Research on the Innovative Application of QR Codes from Perspective of New Media

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Keywords: QR code, new media, function, mass culture

Abstract: With the rapid development of new media, QR codes have become a phenomenal topic. But the traditional QR code is too old-fashioned and stereotyped, so it is difficult to attract the attention of the audience, thus resulting in a decline in the spread rate. Due to the needs of information transmission, brand publicity and public aesthetics, innovative QR codes have gradually entered the public's vision. This article analyzes the reasons why QR codes become popular from the perspective of new media and their innovative applications based on functions and mass culture.

1. Introduction

The QR code, also known as 2d barcode, was born in Japan in the early 1940s. The initial QR code is composed of positioning points, correction points and a number of black and white squares. Its logic is based on the computer binary system. The black square represents the "1" in the binary system and the white square represents the "0". QR codes, like one-dimensional codes, rely on optical sensors, so they were not widely used during the half-century when early identification equipment was lacking. After entering the 21st century, thanks to the popularity of personal communication devices, smart phones are generally equipped with optical sensors. As a result, the QR code, which has been silent for half a century, has become a vital part of the interactive mode in the new media era.

2. The advantages of QR codes in the new media era

With the birth of all kinds of new media, the era of information explosion has come, and the speed of information generation and flow has been greatly improved. However, as the terminal of information, the human brain for receiving information cannot be improved with the development of science and technology. At this time, an effective means is needed to solve the problem that people cannot receive a large amount of information in a short period of time. So if the message that needs to be delivered is seen as a "box", then a "key" is needed to open the box. And having the key creates the possibility for the transmission of information.

Handing out leaflets was the earliest solution, and the seconds it took to pass them around were much shorter than the time people spent standing in front of the posters. This creates the possibility for the later transmission of a large amount of information in a few seconds and shortens the audience's time to receive the information. This is especially important for people living at the fast pace of urban life. When paper flyers can no longer meet the needs of a faster and more diverse spread of information, a new carrier is needed to carry information and the QR code is undoubtedly the best choice at this stage.

2.1. Diversified information carriers

The QR code has the characteristic of high and wide coding density, which enables the QR code to carry more information in a limited space. And it not only carries more content, but also presents more diversified information such as pictures, sounds and videos thanks to the communication medium of smart phones. Compared with traditional media such as leaflets, the combination of audio and video can better meet the communication needs of the new media era.

2.2. Broad graphic expansion space

The QR code has a broad graphic expansion space, which is due to the excellent tolerance rate of it. The tolerance rate means that the QR code can still be recognized in the case of damage, lack, distortion, etc. Only 30 percent integrity needs to be maintained to be recognized. This provides the possibility for the re-design of the QR code, because you do not need to worry about the design accuracy. At the same time, the QR code as a whole, filled with black and white squares and forming large and small graphics, is square in shape and has more design ability, compared with the one-dimensional code of a single shape. Therefore, designers can make great efforts to take full advantage of the small QR code so as to meet the communication needs of the multimedia era.

2.3. An interactive mode of information transfer

In the new media era with the rapid increase of information, people are forced to accept a large amount of information every day. Over time, people have developed a resistance to overly complex and aggressive information. This is why minimalist design has become so popular in recent years. However, the QR code is different in the way of transmission. First of all, it has the nature of "simplicity". It can obtain a large amount of information just by taking out a mobile phone to scan, which simplifies the process of information acquisition. At the same time, this kind of interactive information acquisition makes the audience have the autonomy and selectivity when receiving the information, which is more acceptable to the audience than the aggressive information. According to a survey conducted by the Eastern Express Line in April 2012, the products promoted by the QR code sell better than those promoted by traditional means. Thus it can be seen that in the era of new media, the interactive information communication mode of the QR code is needed to achieve better information transmission effect.

3. Innovative application of QR codes based on functions

With the advent of the new media era, all traditional and non-traditional media have made corresponding changes in line with the development of the times in order to better complete their own work in the new era. Because of its excellent graphics to expand the space, the QR code has gradually become one of the best. Designers, based on the function of the QR code, redesign the code, achieving both purposes of the QR code connotation meaning and aesthetic concepts, which is in line with the "graphic dualism" theory coined by Abraham, Morse (Abraham Moles, 1920-1992), founder of Aesthetics and Modern Information Theory. There are two main reasons for this. Firstly, through decoration, the "key" enables the audience to have a preliminary understanding of the content in the "box" by observing the "key" itself, so that the "key" itself has a certain information transmission function. Secondly, try to please the audience and improve the probability of successful interaction. These types of QR codes are called *Creative QR Codes*.

3.1. Joining together

The QR code is composed of squares representing "0" and "1", and its information recognition does not depend on a certain color, as long as the color brightness of "0" and "1" reaches enough difference. Hence, the earliest attempt of the Creative QR code appeared on this, that is, joining together. Among them, the most common techniques include: base picture joining, pictures joining, frame joining and so on. This kind of creative QR codes is to make a certain decorative effect of the design in the fields of its color and frame. But it itself does not deviate from the square matrix category of the traditional QR code. Therefore, many Apps have already had the function of automatically generating such QR codes, among which WeChat and QQ are excellent representatives. However, such QR codes also have limitations. Simple creativity makes them only able to complete their work in purposeful behavioral interaction. To some extent, the QR code joining does not belong to the category of creative QR code, but because of the low design cost is becoming the most popular form of the QR code.

3.2. Heterogeneous isomorphism

Heterogeneous isomorphism is the core theory of Gestalt psychology. This school believes that there is a kind of "force" between external things, human visual perception and human emotion. If the conflicting visual perception is combined with external things to achieve the consistency of "force", it may cause a unique visual beauty. Then in visual design, a surprise is often achieved. This increasingly popular design method has also been used in the design of creative QR code.

At the beginning of the design, the designer divides the black squares of the QR code into several independent parts composed of one or more squares according to their shapes. Then the designer extracts relevant elements from the design theme and then design the elements according to the appearance of the individual after division. And after the design, the part is finally joined into a new QR code. The combination of new theme elements and the QR code, as two different characters, can break the audience's intuitive impression of the traditional QR code and then achieve a conflicting visual aesthetic effect. Besides, the audience, just by scanning the QR code, can have a preliminary judgment of the information, which greatly improves the effect of information transmission.

3.3. Isomorphism of different dimensions

The QR code, as its name implies, is a two-dimensional planar graph. When the two-dimensional code breaks through the dimensional barrier and appears in the three-dimensional space of human existence, the conflicts and collisions between dimensions will also arouse a different aesthetic feeling. And this cross-dimensional design is known as the 2.5D.

The 2.5D is an emerging computer graphics technology that can display 3D visual effects in two-dimensional space. Originally, it was used to meet the increasingly higher requirements of game players for the game screen. In the QR code, it is to create a 3D effect by adding perspective and shadow. And the reason why 2.5D technology can be used in the design of creative QR codes is that the QR code itself has the characteristics of three loop-shaped positioning points. Even if the perspective is increased, the positioning points can be successfully identified.

3.4. Dynamic state

With the development of the new media era, the carrier of the QR code is no longer a single print, but an intelligent device with more forms of expression, so against such a backdrop, the dynamic QR code came into being. Compared with the previous application methods, the dynamic QR can reflect more content and have more visual impact and fun. However, the dynamic QR code also has its own defects, mainly reflected in two points. Firstly, dynamic design will cause the QR code to be too large, resulting in slow loading speed and decreased rate of spread. As a result, attention should be paid to control the cycle time when designing the QR. Secondly, the usage scenarios are greatly reduced due to the restriction of carriers, but this defect is gradually solved with the popularization of intelligent devices. The dynamic QR code is a rising star in the fields of creative two-dimensional codes, with the popularity of the production softwares and in a trend of linear rise. In particular, with the rise of Internet "we media", the demand for dynamic QR codes is greatly increased for the purpose of data drainage.

It is worth noting that the above application mode is not a single and independent part, but can be combined with each other and reflected in a variety of ways. Attention should be paid to the choice when we are designing the code.

4. Innovative application of the QR code based on mass culture

The development of the QR code presents three stages. The first stage was from the 1940s to the 1980s. QR codes in this stage were just born but not yet popularized, and were mostly used for research purposes. The second stage was from the 1980s to the early 21st century, when the study of QR codes was ripe for this phase and the QR code was being applied to various industries. At this period of time, the QR code was applied from the early certificate management in the departments

such as the Public Security, the Customs and the Military in United States, Germany, Japan and other countries, gradually to the automation management of industrial production line in the field of industrial production, and then to the popularity among people of China's Alipay, WeChat and QQ, ect. At this stage, the QR code greatly flourishes and enjoys a rapid growth. The third stage is the trend emerged in recent years. After the rapid popularization of the two-dimensional code, its unique and appealing black-and-white case image has been deeply rooted in the hearts of people and gradually become a popular mass culture. Designers have combined this natural, harmonious and uncertain pattern with various art forms and have created many wonderful works.

The design of QR codes based on mass culture is quite similar to Pop Art. They both combine common elements in life with various art forms, reflecting a popular, short-term, witty and popular culture. For example, the cover of an issue of "Times" is based on the red border of the journal itself, and the black and white squares after the design adjustment constitute a QR code illustration that reflects the characteristics of the times. The same public service poster named "Save Japan" uses five QR codes to form a red cross figure, and the squares inside these QR codes form the images of animals, implying that protecting animals is urgent. This method of combining the shape of the QR code with the meaning of the graphic, using the symbolic meaning of the visual elements, brings an artistically powerful shock to the audience. Like Pop Art, popular culture is always particularly prominent in clothing design. In the QR code series released by Vans in 2010, black and white squares were widely printed on the vamp. This style, which clearly reflected the popular elements of the current society, quickly became popular among the young people who were following the trend.

5. Conclusion

The QR code has been integrated into all aspects of modern life, being an indispensable part of daily life. Besides, when it is being created by people, it is also unswervingly affecting and transforming the society. What should be kept in mind is that in the innovative application of the QR code, the deep exploration and analysis of the design theme always override the method. The creative QR code is different from the form beauty of simple graphics. The function always matters most for the creative QR code and we must not put the cart before the horse. The Creative QR code still has a long way to go, and the author is looking forward to its more application in future.

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