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Research on Universality Recognition of Public Information Design

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***Abstract*—The universality recognition of public information design is realized as per the design language of cognitive psychology relevant to visual communication. It requires graphic design techniques to make the words readable, as well as using clear words to assist in the understanding and taking use of the recognition influence of color system. It is also needed to integrate with psychology, behavioral science, anthropology, linguistics, semiotics and other disciplines to reduce recognition barriers due to cultural differences, regional environment, social development factors, and physiological barriers, and to quickly and effectively realize the accessibility, generalization and maximum transmission of public information recognition.**

Keywords—public information design; universality recognition; cognitive psychology; visual communication

I. INTRODUCTION

The communication between people and between people and thing is the social orientation of information design. American design theorist Victor Papanek proposed the purpose of design: design should serve the people; design should not only serve healthy people, but also must consider serving the disabled people; design should seriously consider the use of limited resources on the earth, serve to protect those limited resources. This is the social and ecological responsibilities or social ethnics to be undertaken by designers. So, communication power becomes very critical to design. Effective communication in design can not only improve the design efficiency, but also reduce cost. Language communication in design is a way for designers to communicate with their receivers in the form of design expressions. This paper studies how to realize the accessibility, generalization and maximum information transmission of public information recognition through an analysis on the design language in public information design relevant to cognitive psychology and visual communication.

II. INFORMATION DESIGN AND PUBLIC INFORMATION DESIGN

The concept of information design was firstly proposed by the British Pentagram Design Studio based on the graphic design in product service system. It is different from the information design in the field of data statistics, but more inclined to the visual representation of data, also known as infographics design. With the rapid development of technology, information design covers a wider range and media becomes more diverse, For example the product descriptions and chart illustrations of two-dimensional planes, the signage system and display space of three-dimensional space, and the interface of multimedia, human-computer interaction and motion images. Therefore, it involves many different disciplines, and those disciplines are mutually integrated through information design. ("Fig. 1") Information design is to analyze and arrange data and information in the most reasonable way and present it in a way that is most understandable and convincing. Public information design mainly focuses on making systematic design for public space and the like three-dimensional space based information. And the universality recognition of design is a detailed study on human's public behavior based on cognitive psychology and behavioral awareness. At the same time, it aims at general group and special group, and optimizes the presentation of information through reasonable visual language to promote the transmission of information and achieve the maximum communication.

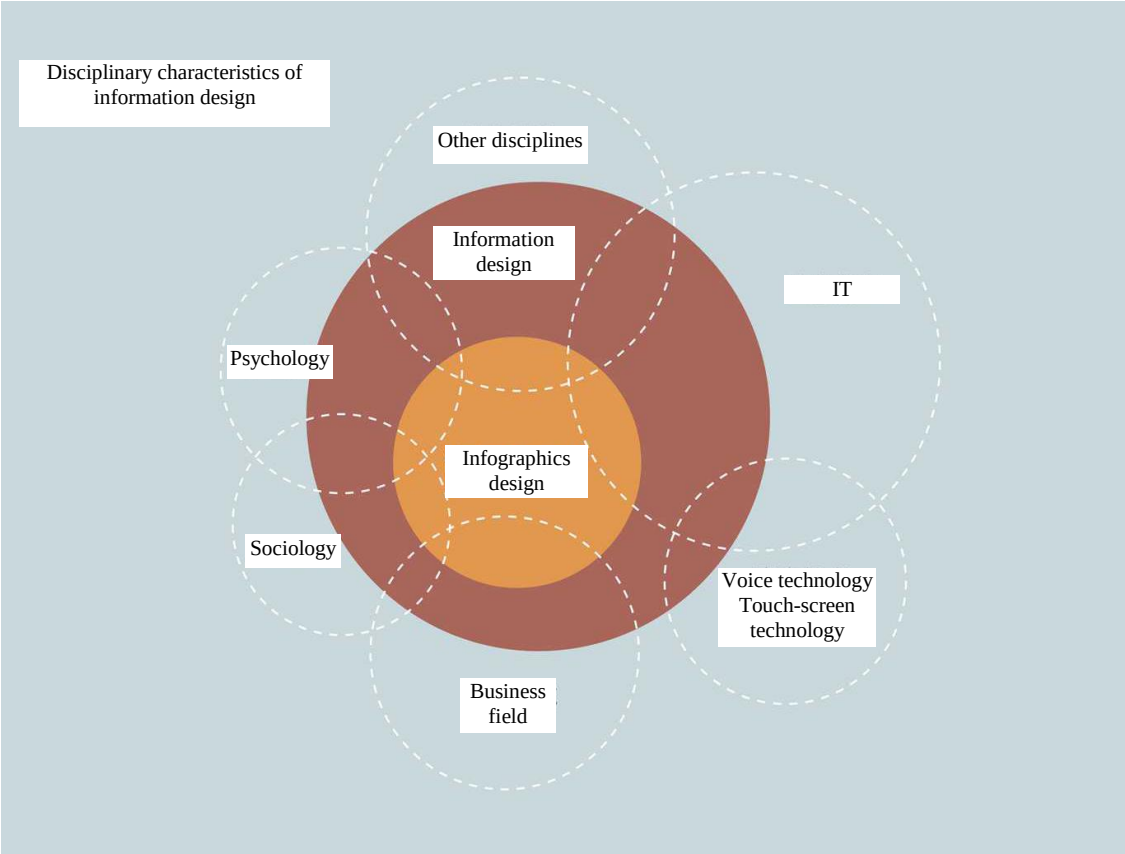

Fig. 1. Disciplinary characteristics of information design.

III. Cognitive Psychology and Visual Communication

The universality recognition of information design involves visual communication, psychology, sociology, information technology, sound technology, touch screen technology, business, and other disciplines. But the most critical factors are visual communication and cognition, psychological understanding and perception. With the development of psychology, through the organic combination of design and experiment, designer can think and analyze in a more rational and scientific way. For example, when designing outdoor information, in addition to studying the targeted user group, what is more important is user's speed of staying; only after knowing their speed in receiving information can it be available to make rational adjustment on the control of graphics and colors in making design. Since information design is a discipline that studies information transmission, it is necessary to know about people's cognitive habits. Human's brain stores a variety of information which not only directs human's thinking but also extends human's behavior.

In receiving information, visual sense is limited by visual laws. The focus of infographics design is how to convey information through visual language. The communication of information is limited by the information itself and human physiology. Therefore, designer can better plan complicated information if he previously knows about the basic theory of visual psychology. For example, if different colors are mixed together, the higher the color purity is, the larger the color difference is, and the faster human's resolution speed will be. Cognitive psychology can make people understand themselves better. Although human eyes have a wide visual angle of about 120 degrees, it can only accept accurate information in the range of about 7-8 degrees; the rest is split vision. Within the range of split vision, only moving objects can cause visual attention and excitement. Therefore, the signage information board in public space needs to be designed on the basis of the best visual area of human eyes and the effective reading of the font size in different distance ranges to reasonably grasp the best visual area of information presentation. Only in this way can the designed signage effectively guide people's public behavior. The Gestalt theory in cognitive psychology believes that in visual sense, part belongs to the whole; the object people see is not only the structure of the unit, but the overall relationship between structures; the interaction between the whole and part stimulates people's visual judgment which is also constrained by experience; that is to see by heart. Gestalt proposed some assumptions on graphical psychoanalysis, including proximity, similarity, closure, connectivity, plus or minus characteristics, and so on. These theories tell people many cognitive habits that have not been noticed in the past, such as similarity which indicates that when people get used to a certain shape, they are easy to analyze other patterns according to this shape; so design should be made in people's thinking habits. As Connie Malamid (康妮.马拉米德) said in

the book "Designer's Visual Language", "The first step for a designer to master visual language is to know how to present, understand, and master visual information. Designers communicate important information through human cognitive approaches, which are called rich information images that have a significant impact on design; the second step is to create designs that are more easily accommodated by the brain and can stimulate brain excitability. ”

IV. READABILITY OF THE GRAPHICAL FORM

Luigi Canali De Rossi believes that "information design is a physiological habit relevant to psychology and user's use, learning and memory, specifically like the habit of perception of color, shape, and graphics." Therefore, the design language relevant to visual transmission and the rationality of application and layout of graphics, words and colors on the basis of cognitive psychology will affect the final transmission effect of information.

First, the subtle change in graphical form determines the readability of information. Using visual graphics to illustrate data and thinking can make abstract things concrete, visual, and easy to understand, and adopting cognitive styles that are generally accepted by the audience in accordance with scientifically rigorous design standards can further reduce the differences caused by different understanding and improve the universality and accuracy of information. Austrian philosopher and sociologist Otto Neurath is a practitioner who used the visual transformation of information graphics in the early days. He proposed the slogan of "the world is separated, but the graphics are connected". At the beginning of the 20th century, he creatively proposed the concept of image symbols and the International System of Typographic Picture Education (ISOTYPE). From the perspective of sociology and logic, he replaced the expression of word language with systematically designed drawings and graphics, and used refined icons and graphics to design and transmit information in a wider range. ISOTYPE is mainly used to visualize the socio-economic relations at that time, to help the public understand relatively complex problems in the field of sociology, so that the common visual language can be used all over the world. Based on the ISOTYPE design criteria and the belief that “text can be differentiated, but images can be connected”, Neurath's team has designed a large number of approachable infographics for the audience, and their reading is not affected by the educational level and cultural background. ("Fig. 2") The generalized information review approach advocated by ISOTYPE, as well as the chart-based logic relationship, is widely used in the design of international information icons, posed a profound influence on the subsequent designation, indicator, ICON and the like symbolic design and relevant fields. The universal identification in signage guidance system is an example of typical graphic visual transformation. Identification has very high recognizability. Although different countries use different languages, the human cognitive system can understand the graphic language contained in the identification graphic without understanding the language. The image symbol of identification is in natural and intuitive shape, so that people of different ages, cultures and countries can see at a glance of the signboard and the guiding role of the identification can be effectively played.

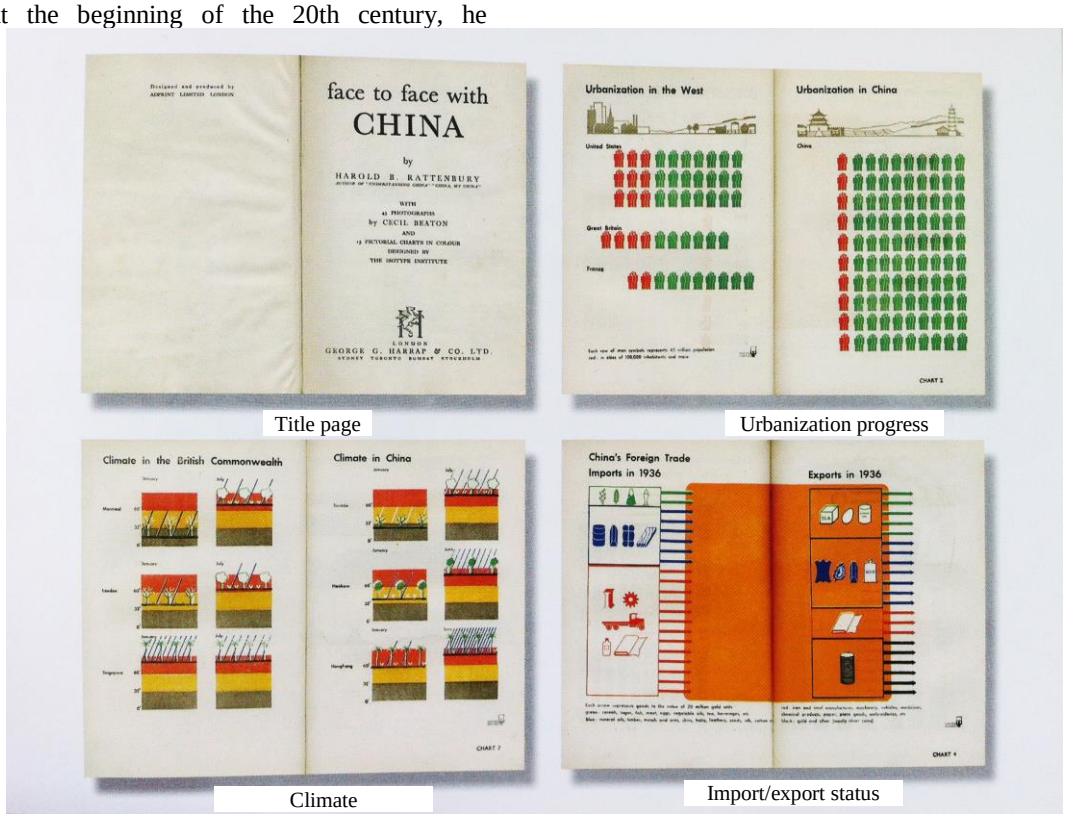

Fig. 2. ISOTYPE illustrations.

V. Assisting in Understanding of Words

Secondly, on the basis of the graphical form, the text language plays an important role in adding the information reading rate of the information design. Scientific, reasonable and effective text design can improve the recognition accuracy and legibility. In need of showing data and text, information designer needs to process text through formatting, font optimization, structural analysis, etc., so that the text conforms to the media carrier, and conforms to the habit of the audience to receive information, so as to improve the recognition universality of the information.

A well-known information design case is the London Underground map. Designer Harry Beck broke through the limitations in distance and space, simplified the complex route and information of stations effectively, and changed the previous way of reading the terrain into reading graphics; in addition to Edward Johnston's font for underground "New Johnston" which is sans-serif with clear and easy-to-read strokes to shorten the time to read the fonts, a template of modern subway traffic map with strong indicative property was formed comprehensively. In addition, the font design of the display in Japanese train station is to better display text and message through the LED screen. The designer respectively analyzed the recognizability and readability of elements such as Chinese characters, kana, English and numbers, and organized the text styling. The staged lighting effect of the outline of the text was rigorously adjusted. The curved part of the text styling was kept online very smoothly, and the display effect was natural and easy to read. This is an improvement and optimization mainly serving the font versatility in digital media, displays and the like fields. It differs from the traditional font design in that it pays attention to the visual limitation of the pixels of digital media. Since the font design on the display screen must be made as per the pixel range, the arrangement and combination of characters have a specific law to which the traditional font design rule cannot adapt. Hence, universal design optimization appears. The United States designs and improves new font Clearview based on the driver's age, vision, response, driving speed, road conditions, weather, lighting, and other conditions as well as road signs and guideboards. This design takes into account the influence of halo of reflective material on the font reading, and uses a mixed arrangement of the upper and lower cases instead of previous full upper case. This way reduces the recognition time and improves the recognition accuracy (see "Fig. 3" and "Fig. 4").

Fig. 3. A set of sans serif designed by London Transport Company.

Fig. 4. Display font design of Japanese train station.

VI. Recognition Influence of Color System

Color recognition in public information design is one of the important factors for universal recognition. Color system is an intuitive way of transmission. Human can judge the type and category of information through color perception and recognition. Brai's perceptual thinking is more accurate than logic thinking and can more quickly understand and convey the color information.

Color recognizability mainly refers to the difference between colors, color attractiveness refers to the degree to which the color is concerned by the audience, and color legibility refers to the visibility of color. Compared with the text, the color itself is easy to attract the attention of audience, and has the characteristics of high attractiveness. Bright

colors such as red, orange and yellow with high purity have the meaning of advancing expansion and are very easy to attract people's attention. The easily recognizable color is not necessarily eye-catching; color attractiveness depends on its independent characteristics and the degree of attention in the surrounding environment. Generally speaking, "a sign having color is more attractive than a sig without color; warm color with high purity is more attractive than cold color with low purity; a sign with high brightness is more attractive than a sign with low brightness; in order to convey some information to the other party instantly and to remind people a very dangerous and important place, it is needed to adopt color with high attractiveness". For example, traffic signs with warning meaning usually adopt bright eye-catching colors such as red and yellow to help people quickly identify the information and make response. Color legibility refers to the visibility of color, the extent that the audience can quickly see the presence of color, while the characteristics of color are to attract strong attention. Color legibility can be improved by adjusting color brightness, background contrast, and the like elements. The greater the difference between color and background is, the higher the legibility is. Color information is transmitted through a series of complex construction processes. The operation of visual system is also the process of mapping color psychology to the brain graphics system. The visual nerve is stimulated by light and then transmitted to the visual center of brain to trigger a series of visual cognitive responses. In information design, the application of color function is inseparable from the shaping of formal language. It is the product of the combination of function and aesthetics. Color recognizability should also consider special people, such as those who have visual impairment, aging, color blindness, cataract, and so on and thus have low perception of ambient light and moving objects so that they are difficult to complete correct judgments in time. Color design and application should try to use colors with strong universality and high recognizability to provide more effective information to different group of people. Taking the Guardian News Media Guide design on British King's Square as an example, the designer selected to fully use cardboard to make the direction sign system considering reducing the environmental impact. A series of cartons are printed in vivid colors through screen mesh; each layer is different based on different combination of three similar colors. The colors of floors are randomly mixed to create an overall hue on each layer instead of presenting a single color. This forms a functional color coding system. ("Fig. 5")

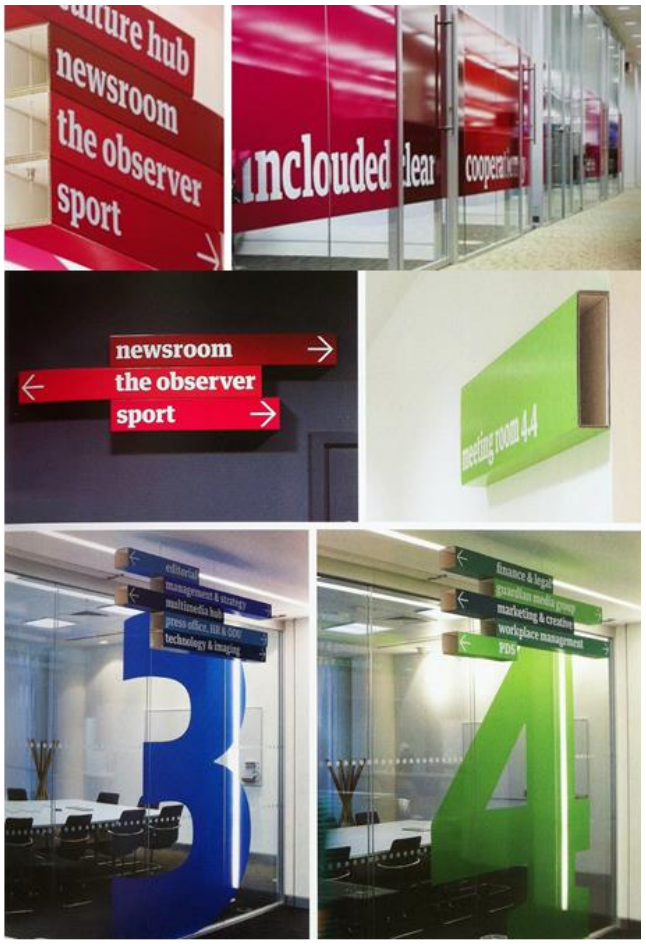

Fig. 5. Guardian News Media Guide design on British King's Square.

VII. CONCLUSION

Therefore, the research on the universality recognition of public information design has important practical significance. This recognition is realized on the basis of the design language of cognitive psychology relevant to visual communication. It requires graphic design techniques to make the words readable, as well as using clear words to assist in the understanding and taking use of the recognition influence of color system. And it also requires integrating with psychology, behavioral science, anthropology, linguistics, semiotics and other disciplines to reduce recognition barriers due to cultural differences, regional environment, social development factors, and physiological barriers, and to realize the universality recognition of public information design quickly and effectively.

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