, that the monumental "Stalinist" houses of peculiar architecture, churches and temples, theaters and museums, parks and alleys are concentrated. In the city there are 97 monuments of historical and cultural heritage. The territory of the city also includes 5 parks and 4 squares.

Decorated flower beds, green lawns play a huge role in the color design of the city.

Boulevard named after the merchant Efremov is the street leading to the historical and oldest part of the city. On the left side of the boulevard there is the building of the Chuvash Drama Theater, made in the style of classicism with columns and a pediment with sculptural figures. On the right - the Chuvash National Museum, which lost its former appearance during the restoration, but still perfectly fits into the ensemble of old historical buildings.

Holy Trinity Monastery, cathedrals and churches create a comfortable visual environment around the bay of Cheboksary, admired for hours; their architecture is exquisite and complex, which means that the physical field is enough for the work of the eye. A person rests spiritually in these areas with no homogeneous and aggressive fields, the color scheme of both the natural landscape and socio-cultural objects is rich.

The residential and industrial areas create homogeneous and aggressive fields in continuous rows of monolithic residential buildings, shopping and office centers, schools, hospitals. For example, the building of a children's city center is characterized by a large number of identical windows. Images obtained by the right and left eyes are difficult to merge into a single visual image. There are so many windows and they are so identical that,
in fact, the main function of vision is disrupted determining where the eyes look and what they see.

An example of a homogeneous visual environment is the use of glasses larger than their size. Eyeglass does not like - it is transparent, there is simply nothing to concentrate on.

In industrial areas, there is no compositional and functional connection with the environment, industrial buildings are built taking into account the cheapness and functionality (buildings of the tractor and aggregate plants). Some industrial buildings are located in the immediate vicinity of residential buildings (industrial buildings of an aggregate and electrical appliance plants), and from the point of view of video ecology this is unacceptable.

The most aggressive buildings located on the territory of Cheboksary are: the buildings of the administration of the Leninsky district, the administration of the Moskovsky district, the building of the Government House, the building of "Carousel" shopping center, the building of "Cascade" shopping and entertainment center, the building of "MTV" shopping and entertainment center, the building of "OVOS" service center, the building of "Expo-Contour" exhibition center, the building of "Sespel" cinema, the building of the hospital complex on Traktorostroitelny Avenue, the building of the children's city center, the building of the Palace of Children's Youth and Creativity, the building of the Palace of Culture of the Tractor Plant, the building "Salyut" (the Palace of Culture), the Opera and Ballet Theater, the "Business Plaza" office center.

In addition, we analyzed the visual environment on 10 streets of Cheboksary of different years of development.

Along Composers Vorobyov Street (buildings of the 20s - 40s of the XX century) of the 8 architectural structures considered, 3 administrative buildings are an example of a comfortable environment, 4 buildings create aggressive fields, and one is a homogeneous field.

Along Konstantin Ivanov Street (18 architectural structures of the old buildings), a church, a monastery, a cathedral, a diocese building, an art gallery building, a psychotherapeutic center, 6 residential buildings are examples of a comfortable visual environment, but another 6 residential buildings create homogeneous fields.

Thus, of the 26 architectural structures of the 20s - 40s, 15 (58%) are examples of a comfortable visual environment, 4 (15%) buildings create aggressive fields and 7 (27%) create homogeneous fields.

Along Lenin Avenue (buildings of the 50s - 70s) there are 90 architectural structures; of these, 55 buildings (61%) create aggressive fields, 3 (3%) are examples of homogeneous fields and 32 (36%) are comfortable in terms of visual environment.

Along Karl Marx Street (52 architectural structures), 23 buildings (44%) are examples of a comfortable visual environment, 17 (33%) - create aggressive fields and 12 (23%) are homogeneous.

Of the 142 architectural structures built in the 50s - 70s of the XX century, 39% of architectural structures are comfortable visual fields, 51% are examples of aggressive visual fields and 10% are examples of homogeneous fields.

Consider the streets of the Novoyuzhny district (buildings of the 80s of the XX century) and count the architectural structures located on these streets, creating homogeneous, aggressive and comfortable fields.

Along Huzangay Street (55 architectural structures), 27 residential buildings, 4 schools, 3 dormitories, 3 nursery schools, a center for social assistance to families and children, the buildings of the social university, Petrovsky College, the building of the State Statistics Committee, the building of Systemprom business center
(76%) create aggressive fields, including 25 residential buildings (45%) have homogeneous fields. The Palan store, the Pyaterochka trading house, the sports complex and 10 residential buildings (24%) also create homogeneous fields. Thus, not a single building along Huzangay Street is an example of a comfortable visual environment.

5. Along Shumilov Street (40 architectural structures) - 27 residential buildings, 2 schools, 3 nursery schools, Campus No. 4 of Chuvash State Pedagogical University named after I. Ya. Yakovlev, former state telephone service building, Federal State Unitary Enterprise of Disinfection Profile (87.5%) create aggressive fields. Of these, the transverse faces of 20 residential buildings also create homogeneous fields. 5 architectural structures (12.5%) also create homogeneous fields on this street.

6. Along Proletarskaya Street (28 architectural structures) - 24 residential buildings and 2 nursery schools (93%) create aggressive fields. The garage complex, located on Proletarskaya Street together with the building of the bus station (7%) create homogeneous fields.

Thus, in the Novoyuzhnny district, the considered streets have 123 buildings with no common architectural structure identified. Among them 101 (82%) buildings create aggressive fields and 22 (18%) - create homogeneous fields.

Consider the architectural structures on the streets of the north-western district (buildings of 2000 - 2010 of the XXI century): Denisov Boulevard, Ignatiev Street, Sverchkov Street:

Along Denisov Boulevard (10 residential buildings in total) - 5 (50%) create aggressive fields, and 4 (40%) are an example of a comfortable urban visual environment. The garage complex built there (10%) is also an example of a comfortable visual environment.

Along Ignatiev Street (16 buildings in total) - 3 residential buildings and 3 cottages (37.5%) create a comfortable environment, 5 residential buildings and the building of the former open university of the Volga region (37.5%) create aggressive fields and the transverse face of 4 residential buildings (25%) are the examples of homogeneous fields.

Along Sverchkov Street - 4 residential buildings (23.5%) create aggressive fields, 3 residential buildings and 6 cottages (53%) create comfortable visual fields, 2 residential buildings, a townhouse and a garage complex (23.5%) create homogeneous fields in the street.

The analysis shows that on the streets considered, in the total number of houses (43 architectural structures), 20 structures (47%) were identified, which are examples of a comfortable visual environment, 16 – create aggressive fields (37%), 7 structures (16%) are examples of homogeneous fields.

The analysis showed an increase in the number of buildings creating aggressive fields in the development of the late XX century (respectively, from 15% in the 20s - 40s of the XX century to 82% in the 80s of the XX century). The number of buildings creating homogeneous visual fields in the development of the 20-40s was 27%, by the 50-70s their number had decreased to 10%, but by the end of the XX century it had increased again to 18%.
Fig. 1. Comparative analysis of aggressive, homogeneous and comfortable fields in a period of time in Cheboksary

Figure 1 clearly shows how rapidly decreases the number of buildings creating a comfortable urban visual environment in the city is (respectively, from 58% in the 20s and 40s to 0% by the end of the XX century).

The beginning of the XXI century is characterized by a decrease in the number of buildings creating homogeneous and aggressive fields (from 82% in the 80s of the XX century to 37% by the beginning of the XXI century) and there is a tendency of increase in the number of buildings that create comfortable fields (from 0% in the 80s of the XX century to 47% at the beginning of the XXI century).

As a result of testing residents of Cheboksary to assess the general perception of the aesthetic beauty of the city, the following was revealed:

to the question: "Which part of the city is the most comfortable for residents?", 146 (73%) of respondents noted the bay and the embankment of the Volga River, 24 (12%) - the central street of the city, 18 (9%) - Victory Park, 12 people (6%) named the areas where they live as the most comfortable parts of the city.

to the question: "Which buildings do residents like more – the old or the modern ones?", 68% of respondents answered that they prefer the old style of architecture, and 32% - respondents answered that they like modern architectural structures.

3.2 Color Preference Assessment Results

As noted above, we conducted a preliminary selection of respondents according to the Lüscher method.

In Cheboksary, 103 (51.5%) out of 200 respondents put the main colors (red, yellow, green, blue) in the first four positions. This suggests that these respondents do not have deviations of psychophysiological states from the norm, since these colors symbolize calmness and balance. This group of respondents helped to determine more accurately the degree of influence of modern aggressive, homogeneous, and comfortable visual fields on the psychophysiological comfort of a person. And 48 respondents put three and two primary colors in the first places.
20 respondents put on the first four positions the additional colors (gray, brown, lilac and black). This indicates the presence in this group of respondents a psychophysiological conflict or physiological abnormalities. 3 respondents (1.5%) also put additional colors in the first three positions. Another part of the group (26 people) put them in the third and fourth place. In total, 49 people (24.5%) of the 200 respondents did not match the sequence of color arrangement.

During the Lüschner test, we defined that 24.5% of the residents of Cheboksary have a sign of psychophysiological conflict. (Fig. 2).

**The amount of people, %**

<table>
<thead>
<tr>
<th>Colors in the first four positions</th>
<th>Colors in the first three positions</th>
<th>Additional colors in the first four positions</th>
<th>Additional colors in the first three positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 colors</td>
<td>3 colors</td>
<td>4 additional colors</td>
<td>3 additional colors</td>
</tr>
</tbody>
</table>

**Fig. 2. Results of assessments of color preferences of Cheboksary residents**

Psychophysiological comfortable environment of Cheboksary

Determination of the coefficient of aggressiveness of modern architectural buildings, and its changes in the repainting of buildings. For this study, the following architectural structures were selected (Appendix 2, Fig. 7 - 16): the building of the Supreme Court of the Chuvash Republic, the building of the Government House of the Chuvash Republic, the building of Cascade" shopping and entertainment center, the building of "Carousel" shopping center, the building of the Chuvash National Library named after Gorky (Table 1).

**Table 1. Determination of the coefficient of aggressiveness of administrative, commercial and cultural institution buildings of Cheboksary**

<table>
<thead>
<tr>
<th>Objects under research</th>
<th>Black and white version</th>
<th>Color version</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>K agr., %</td>
</tr>
<tr>
<td>1. Building of the Supreme Court of the Chuvash Republic</td>
<td>3.82</td>
<td>26</td>
</tr>
<tr>
<td>2. Government House of the Chuvash Republic</td>
<td>3.58</td>
<td>28</td>
</tr>
<tr>
<td>3. &quot;Cascade&quot; Shopping and Entertainment Center</td>
<td>2.42</td>
<td>41</td>
</tr>
<tr>
<td>4. &quot;Carousel&quot; Shopping Center</td>
<td>2.34</td>
<td>43</td>
</tr>
<tr>
<td>5. National Library.</td>
<td>3.36</td>
<td>29</td>
</tr>
</tbody>
</table>

As a result of the experiment, it turned out that when evaluating black and white images, the most favorable effect gave the test No. 1 (Kagr, = 26%) - the building of the Supreme Court of the Chuvash Republic. When describing it, the most common answer was: "An arched roof with a dome decorates the building." This building is an example of a
combination of modern architecture with national architectural elements, which attracts attention.

Test No. 2 (the building of the Government House of the Chuvash Republic) and test No. 5 (the building of the Chuvash National Library) received an average score of aggressiveness: 28% and 29%.

For test No. 5 (the building of the Chuvash National Library), the most frequently repeated answers to the question "What did you like about this architectural building?" were: - the low number of floors of the building, the location of the windows on diamond-shaped protrusions; in front of the building there is a park, which significantly decorates the building itself.

The most aggressive of the proposed tests are test No. 3 (the building of "Cascade" shopping and entertainment center - 41%) and test No. 4 (the building of "Carousel" shopping center - 43%). The building of "Carousel" shopping center is a typical example of an aggressive visual environment. The bare monochromatic walls of the building, alternating with smooth glazed surfaces, the correct geometric shape of the building create a homogeneous visual environment. To the question: "Do you like this building?", the majority of respondents answered that the building of the shopping center resembles the building of the factory. The building of "Cascade" entertainment center also received a high coefficient of aggressiveness. To the question: "Do you like this building?", most of the respondents answered that "The building stands out among other modern buildings with its unusual shape, but you do not get aesthetic pleasure looking at this building. The building is devoid of windows and resembles a large "aquarium" with blank solid walls."

The most common characteristics of the description of the attractiveness of the test No. 1 "the building of the Supreme Court of the Chuvash Republic" were: color gives the building freshness; coloring enlivens the building (the value of the aggressiveness coefficient has improved from 26% to 25%).

When assessing test No. 2 "the building of the Government House of the Chuvash Republic" in color, the aggressiveness coefficient did not change, since the building has a neutral color (beige).

The value of the aggressiveness coefficient of the test No. 5 "the building of the Chuvash National Library" has also changed for the better level (from 29% to 25%) due to colored stained-glass windows. These changes in the values of the aggressiveness coefficient are the proof of the influence of color as a psychophysiological characteristic on the formation of a comfortable urban environment. In tests No. 3 "Cascade" and No. 4 "Carousel", the values of aggressiveness coefficients have also decreased and became equal to 38% and 34%, respectively.

Based on the data of the psychophysiological influence of architectural forms, it can be stated that the experimental data show the influence of modern silhouettes of architectural buildings on the psychophysiological comfort of a person confirming the negative influence of aggressive and homogeneous visual fields. The results of the evaluation of black and white and colored buildings showed that color is a powerful psychophysiological factor in the formation of the visual environment and, with the correctly selected color scheme of each building, can soften the aggressive appearance of the structure.

3.3 Determination of the coefficient of aggressiveness of national architectural ensembles of Cheboksary

The following buildings were chosen as national architectural ensembles for the study: Vvedensky Cathedral, Chuvash Drama Theater, Holy Trinity Monastery, Art gallery and St. Tatiana's Church (Table 2)
Table 2. Coefficient of aggressiveness of national architectural ensembles of Cheboksary

<table>
<thead>
<tr>
<th>Objects under research</th>
<th>Black and white version</th>
<th>Color version</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>K agr %</td>
</tr>
<tr>
<td>1. Vvedensky Cathedral</td>
<td>4.54</td>
<td>22%</td>
</tr>
<tr>
<td>2. Chuvash Drama Theater</td>
<td>4.18</td>
<td>24%</td>
</tr>
<tr>
<td>3. Holy Trinity Monastery</td>
<td>4.12</td>
<td>24%</td>
</tr>
<tr>
<td>4. Art Gallery</td>
<td>4.50</td>
<td>22%</td>
</tr>
<tr>
<td>5. St. Tatiana's Church</td>
<td>4.56</td>
<td>21%</td>
</tr>
</tbody>
</table>

All buildings submitted for testing got "good" and "very good" ratings. These buildings do not make homogeneous and aggressive visual fields in the city. It includes churches, theaters, museums, galleries that create a comfortable visual environment with their silhouettes. Vvedensky Cathedral and St. Tatiana's Church are marked as the most beautiful buildings. Properly selected colors of churches (white, blue and gold) emphasize their beauty and grandeur.

4 Conclusions

To prevent the negative factor associated with the widespread deterioration of the urban visual environment, we expect practical activity of vision specialists, psychologists, doctors, ecologists and, of course, architects and city authorities (Likhacheva, 2002). Video ecology should become a phenomenon of mass consciousness. Thus, it is recommended to:

- analyze and map the "pollution" of the urban visual environment of cities. To create maps, it is necessary to develop a method and devices for assessing the urban visual environment;
- create closed spaces in cities providing a sense of security. This can be achieved by compacting the territories with small buildings, making "arch" forms between the houses, as well as additional streets and landscaping;
- recommend that architects reduce the use of continuous glazing of building facades, the use of a large number of repeating identical elements;
- develop cottage construction;
- pay special attention to the color of the city. Color saturation of the urban environment is one of the necessary conditions for creating a comfortable urban visual environment. Color in the architecture of the city creates psychophysiological comfort, forms a meaningful and emotionally saturated urban space, and also softens the aggressiveness of buildings;
- strive to limit the growth of the city and to limit the growth of the number of storeys of buildings. A big city rejects man from natural nature and gives rise to many environmental problems;
- carry out landscaping of streets and squares; pay attention to flower beds and flowerpots;
- carry out a gradual reconstruction of the residential districts with panel housing;
- separate industrial development by joint buffer zones from natural zones and residential districts.
References