





QR code design: From digital graphics to environmental, product and fashion design

ABSTRACT

Classification of design codes by the level of complexity of their design was created for the first time. The obtained results are key to understanding the role of the QR code as a full-fledged work of art in the context of modern design. In the future, this will allow us to single out the most noticeable trends in the development of coded information in the conditions of modern visual culture.

KEY WORDS

Broadband, graphic design, barcode, QR code, artistic image, design approach, artistic and visual solution, advertising, digital design

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Introduction

The life of a modern person cannot be imagined without visual data. In the 21st century, QR codes as objects with the possibility of multimedia and imaginative transformation began to be actively used by designers and used in various spheres of human life (Xu et al., 2019). Companies place them on billboards to make quick sales online, on food and beverages, on movie posters or educational videos, on store windows, and on advertising signs. QR codes are very often placed near exhibits, people use them on business cards, bracelets, in the form of a pendant on a chain. In the city, you can find codes that are navigators that help you navigate the environment (Sklyarenko & Kalytyuk, 2020).

The development of QR code is based not only on the software and mathematical component, but

also on the artistic and figurative component, which implies positioning the code as an artistic means for expressing the author's artistic idea (Vorobchuk & Pashkevych, 2022). Despite the fact that QR codes have a functional purpose in the queue, very often they become an artistic or design work.

The goal is to study modern designer QR codes and, based on their analysis, offer a classification of encoded information according to the level of complexity of their design, as well as provide a characteristic of each of the types.

Formulation of the problem

Over the past decades, there has been a tendency for a gradual transition from contemplating a work

of art to the viewer's participation in it. For example, the viewer can use a QR code to get additional information about the history of creating a work, the author, the production technique, watch a video, and so on (Sklyarenko & Kalytyuk, 2020).

Visualization technologies are rapidly improving, so despite the existence of various concepts, it can be argued that today the theoretical and practical issues of QR code development by designers require additional research.

Xu et al. (2019) found that with the proliferation of smart mobile devices, QR code has become one of the most commonly used types of two-dimensional code in the world (Xu et al., 2019).

A number of methods have been developed to visually embellish the appearance of QR codes. Sometimes when creating designer code, its practical significance is lost.

Researchers Tsukanova & Dibrova (2013) refer to a QR code as a direct response carrier. They investigated the advantages and disadvantages and showed examples of the implementation of QR codes in the modern realities of Ukrainian business, but did not focus on the aesthetic appearance of the code (Tsukanova & Dibrova, 2013).

Gültekin, Ural & Yaman (2019) made several parts with QR codes, they printed cubes and compiled a matrix code (Gültekin, Ural & Yaman, 2019). Instead Deineko, Kraievska & Lyashenko (2022) in their article consider such QR codes that stand out significantly against the background of the same type of QR codes and focus on the importance of an attractive appearance of the code as an advertising element (Deineko, Kraievska & Lyashenko, 2022). For example, painting matrix codes in the company's corporate colors or embedding a logo in the code.

Researchers Karrach, Pivarčiová & Božek (2020) considered various ways to transform matrix codes (Karrach, Pivarčiová & Božek, 2020). They described that the QR code structure restricts its change. This study opens up more opportunities for graphic designers when creating designer code.

In their article, Abu-Jassar et al. (2021) analyze the features of the structure of image recognition methods based on which matrix codes are decoded (Abu-Jassar et al., 2021). This makes it possible to develop a designer QR code while maintaining its main function — decoration.

People scan QR codes and usually trust their contents, but there is no standard mechanism for ensuring code privacy. Scientists Huang, Chang & Li (2022) investigated that QR codes are transmitted

through public channels (Huang, Chang & Li, 2022). To prevent fraudsters in the decoding procedure, a scheme was proposed that would be efficient and highly secure and ensure the security of the device.

In their study Focardi, Luccio & Wahsheh (2019) conducted tests showing that the usability and appearance of matrix codes affects the performance of QR code scanning (Focardi, Luccio & Wahsheh, 2019). As a result, the consumer evaluates the attractive appearance of the code without neglecting cyber security, so they choose an aesthetic QR code that is safe for their decoding device.

Broadband in design is mainly considered from a software point of view, but since the artistic and figurative aspects of design shaping are common to the design of all design objects, regardless of their functional purpose, these publications do not lose their relevance.

The relevance of the research is due to the need to develop a design code and use encoded information in the modern design of various objects.

Methods

Main research method is an artistic and imaginative analysis of the issue under study. It involves a thorough study of the visual system of the work of art in order to identify the artistic concept of the work, the idea laid down by the designer for a logical and consistent analysis of the image, also method of grouping information, which are used in the formation of the table.

Study uses artistic-figurative and structural approaches. The authors apply comparative analysis, which involves the search and identification of similarities or differences of the same type of properties of the studied object as one of the tools of the art history method. In research used visual methods of cognition, which involve the use of demonstrations and illustrations which are extremely relevant today.

Samples of objects, selected as examples, were taken from the official websites of designers or design studios that developed them.

Problem Development

In this paper, we explore a new interpretation of the representation of QR codes in the form of structures embedded in arbitrary shapes. The study uses artistic and imaginative analysis, because each design code is developed in accordance with the field of activity in which it will be used. Thus, designer QR codes are original, durable and reliable (they are harder to crack and reproduce).

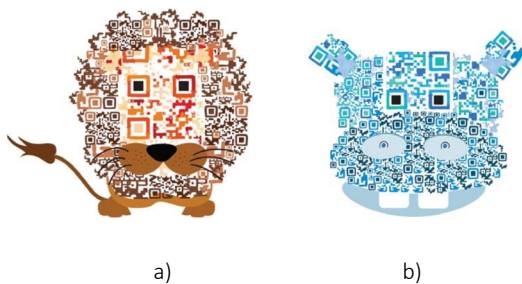
Although QR codes are made as decoration, they can be embedded to spread information due to their realistic and reliable operation. Each QR code, whether online or in print, can simply be decoded using your mobile phone's camera.

Matrix codes are used to promote new exhibitions, in student art portfolios, on business cards, on museum websites and exhibits, and so on. QR code is easy to integrate into illustrations, logos and any artistic material.

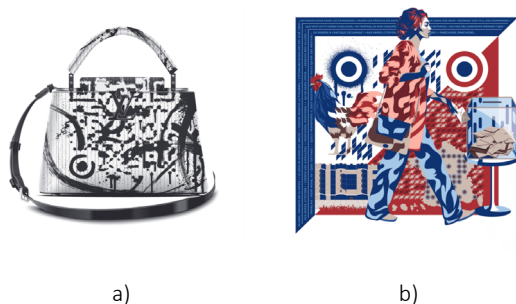
The novelty is that artistic QR codes are not only black and white, but also colored, made of different shapes and materials.

QR code is a technological achievement, but graphic designers create a work of art that includes a mathematical-software and artistic-figurative component.

Able to meet the needs of many professional sectors, the QR code allows you to get direct access to information after scanning. For example, food packaging contains information about the nutritional value of a dish or drink (Fig. 1) (Mouzouris, 2022). A QR code integrated on the packaging of a cosmetic product transmits its composition. The matrix code invites users to visit the store, indicating the route to go to the displays (Fig. 2:a) (The Art of QR Codes, 2022).



» **Figure 1:** Artistic QR code, Irene Mouzouris, London, United Kingdom, 2020 (Mouzouris, 2022)



» **Figure 2:** Designer QR code, The ART of QR Codes (a) fashion brand Destination, New York, USA, 2022; (b) fashion brand Destination, New York, USA, 2021 (The Art of QR Codes, 2022)

Designer QR codes can also be collectibles, adding informative value to everyday items that are usually discarded (Fig. 2:b) (The Art of QR Codes, 2022).

Some graphic designers modify the code by animating it. Designers use specialized software to create animated graphics in social networks. Thus, the Chinese company Art memoe animates codes for companies such as Rong Chuang and Adobe (Fig. 3) (Minor, 2022).



» **Figure 3:** Animated QR code, Art memoe (a) Rong Chuang QR Code Design, China, 2020; (b) Adobe QR Code Design, China, 2020 (Minor, 2022)

Designer codes quickly penetrate every person's daily life. Designer Thorunn Arnadottir decorated Swarovski crystals with QR codes to make Swarovski crystals recognizable. Also, Thorunn Arnadottir designed a "Super self-promotional dress" for Icelandic pop star Kali from Steed Lord. After scanning the QR code, the viewer goes to a number of links, which includes videos of the group, music sites (Fig. 4) (Thorunn, 2022).

A seasonal code that can be decoded in warm seasons has been created for the landscape agency Landscape Studio's (Fig. 5) (Campbell, 2022). This method of self-presentation added several dozen clients to the landscape agency.

Another example of a temporary QR code was created by English photographer David Sykes. He decided to use it to promote his own new website by sending invitations to his friends in the form of a QR code model made of shoes, calculators, briefcases, tape recorders, etc. (Fig. 6) (Zhang, 2011).

Architect Alt S. created a unique mural in the city of Siracusa in Italy (collabcubed, 2012). The image is a mosaic consisting of dozens of unique QR code fragments, each of which is associated with the organization of contemporary art in the city (Fig. 7) (collabcubed, 2012).

QR code is a versatile and flexible tool. The advertising agency DDB has developed portraits of artists that consist of many small QR codes (Fig. 8) (Agency: DDB, 2022). This ad, titled "Michela, Mike, Paul", was published in the United Arab Emirates and created for the MusicMaster brand.

Samples of designer QR codes, that can be decoded under illumination only, were discovered during the artistic analysis. For example, the project of architect Drzach and programmer Suchy "Shadow Cloud" is presented in the form of a cube that creates shadows forming a QR code (Fig. 9) (Watkin, 2017). A similar idea was previously presented by Triada Studio Games in the virtual puzzle

Shadowmatic (Fig. 10) (Brown, 2000).

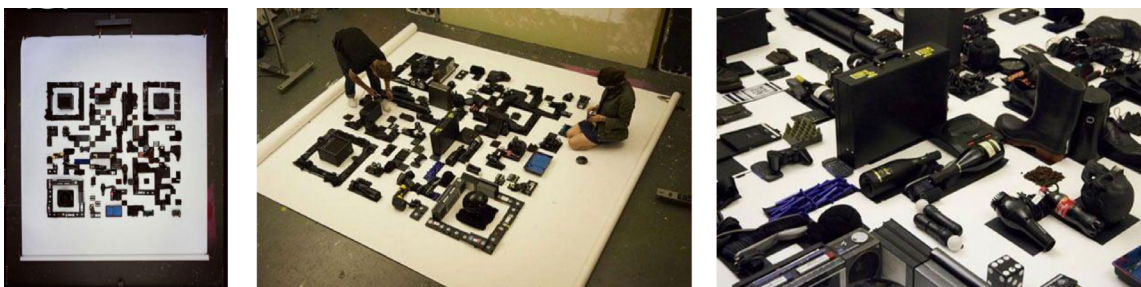
After analyzing samples of design codes, it was found that today in design, a QR code allows you to expand the boundaries of communication between the object and the viewer. The viewer can use the QR code to find out additional information about a particular work or object.



» **Figure 4:** Coded patterns in this beaded dress "Super self-promotional dress", Thorunn Arnadottir, London, United Kingdom, 2017 (Thorunn, 2022)



» **Figure 5:** Landscape Studio's QR Code Garden, Chelsea, United Kingdom, 2017 (Campbell, 2022)



» **Figure 6:** QR Code Made from Ordinary Objects, David Sykes, London, United Kingdom, 2018 (Zhang, 2011)



» **Figure 7:** City project, by Alt S., Siracusa, Sicilia, Italy 2012 (collabcubed, 2012)

I AM MY MUSIC. I AM **musicmaster**

Discover the music that defines me. Snap the QR codes in my portrait with your smartphone and download the twenty tunes for free. As the region's most comprehensive download site, Music Master allows you to explore and express your individuality through your favourite tracks.

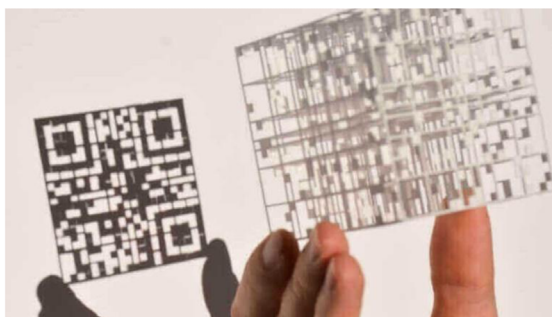


a)

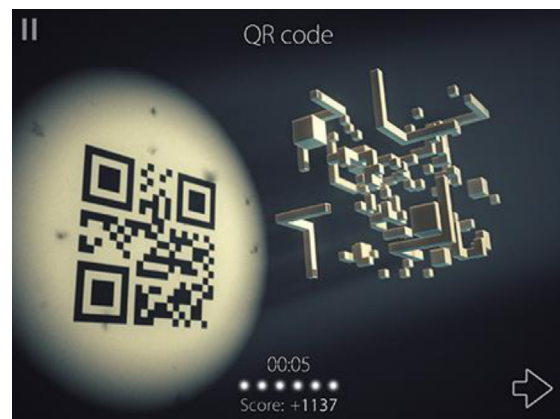


b)

» **Figure 8:** MusicMaster, agency: DDB:
 (a) Paul, Dubai, UAE, 2020;
 (b) Michela, Dubai, UAE, 2020 (Agency: DDB, 2022)



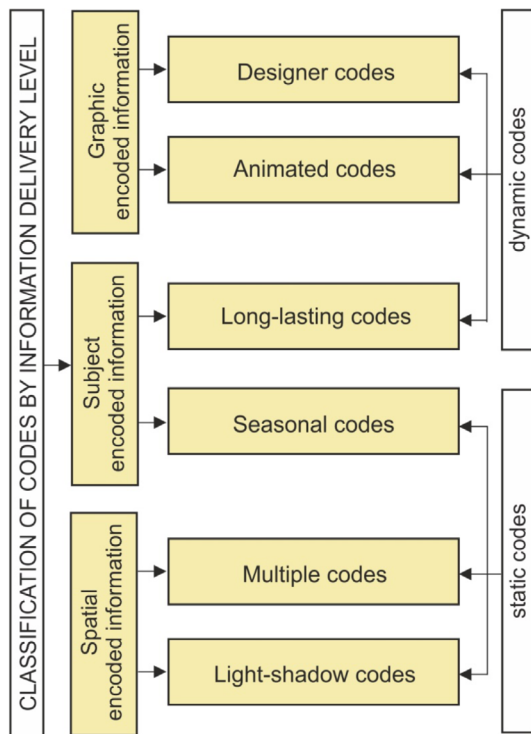
» **Figure 9:** Shadow Cloud, Technoram, Artists Drzach and Suchy Create, Switzerland, 2019 (Watkin, 2017)



» **Figure 10:** Shadowmatic, Triada Studio Games, Yerevan, Republic of Armenia, 2017 (Brown, 2000)

Results

The result of the study is the following classification of codes according to the level of complexity of their design (Fig. 11).



» **Figure 11:** *Classification of codes by information delivery level*

In this case, we identified simple, complex and super-complex codes that are currently developed by graphic designers. This gave grounds for dividing them into three groups: graphic, subject, and spatial encoded information.

Graphic encoded information contains designer (Fig. 1-2) and animated codes (Fig. 3). Subject encoded information allows the designer to create long-lasting codes (Fig. 4) and seasonal codes that, for example, depend on the time of year or other environmental conditions (Fig. 5-6). Spatial encoded information shows the complexity of designing light-shadow codes (Fig. 9-10) and multiple codes (Fig. 7-8).

QR codes that are considered by the creation tool are dynamic and static (Fig. 11). Dynamic codes allow you to change the hosted information that the consumer receives during decoding, while static codes store only the primary data. For graphic designers, this is an essential indicator when designing designer code.

So, the presented classification within the framework of artistic and figurative analysis combines design solu-

tions, the common characteristic features of which are revealed after a detailed analysis of structural and figurative characteristics, which makes it possible to consider QR codes as an innovative tool for design. The obtained results are key to understanding the role of the QR code as a full-fledged work of art in the context of modern design. In the future, this will allow us to single out the most noticeable trends in the development of coded information in the conditions of modern visual culture.

Conclusion

The conducted research shows that today in the practice of design, a clear trend of growing popularity of conceptual design objects, the change of which requires direct interaction with the consumer, has formed. It becomes a central part of the transformation process, influencing the final result.

As a result of the analysis of modern QR codes, a classification of codes by the level of complexity of information submission was proposed. Three types of coded information are defined: graphic (designer, animated code), subject (long-lasting, seasonal code), spatial (light-shadow and multiple codes). Based on a specific examples, the characteristic features of design solutions of QR codes are considered. It has been established that artistic analysis expands the limits of perception of encoded information. It was determined that earlier QR-codes were perceived as auxiliary functionality and were used individually, but now they are present in many areas of project activities of design and art.

Positioning code as an artistic medium for expressing a designer's artistic intent gives designers more opportunities to implement new concepts and viewers - new ways to interpret. Today, QR-codes are not only software-mathematical objects, but also artistic-figurative ones, therefore, they can be considered works of modern art, which makes them a valuable asset of modern times and an interesting object of research.

The possibility of direct interaction of the viewer with the design code allows the viewer to become an active participant in decoding the QR code and receive various emotions. In the future, it is planned to investigate the role and place of designer encoded information in the conditions of modern visual culture.

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