Window display in formation of safe perception of urban light and colour environment

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Abstract. The article considers the issues of a safe approach to the formation of comfortable light and colour environment of a modern megacity. The factors influencing the perception of light and colour environment by drivers and pedestrians in the dark are determined. The state of the regulatory framework on this issue is analyzed. The ways of dark time lighting for window displays at Chelyabinsk intersections are studied, taking into account the historically formed light and colour context of the Ural region in the interrelation of objects and the existing lighting system. The contextual peculiarities of the perception of window display light and colour design in the era of “information society” were revealed.

1. Introduction

In the architect’s, and later designer’s sphere of activity, the problems of people’s safety when moving between city objects and across the roads were considered only indirectly until the middle of the last century. The first town-planning formations assumed basically pedestrian and fragmentary traffic, in some areas, on horseback or on wagons. The issue of moving safely in the urban space was solved mainly by regulating the speed and was not separately regulated at intersections.

The appearance of megacities and an increase in the proportion and intensity of evening lighting of architectural and other objects of the urban environment increased the requirements in the field of forming the light and colour scenario. The window display, being an integral part of the building in a historical retrospective, provided a competition to thematic weathercocks as a full-fledged advertising medium in the dark time only in the 19th century, with the start using the large glass and lighting with gas lamps.

The twentieth century was the time when a window display became significant as the main sign and orienting element of the urban environment [1]. It raised an especially topical question, which has not been investigated so far, of the light and colour design role of window display at multi-lane streets and crossroads of a city from the position of safety. Three main trends in the development of the modern city window display functions in the light and colour scenario of the evening city, directly related to human safety issues are revealed.

2. Problem statement

The difference in perception of the urban environment by drivers, in contrast to pedestrians, is significant. The right lane is used by public transport, which is higher and larger than the rest of the vehicles, which in turn affects the angle of perception by other drivers of the visibility of window
displays and traffic lights. The window display, with its size and tendency to shift the main light and the colour accent to its top or completely beyond it, often appears on the same level as the traffic lights at the intersection. The light-colour competition between objects of perception affects the traffic safety. The first experiments of using a window display space for the placement of interactive dynamic advertising media imply discomfort of perception. The problems of settling the responsibility zones for different departments arise in the overall picture of security.

3. Analysis of the documentary base

The study of the regulatory framework relating to the window display design in the XX-XXI centuries reveals an unclear definition of its environment forming role and the degree of influence on the formation of the light-and-colour concept in the context of safety. The search for the place and role of the window display in the context of the environment is reflected in a number of local documents. In 1971, the Ministry of Trade of the USSR published the first recommendatory document on the content of window displays, which noted the low level of their design and insufficient lighting in the evening. For the first time it was prescribed to develop plans for complex advertising design on the main streets and highways of Moscow, including window displays [2]. Two years later, an addition appeared in paragraph 14, “In the evening, window displays should be illuminated in accordance with the current standards of illumination of window displays” [3].

In the XXI century, the perception of the window display became more complicated. This was largely due to the transformation of the lighting concept of the building itself [4] as the main element forming the urban environment. The main «sign» of the "information society" era [5] with the development of light-and-colour technologies is that a modern architectural structure can be perceived immediately in three ways: the building itself, advertising medium and art object [6]. The boundaries of the building, advertising spaces, and shop windows are very relative in this case. A multilayer function can only be defined with a conceptual approach in the initial stages of design in order to be contextually integrated into the building. In 2008, the Resolution of the Government of Moscow of 11.11.2008 № 1037-FZ “On the Concept of a single light-and-colour environment of Moscow” [7] defined the luminous facade as a “lighting technical effect by illuminating the interior of a building or structure and partial passage of light through light-transmitting enclosing surfaces into outer space”. According to the definition, in some cases the window display became a part of this “luminous facade”, and had to meet all complex light and colour and architectural-artistic requirements for the facades. The noted aspect introduces certain confusion in the solution of problems of both the artistic expressiveness of the facade and its functions. In the same document, it was noted that the terms of “window display” and “stained-glass window” were combined in the legislative framework without a clear definition of each of the concepts. There were also no instructions on the integrity of the relationship between the window display design, especially in its illumination, and the conceptual decision of the building and the surrounding environment. It became difficult to “recognize” the existing building with all its constituent elements, in the dark time of the already established light and colour environment of the metropolis.

Discussions and publications [8] devoted to the appearing of this document, which at that time was the only standard for other regions of Russia, noted the imperfection of the mechanism for implementing the provisions for a number of reasons, including their declarative nature and the need to clarify certain terms.

The main document regulating the norms of lighting, the “Natural and artificial lighting” in the Construction Norms and Regulations (later referred as CR), being an integral part of the national standardization system of the Russian Federation, was republished and supplemented in 2016 [9]. The concept of a media facade as a light-transmitting advertising structure, located directly on (including) the existing glazing of a building, construction, or structure and allowing information material to be demonstrated, did not necessarily correspond in any way to the functions of the window displays. In Table 7.26 of the above-mentioned document for the window displays, only the required colour
temperature, the colour rendition coefficient and the elimination of the blinding effect of light sources are clearly prescribed.

Published almost simultaneously with it, the changes on May 17, 2016 in the “Concept of a single light and colour environment of Moscow”, pointed to the importance of ranges of brightness and colour of colour accents, but only prescribed to regulate them, as well as in the city as a whole, by methods of rationing and expertise. [10]

Following it, the Decree of the Moscow Government of July 19, 2016 No. 430-FZ “On Amendments to the Resolution of the Government of Moscow of December 25, 2013 No. 902-FZ “On the deployment of information constructions in Moscow”, set the following definition in paragraph 2.10.8: “... the window displays are understood as the space formed by the architectural design of the building, limited from the outside by glazing and used solely for the exposition of goods and services.” In addition, it was offered to determine the basic colours of light and the methods of architectural illumination of selected objects [11].

Moscow documents initiated the appearance of comprehensive research in the field of safety [12,13] and the first conceptual light and colour solutions in other cities of the country [14,15].

In the capital of the South Urals, Chelyabinsk, the tendencies that have evolved in the country are generally repeated. The filling, local and accent lighting of the main architectural objects are used. Recognition and readability of the city skyline when entering it from the north are first of all set by the hyper-scale of the production environment. At the same time, the fragmentation, «selectivity» of the evening-night illumination of the city, is worth mentioning without taking into account the formation of the planning structure connections, uniqueness of natural and recreational resources [16].

The historical context also does not always serve as a reference point for the formation of a modern architectural and lighting environment. Thus, the building of the Chelyabinsk Picture Gallery of pre-revolutionary construction (figure 1) [17] appears to the viewer in the context of utilitarian lighting with full-size, but not involved in display and advertising window displays. The most historical appearance of the city was preserved only on the present-day pedestrian Kirov Street, where almost every shop window is involved as a full-fledged “leading character” of the advertising and aesthetic scenario at any time of the day.

A pivotal role of the architect or designer in the formation of the light-and-colour environment semantics is beyond doubt in this case. However, complex crossroads of multi-lane roads require a multifactor analysis. It is also necessary to take into account the climate peculiarities of the Ural region with its frequent changes in the weather of sharply continental climate, rain, snow, and ice, which affects the reaction rate of all participants in the street traffic.

Approved by the decision of the Chelyabinsk City Duma of December 22, 2015 № 16/32, Rules for the improvement of the territory of Chelyabinsk [18] determine the directions for the formation of the

Figure 1. The trading house of the Yaushev brothers in Chelyabinsk – the present day window displays condition of the operating Chelyabinsk Picture Gallery under utilitarian illumination by sodium light sources.
light and colour environment of the city in general. However, similar to the documentary base of the capital, the role and place of the window display is not clearly determined. In particular, according to paragraphs 30 and 31, crossroads are documented as objects of both urban improvement and street-road network. Paragraph 163 does not determine the mechanism of execution and control of the prescribed operation of the lighting design of the window display in the same mode as external lighting. Paragraph 82 specifies the functions of advertising and information lighting, which is considered a window screen, as a dissemination of advertising or social advertising, while the safety function belongs to utilitarian illumination.

The Chelyabinsk City Duma decision of the fourth conference on 25.10.2011 № 28/11 "On the Approval of the Rules for the Maintenance, Repair and Restoration of the Facades of Buildings and Constructions on the Territory of Chelyabinsk" [19] in paragraph 29 of Section IV, “Windows and Window Displays”, defines the complex nature of the design of the windows, a single colour solution and lighting, and high quality of the artistic solution and performance. Section IX, “Architectural and Art Lighting of Facades of Buildings and Constructions”, supposes the implementation of the lighting design of the window displays together with the decoration of the whole facade of the building, without breaking it into several parts. However, in the list of outdoor lighting such as utilitarian, architectural, decorative or landscape ones, the advertising and information lighting of display windows, declared in paragraph 182 of the previous document, is absent as a kind of lighting.

4. Methods and results of experimental studies
To study the features of lighting window displays in the formation of a safe light and colour environment, local regulatory framework methods were used as well as field studies and the architect's creative method, which includes a hypothesis, feasibility analysis, and computational and graphical constructions.
The pilot study covered the Lenin Avenue section in the central part of the city within the boundaries of the Revolution Square and Gorky Street with a special emphasis on the seven major intersections, the objects of which are geographically located in three different districts of the city. Lenin Avenue is a multi-lane central transport artery, surrounded by significant architectural ensembles. The peculiarities of perception of the light and colour environment of the crossroads data by drivers and pedestrians at dark time from the point of view of safety were considered. The aspects of the presence of architectural and artistic illumination of the building, to which the investigated window display belongs, were singled out and in what capacity advertising or information lighting is used. Particular attention was paid to the colour design of the window display.

The study was carried out at the selected area, using window displays located within 15 meters in the zone from the corner of the building, competing in the field of visibility of traffic lights at 57 intersections.

It was revealed that, in 7% cases, window displays belonged to a building with architectural and artistic lighting, 35% used separate window display lighting. At the same time, 19.3% of window displays exposed goods while 51.9% of them had posters. The window displays used as simple windows, as well as displays without lighting, amounted to 36.8%. In two cases (3.5%) the dynamically changing colour of light was used and in 3.5% cases the reflection of the green colour used in advertising was revealed at the investigated zone of visibility. Advertising was displaced beyond the window display in 36.8% of cases.

Theoretical and practical studies showed the following.

1. According to the existing terminology base, the definition of a modern window display, depending on its function, can be related simultaneously with the definitions of «luminous facade», «media facade», and «window», which introduces an imbalance in compliance practices.

2. A window display traditionally performs three functions: presents the decorative and illuminated information about the product, serves as a means of artistic expressiveness of the façade, and takes a part in the general lighting scenario, acting as a means of pedestrian space lighting (figure 2).

3. The new trends of a window display functioning have appeared:
   - a window display left partially decorated or undecorated, with an active light-and-colour accent displaced beyond the window;
   - a window display used as a screen for interactive dynamic advertising media directly in its frame, becoming a multifunctional object of the architectural environment (figure 3) without clear normative definition;
   - a window display as an object of light-colour competition in the field of road safety at intersections.

We believe that particular attention in the colouristic analysis of light-and-colour situations should be paid to the use of green colour, since it is strongly associated with the permissive signal of a traffic light (figure 4). Pedestrians, with their slow speed, are allowed to find themselves in the architectural space with the help of features of the perception of architectural details in the field of vision from the particular to the general, to highlight significant elements in the scale hierarchy and evaluate them.
both in terms of aesthetics and safety. As for the driver, safety comes first, but not the perception of the architectural and artistic merits of the object. First, he triggers a pattern of behaviour to single out certain significant elements of the field of vision in a zone of instantaneous vision. Objectively, there is a danger of confusing the green colour of architectural lighting with the prohibiting or permissive signal of a traffic light.

A pilot survey of city residents, conducted by the author in December 2013 [20], revealed the colours of light in the urban environment, causing emotional rejection. In the colouristic list of rejection there was no green colour. Obviously, that is why it is so often used for dynamic advertising, taken out of the window display. However, in specific cases, the green colour of the dynamic advertisement, reflected from the glass surfaces of the window display, serves as a means of colouristic competition with the green traffic light allowing driving, which provokes the driver to continue driving instead of stopping. Thus, the light and colour design of the window display as a key element of the building in the urban environment, in addition to aesthetic expediency and conceptual and functional integrity with the architectural design of the façade, should contain a solution of technical and social issues, including safety and ecology of perception.

In this context, it is proposed to introduce regulations on the use of the colour of the window display or the advertising shifted beyond it and competing with traffic lights and other road signs that have regulatory requirements for a colour solution at intersections, using the term "the object of colour competition".

5. Conclusion

Taking into account the importance of light and colour characteristics taking part in the formation of a safe intersection space, it is proposed to introduce the term of "the object of light and colour competition", applied to all the objects of light and colour design and, in the context of this study, to the window display.

Considering that the study of the window display phenomenon goes beyond its traditional definition and the innovative technologies demonstrate dynamic development, it is proposed to introduce the term of "dynamic order". It should be understood as a strategy for adjusting the continuous process of transformation of individual elements and the entire building in the era of the "information society", using interdisciplinary research, succession keys [21], and a scenario approach to the formation of safe light environment.

The organization of architectural, design and lighting engineering at the crossroads of the highways of megacities require a regulatory separation in relation to areas of responsibility of specialists with mandatory collegial solutions.

The Shared Space concepts of the public space [22], being successfully implemented, show the ways of transition to a new philosophical stage of rethinking the urban space and understanding the prospects of collective responsibility for creating a safe urban environment.

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