

Constructing Cognitive Pattern in Design Thinking Based on Complementary Perspective

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Abstract. Design thinking is a phase of thinking fast with high-intensity, and cognition phase is also a very complicated process, in which the perspective of observing and pondering on design matters often directly affects the process and results of design. Some distinguished scholars have provided different perspectives for us to understand the world around us, such as E. H. Gombrich's "Reflections on Main Project", Rudolf Arnheim's "Vision is Thinking", Michel Foucault's "The Eyes of Power", and Heinrich Wölfflin's "Reflections on Form", among others.

In the long-term design practice and research, from the "Complementary Perspective", the author finds that the cognitive intention is rooted in the Chinese traditional thoughts and culture, and perceives the objective world with a unique way. As Lao Tzu said, "Distinguishing the right from the wrong is the basic rule of life". From the opposite side, we should observe, analyze, and understand the design matters in a thinking mode of "tackling both extremes" to break through the limitation of one-way thinking. In the dynamic activities of opposition and complementation, noting the rheology between the opposite and the complementary relationship behind enables us to "sense" the "phenomenon" that others analyzing architecture failed to sense, which can help the design cognition become more comprehensive and the innovation deeper.

"Complementary Perspective" aims at broadening design thinking, constructing, organizing and creating a more comprehensive cognitive pattern based on the diversity, unity, and integration of design, contingency of decision, and varieties of possibilities in problem solving. Specifically, Complementary Perspectives include positive perspective, and opposite perspective; common-seeking perspective, and difference-seeking perspective; ego perspective, and non-ego perspective; ordered perspective, and disordered perspective; and traditional perspective, and prospective perspective, and among others.

Keywords: Complementary perspective · Cognitive pattern · Design thinking and method · Innovation capability

1 Introduction

In this digital information era of rapid development, with the progress of science and technology, the internet has witnessed the explosive development while various aspects in people's lives have witnessed revolutionary changes, including production modes,

living, reading, and information exchange. When the screen came into people's sight instead of the paper, the old mode to obtain information, which is passive, linear, and unidirectional, was eliminated. Reading on the screen via digital media, the information is decomposed, included, produced, stored, and transmitted in the form of "digits". People selectively screen the information. They are both the receiver and the publisher of information. The involvement of new media forms, not only provides more presentation modes and methods for visual communication, but also contributes to a visible, audible, sensible, touchable, and movable world of information. New media forms interact with the traditional ones and accelerate the change of our design thinking and methods. Our ideas have been changed that we stop chasing the unpredictable cause-and-effect relationship but to focus our attention upon the correlation between things [1]. Within such a big background, the author deeply feels that we need to view and think problems from a more open, diversified, systematic, and related perspective, and diversified media forms actually provide us with a more diversified stage for design. From print media to digital media, as a matter of fact, all sorts of information dissemination media are involved in a dynamically changing system. In the process of contact, confliction, and communication with each other, they achieve self-perfection by interaction, complementation, and self-regulation, and therefore produce new changes to meet the demand of information communication under new conditions. It is a proposition for us to know how to comprehensively use the diversified media methods for visual information communication, which is proposed by the era. Whether problems confronted in design are on paper or on screen, static or dynamic, unidirectional or interactional, humanistic or scientific, tangible or intangible, and passive or active, they have been more complex than ever meanwhile the phenomenon of complementarity and the demand for complementarity have been increasingly evident. On the other hand, in the actual design practice and research work, especially at the idea creation stage, we always find that a complementary relationship is left finally between the seemingly opposite content and forms, or even between mutually exclusive ideas and systems. The series of phenomena and problems arouse author's thinking: there exists a complementary relationship between the seemingly opposite things. Therefore, the author "complementarily" comprehended the cognition of "complementary" existences in various domains through the source tracing for "complementarity", and learnt that complementarity can be regarded as not only a law of nature, a type of philosophical idea, a scientific principle, and a means, but also a type of design thinking and method.

2 Concept of "Complementarity"

2.1 Philosophical Thinking Sources of "Complementarity"

When Pythagoras with his school put forward the ten pairs of "opposites" constructing the universe, that is, finite and infinite, odd and even, one and many, right and left, man (male) and woman (female), dynamic and static, straight and curving, light and shade, good and evil, and square and rectangle, the description for the interaction between opposites was unclear and just focused on the "opposition". Until Heraclitus gave his idea in his words that "on the circumference, the end point is the starting point", as well

as “ever-living fire” and “the flux of river”, the implication of being “opposite and complementary” or “unity of opposites” had been firstly expressed. Heraclitus said, “They do not know how the opposites can be complementary. The power of opposition can contribute to harmony, just like the bow and the lyre”. The “opposition” in his words actually means “conversion”. He not only clearly put forward the idea of being opposite and complementary, but also pointed out that only opposites can contribute to harmony in this theory. For the western philosophy, Heraclitus is the father and founder of this theory.

In China, Lao Zi, known as “the founder of Chinese philosophy”, often masterly summarized concepts of things with opposite and complementary words. For example, he said, “All in the world know the beauty of the beautiful, and in doing this they have (the idea of) what ugliness is; they all know the skill of the skillful, and in doing this they have (the idea of) what the want of skill is. So it is that existence and non-existence give birth the one to (the idea of) the other; that difficulty and ease produce the one (the idea of) the other; that length and shortness fashion out the one the figure of the other; that (the ideas of) height and lowness arise from the contrast of the one with the other; that the musical notes and tones become harmonious through the relation of one with another; and that being before and behind give the idea of one following another”, and “Who knows how white attracts, Yet always keeps himself within black’s shade, The pattern of humility displayed, Displayed in view of all beneath the sky”. In which, Lao Zi showed a type of relative thinking method and his words “are strictly true seem to be paradoxical”. However, upon the description for a certain thing, it obtains a kind of unity with another aspect, and they are interdependent, mutually included, integrated, and interpenetrated, so as to be unified and consistent. Thus, the flow and conversion of opposite concepts are included in the judgement for the same concept. The view on empty and fact in the foresaid words “existence and non-existence give birth the one to (the idea of) the other” together with the view on beauty and ugliness of the conversion between goodness and evilness, has brought a profound influence on the development of Chinese design.

Moreover, Confucius mentioned “tackling both ends” in *The Analects*, which means think of the problem from two aspects, and then you can solve it. In *On Leveling All Things*, Zhuangzi also tell us how to know something entirely and comprehensively, “There is nothing which is not this; there is nothing which is not that”.

However, the author thinks the best interpretation for complementarity is *The Book of Changes* which says “Dao contains one Yin and one Yang”. “All things leave behind them the Obscurity [Yin] (out of which they have come), and go forward to embrace the Brightness [Yang] (into which they have emerged), while they are harmonised by the Breath of Vacancy.” [2] Yin and Yang became one in an opposite and complementary relationship. They are opposite and rooted in each other while waxing and waning with each other. When both of them achieve the extremes, they will convert into each other. Yin and Yang, a pair of complementary notions, have been widely used into various aspects such as the universe nature, structures, relationships, the root (internal reasons) of changes (including creation, metaplasia, and birth and death), and laws. As a matter of fact, it is a complementary dialectical idea. The cosmic philosophy characterized by the opposite but unified organic integrity where “all the things can be

separated into two and combined into one” has been a basic idea, instructing people to observe and learn about the world for two thousand years.

Li Zehou is the one who introduced the concept of “complementary” into Chinese philosophy research. He said in his book *The Course of Beauty* that “Complementation between Confucianism and Taoism” is a basic clue of Chinese thoughts for two thousand years. But he failed to interpret the concept of complementarity. Confucianism represented by Confucius and Mencius, and Taoism represented by Laozi and Zhuangzi, are different and opposite, but actually are complementary to each other for harmony. Here, the word “complementary” largely means the infiltration and coordination between the opposites rather than the exclusion and confliction. It is this very pair of opposite and complementary thoughts that contributes to prosperous cultures in Chinese history.

Thus, it can be seen that from the very beginning of Chinese and Western philosophical thoughts, sages managed to interpret notions of things and expressed their ideas with the concept of “complementarity” simultaneously. In philosophical thoughts, coexistence of both sides is the premise of “complementation” which includes opposites and complements. They turn into the complement of each other in the process of contradiction, movement, waxing and waning, and conversion, and therefore become more complete. “Complementarity” is a related, dynamic, and developmental concept. As a broader thinking framework, complementarity exists in various domains such as traditional Chinese medicine, painting and calligraphy, literature, poetry, and building.

2.2 Linguistic Application of “Complementary”

Language has been applied in a typical complementary way from its very beginning. (Niels Bohr, 1960) However, human’s thinking method is realized by means of language, and people think of problems with the opposite and complementary mode unconsciously. Just like what mentioned by Confucius, “tackling both ends”, we can often learn the nature of things more comprehensively, which exactly explains why there are so many scholars at all times and in all over the world using the complementary relationship to interpret basic theories, including shape and spirit, empty and fact, sparsity and density, pen and ink, beauty and ugliness, nature and charm, adoption and discard, and similarity and dissimilarity in painting and calligraphy; appearance and morality, appearance and nature, sensibility and rationality, one and many, dynamic and static, novelty and rigor, elegance and popularity, generalization and change, and style and character in the aesthetics domain; opposition and unification, symmetry and equilibrium, rule and freedom, and contrast and reconciliation in the law of beauty in form; and the five pairs notions of art styles raised by Wolfflin, that is, Linear und Malerisch (linear and picturing), Fläche und Tiefe (plane and deep), geschlossene Form und offene Form (closed form and open form), Vielheit und Einheit (identity and diversity), and Klarheit und Unklarheit (clearness and ambiguity).

Wittgenstein said the language you select determines your thinking mode, and the selected thinking mode determines your life style. There are two weak points in Chinese language. One is that our concepts are ambiguous, and the other is that our

logic is weak, [3] which lead to the lacking in rational thinking and meticulous scientific logical thinking in Chinese people's thinking mode. Chinese people lack the exploration for "seeking the truth", but think highly of "pragmatism"; put emphasis on the intuition and experience as well as general feelings, and study objects roughly, which easily results in ambiguous concepts; lack the deep thinking for perceptual material and the precise analysis for things, but prefer the summarization of experience and general description. Just as what mentioned by Lin Yutang in his book *My Country and My People*, "Here enter the survivals of savage in Chinese thinking. Unchecked by a scientific method, 'intuition' has free room and often borders on a mere play of words or on some fantastic association of thought." In this way, the abundant perceptual thinking in Chinese thinking mode and the strong imagination have been developed, and therefore this type of perceptual thinking mode has been rooted in Chinese culture and life styles.

2.3 Philological Paraphrase for "Complementary"

The word "complementary" in Ci Hai is paraphrased as supplementary or replenishing; (things) complement each other. Here, as it mentioned, "each other" means it is bidirectional. A one-way dependency between A and B cannot be said as a complementary relationship. Being complementary means two items are different from each other but make a good combination, which becomes more complete.

Therefore, there are three stipulations for being complementary: be bidirectional; preserve the nature of themselves; and overcome their own weak points by learning from each other's strong points. Thus, both of them can benefit from each other in complementation. Coexistence of the two items is the premise of complementarity whose role is for a more complete combination.

2.4 Knowledge of the "Complementary" Principle

The Danish physicist Niels Henrik David Bohr is the first person who clearly put forward the concept of "complementary". In 1927, Bohr raised the "complementary principle" for explaining the major feature of quantum phenomenon – wave-particle duality. He thought microscopic particles have two features which are exclusive but complementary – particle property and wave property. In experiments, the two phenomena cannot be completely described with a unified image, but both particle property and wave property are indispensable for the description of quantum phenomenon. The two properties must be combined together for the complete description. Therefore, the quantum phenomenon must be described with the method in which the two properties are exclusive but complementary to each other. The scientific method of creation is characterized by complementarity, interaction, dialectical thinking, and comprehensiveness. Bohr thought the complementary principle can be regarded as a universal philosophical principle and used as a boarder thinking framework to solve problems in various domains such as psychology, linguistics, biology, mathematics, chemistry, anthropology, and national culture. He also managed to reveal other forms

of complementary relationships in his research. The complementary principle shows us the interaction between objects in research and observation tools from a scientific perspective. Although the phenomena observed in different experimental conditions are seemed to be so opposite, they are indispensable parts for learning the objects completely. The author believes it actually reveals the integration of knowledge and enables us to observe with different perspectives in the actual design practice, especially in the process of design thinking, and thus deepen our cognition. It is uneasy for us to deepen our thinking with research perspectives in the same direction, but the complementary perspective may enable us to have comprehensive and thorough knowledge in research.

2.5 Analysis of the “Complementary” Methodology

In 2001, Lu Yuntao, a professor in Southwest University for Nationalities, put forward the “complementary theory” from the epistemological perspective. He demonstrated the common existence of complementation in the nature world, social life, and thinking domain, and analyzed the mechanism of complementary existences: ①The universe is a unity, in which each part are interrelated. Each part in the unity inevitably possesses a complementary relationship with each other. ②Each component within things seeks balance all the time. Complementarity is an important method to achieve balance. The imbalanced tendency of some components can eliminate the weak points by learning from each other’s strong points, and therefore approach balance, which gives us the epistemological meaning, and some enlightenments for knowing the world: ①The world is diversified. ②Everything is good for something. ③Nothing and nobody in the universe can be self-sufficient without others [4].

In 2002, Professor Liu Dachun, a Chinese scholar, introduced the complementary philosophical concept into methodology for research. Based on the comparison of methodology in his monograph *Scientific Activity Theory, Complementary Methodology*, he found a macroscopic law related to methodology – “Complementary Methodology”, which evidently shows with multiple perspectives, the occurrence of the methodological thinking system cannot be avoided, the content or forms of which are exactly opposite (exclusive). However, during conflicts and confrontations, they will finally reveal a certain complementary relationship [5]. It is the first time for Chinese scholars to introduce complementarity into methodology for research.

In 2011, Professor He Xiaoyou introduced the complementary philosophical concept into the design domain for research. He put forward the “**Complementary design method**” and managed to establish an interrelated design thinking mode. This type of relationship is seemed to be opposite, but to some extent complementary. In other words, with the complementary perspective, the exclusive ideas may show a certain type of complementarity. When we think of these problems dialectically, our innovative thinking can be more comprehensive and thorough under its guidance [6]. It is the first time for the design methodology research to have a specific concept of “complementary design method”.

3 “Complementary” Perspectives

Designers use the thinking tools to develop relationships with the target world and form a certain type of cognitive structure schema shown as specific understanding for their own design activities, which is the cognitive structure of design thinking methods.

In the design research, we “see” the “phenomenon” which cannot be seen in other thinking frameworks with the cognitive intention based on the “complementary understanding”. Laozi said, “All things leave behind them the Obscurity [Yin], and go forward to embrace the Brightness [Yang]”, which exactly refers to the philosophical structure of the universe. Yin and Yang are opposite and interdependent, and cannot present themselves without each other, which emphasize the interrelation between all the things in the universe rather than the isolated status. “Interrelation” refers to an opposite and interdependent relationship. At the actual design innovation stage, designers need to handle the problems from an “interrelation” perspective like Yin and Yang rather than an isolated perspective. We shall “tackle both ends” with the “complementary perspective” upon observation, seeing from not only the opposite side but also the interdependent side.

From the complementary perspective, based on the diversity, unity, comprehensiveness, contingency of selection behaviors, and multiple possibilities of problem solving, one can expand the design thinking, and construct, organize, and create a more profound cognitive mode. In detail, complementary perspectives include: forward or reverse perspectives; commonness-seeking and difference-seeking perspectives; self and non-self perspectives; ordered and unordered perspectives; and traditional and future perspectives.

3.1 Cognitive Mode of Forward or Reverse Perspectives

Positive orientation based on the forward perspective. Forward perspective, also called positive perspective, refers to a kind of presupposition adopted for observed objects or considered “problems”, which is good, correct, valuable, meaningful, and positive. One may find the advantages and value in observed objects or considered “problems” with the positive perspective. It is a transcendental thinking direction of positive value.

In daily life, we basically use the forward perspective for those accepted valuable, good, correct things. As a matter of fact, it only adds grace to what is already beautiful with the positive perspective, which makes a little difference. Under this condition, designers are required to think of problems with the “forward perspective” at any time, especially for the cases when everybody thinks it impossible to be positive, which actually can be regarded as a kind of creative thinking. The positive thinking upon negative things, indeed is dialectical to some extent. For example, we can turn “waste” into “wealth” with the forward perspective, including household articles made of straws, fine photo frames, and fruit baskets made of old magazines. The thinking mode of the forward perspective enables us to comprehensively evaluate the value of things, actively explore the potential value of things, or develop new values which are useful



Fig. 1. Coca-Cola 2nd Lives

for us. With emotions being input, design culture being endowed, and social responsibilities being delivered, ordinary things also can be classic (Figure 1).

Subversive creativeness based on the reverse perspective. Reverse perspective, also called negative perspective, is opposite to forward perspective. The word “negative” is similar to “reverse”, which means thinking from the opposite or reverse side, and finding, analyzing, and answering the problems in the reverse direction of common thinking. It shows a thinking mode different from the normal forward perspective, which is anti-traditional, anti-conventional, and anti-habitual. Lao Zi said, “The movement of the Tao by contraries proceeds” [7]. The plain dialectics in his words tells us a creative thinking method – seeking from the reverse side, with which one can always achieve success with original ideas and break the rules. One can start from a subversive idea at the early stage of thinking to develop a hypothesis on the reverse side: “What if...not...?”

Complementation between forward and reverse perspectives. Anything has its opposite side. The opposition between objective existences provides two different thinking directions including positive and negative directions, and inspire the dialectical thinking of designers. Thus, the thinking cognition becomes dialectical and comprehensive.

When we think of design objects, or design “problems”, we can start with the “forward perspective”, determine the design value, and observe and analyze the problems under the guidance of positive thinking in order to achieve the unity of the design content and forms and obtain logical design results. Experience tells us that it is very common for most of people to think about solutions for problems firstly, so it is necessary to expand our thinking in multiple directions and collect the information as much as possible under the positive, active, and valuable guidance of the “forward perspective”. If one thinks of problems with the “reverse perspective”, the rules can be broken while the traditions can be subverted with the reverse thinking, and we may obtain some novel ideas. It is contrary to the normal and proper practice, but is reasonable and conforms to the righteousness (Fig. 2).

In the process of cognizing design thinking objects, the key is to develop the type of complementary thinking habit at the creation stage, and therefore we can think of thinking objects immediately from forward and reverse perspectives. Thus, we are able to have relatively profound and comprehensive cognition and knowledge for such “problems” and may find different ways and suitable pointcuts to effectively solve the problems.

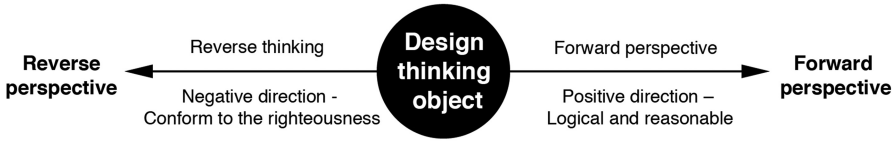


Fig. 2. Mind mapping of forward and reverse perspectives

3.2 Cognitive Mode of Commonness-Seeking and Difference-Seeking Perspectives

Finding universal connections between things based on the commonness-seeking perspective. With the commonness-seeking perspective, we are required to seize some common points between two or more things, phenomena, ideas and concepts in order to connect the dramatically different things, phenomena, ideas, and concepts for generating new creative ideas.

Finding connections between things is the starting point of the commonness-seeking perspective. We aim to finding the common ground and similarities between different things and connecting them with its thinking results. By introducing the analogical and associative thinking, we are provided with the cognitive basis and thus obtain new creative ideas. With the cognitive purpose, on one hand, we can have a clear concept of design thinking objects; on the other hand, the audience can know well about unfamiliar things, which will arouse their sympathetic responses. In various connections, the greater the superficial difference, the more amazing the connections, when they are connected within the commonness-seeking perspective.

The print advertisement of “ABSOLUT” Vodka is a typical example of the “commonness-seeking perspective”. The shape of its bottles is very distinctive, which has been shown in hundreds of print ads. You can find it if you are careful. The bottle shape combined with various natural regions, cultures, and living scenes in print ads, contributes to this extraordinary design idea and the classic “ABSOLUT” (Figure 3).



Fig. 3. A series of “ABSOLUT” ads. A classic work in advertisement design using the isomorphic technique

Finding distinctions of creativity based on the difference-seeking perspective.

With the difference-seeking perspective, we are required to find solutions of problems with divergent thinking which features adaptability and flexibility. We need to get rid of the accepted knowledge and old experience upon consideration, break through the limitation of logical thinking and linear thinking, focus our attention on “what else it may be” other than “why”, and therefore put forward creative ideas, views, and solutions. From the difference-seeking perspective, design thinking is differentiated, distinctive, experimental, individualized, and diversified, divergent thinking can be used profoundly while the adaptability and flexibility can bring the diversity in design.

Design ideas need to be distinctive, so all those excellent designers are characterized with the “difference-seeking perspective.” For example, the topic of the 2003 Alliance Graphique Internationale (AGI) meeting in Helsinki was “Chair” and the AGI had invited its members for creation as shown in Fig. 4. On the same chair model, we can see that designers had their own perspectives different from each other, which gave birth to various types of amazing chairs.

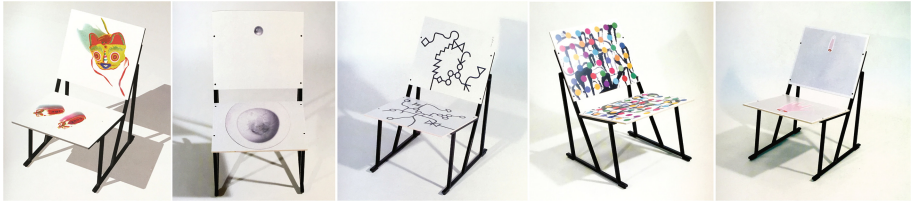


Fig. 4. Members’ design: “skin of chairs”, 2005 (designed by Yu Bingnan, Wang Xu, An Shangxiu, Liu Xiaokang, and Stefan Sagmeister (from left))

Complementation between commonness-seeking and difference-seeking perspectives.

The key for developing commonness-seeking and difference-seeking perspectives is to think by means of association, analogy, and divergence. The former (commonness-seeking perspective) features the reconstruction of the commonness in order to obtain the concept of thinking objects. The latter (difference-seeking perspective) emphasizes the change of perspectives for receiving novel results of thinking (Figure 5).

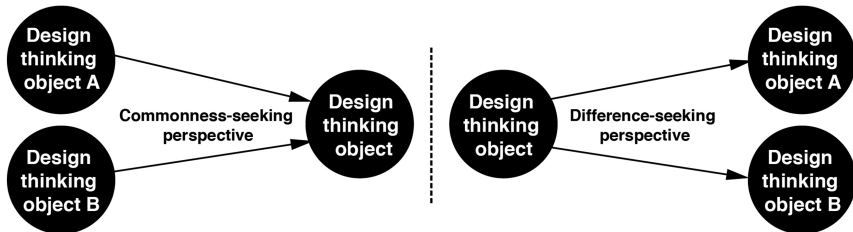


Fig. 5. Mind mapping of commonness-seeking and difference-seeking perspectives

At the stage of cognition, the “commonness-seeking perspective” can be used to fully know about the observed objects and find the commonness between things, so one can have profound knowledge of “notions” of objects, find common relations between various kinds of things to arouse association and perform isomorphism, and turn the unfamiliar into the familiar. Thus, we can well prepare for the translation of visual images. The “difference-seeking perspective”, on the contrary, is complementary to the former. At the stage of observation, with the difference-seeking perspective, objects can be observed from different points of view, and therefore unique characteristics of which can be found. In the process of visual image interpretation, the familiar is turned into the unfamiliar, with which one can achieve success with some original ideas. With the two perspectives, one can have comprehensive knowledge of observed objects and find solutions based on actual cases.

3.3 Cognitive Mode of Self and Non-self Perspectives

Experiencing design perception based on the self perspective. In the design thinking, self perspective refers to the design perception experienced from designers themselves. Based on the interpretation of themselves for observed objects, designers can produce the pieces evidently featured with their own styles. This type of design generally fails to follow those popular design styles, yet it is popular for its unique and distinction and thus can lead the design trend of the era. The self perspective of design mentioned here, mainly features designer’s own subjective consciousness and evident personal design style.

“Body writing” of Stefan Sagmeister, “potato series” of Gunter Rambow, “word games” of Zhu Yingchun, and “free curves” of Luigi Colani are good examples to show the resonance between the designer and the audience can be achieved with the self perspective. It is partially because designers are also audiences and users. We live in the similar social environment and are confronted with similar problems, so we can focus on ourselves and directly show our own feelings and experience. In particular, the word “self” refers to the ordinary people who can find the common ground with others in daily life and have personal demands similar to others, and thus they can create designs accepted by others. In addition, extremes shall be prevented in the self perspective. The job of designers is to design the items which can be accepted by the public rather than something with extreme individualism which otherwise may be art pieces but not design.

Reflecting user’s requirements based on the non-self perspective. With the non-self perspective, we are required to get rid of the narrow concept of “self”, and also the restriction of inherent personal concepts, feelings, and standpoints in the process of observing and finding problems.

As a matter of fact, non-self perspective is a design method for the user’s requirement research. One needs to get rid of himself and stands on the user’s position to think for them, and their requirements, aesthetic demands, emotional expressions and others. For commercial projects, when a designer cognizes design thinking objects with the non-self perspective, he is propelled by commercial interests, and needs to have a kind of

humanistic concern. For example, the brand concept of Muji, raised by Ikko Tanaka, is rooted in the life style and aesthetic awareness of Japanese people. It is Shinzo Higurashi who firstly came up with this brand name, and Mr. Ikko Tanaka accepted and used it. Ms. Ichiko Koike also put forward the slogan, “quality and cheap”. As a result, Muji provides batches of customer-friendly and affordable products with simple styles and natural texture. Since 1980, Muji has achieved so many good results, which is known by Japanese and the rest of the world. From its founder Ikko Tanaka and Ichiko Koike to Hara Kenya and Naoto Fukazawa, Muji has influenced people’s life style with its products which are “fine enough in this way”, its attitude of “WORLD MUJI” and its “good enough living” style, and thus owns a great number of loyal fans.

In addition, in another case, that is, when design thinking objects are things, animals or plants, with the non-self perspective, we can observe and analyze them in another interesting way. The examples include “Language of Ant” of Zhu Yingchun, “Drawing of Tree” of FSC, and “Thinking of Apes” of Hiroki Taniguchi.

Complementation between self and non-self perspectives. Self and non-self perspectives are a unity of contradiction. The conclusions obtained from the two perspectives are different as shown in Fig. 6.

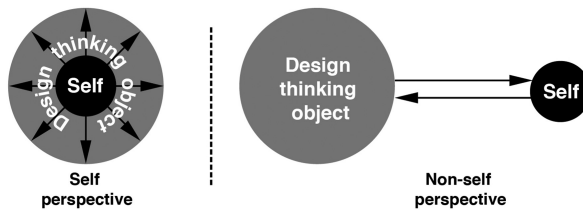


Fig. 6. Mind mapping of self and non-self perspectives

With the self perspective, designers tend to solve problems with their own consciousness, understanding, requirements, and aesthetic preferences. However, as a member of the society, the designer is living in a similar environment and life style as that of other people and confronted with similar problems, moreover, has almost the same physiological structure like others. Thus, they obtain consonance with the self perspective meanwhile their design always features strong individual awareness and styles. But designers shall never only pay attention to their own consciousness, they need to find balance between the subject and the object and build a bridge between the visual information and its receiver for free communication. On the other hand, with the non-self perspective, designers need to get rid of the role of self, and be user-centered and neutral to design for “He”. They need to solve problems with an objective, just, rational, and effective attitude based on requirements, aesthetic standards, living styles, and even reading habits of users. Design with the non-self perspective is more similar to research, which is more rational and logical than the self perspective. Purposes and results of the self perspective are aimed to meet requirements of a certain group. In the actual design thinking process, there is indeed no absolute self and non-self perspectives, because they are interwoven with each other in most cases with their own focuses and are complementary to each other for target groups in design.

3.4 Cognitive Mode of Ordered and Unorderly Perspectives

Forming systematic design based on the ordered perspective. With the ordered perspective, designers are required to observe and analyze design thinking objects strictly based on a certain logical principle, demonstrate concepts and solutions practically in order, analyze the nature from the phenomenon, put emphasis on the logicity, and recognize the inevitabilities to ensure creative points in design can be performed and completed as planned.

For the ordered perspective, the author thinks it includes two types of order: One is “natural” order; another is “man-made” order.

Nature is a type of order. “The structure of any nature shape is inevitable while the connotation of which is self-known” [8]. We choose to observe a certain objective target from the outside to the inside, cognizing it from appearance, shape, texture, and material to structure, organization, and laws. The step of observing “from the outside to the inside” itself is a kind of ordered perspective. On the other hand, for the man-made order, this kind of “ordered perspective” is actually developed based on people’s design practice and activities and established as a systematic mode of design, such as “systematic visual image design” put forward by an American designer Lance Wyman.

The ordered perspective is instructed by logicity and linearity. This type of perspective for observing and analyzing problems basically has the following major characteristics: carry forward according to the purpose and the plan step by step, and generate the conclusion based on the cause-and-effect relationship. At the cognition stage, the “order” cannot be separated from the frameworks in mind, including “concepts”, “laws”, “rules”, “common sense”, “habits”, and others we are familiar to.

Obtaining unique creative ideas based on the unordered perspective. With the unordered perspective, designers are required to observe and analyze design thinking objects without the established frameworks and traditional modes in mind, break out “laws”, “rules”, “principles”, “common sense”, “habits”, and other like things, get rid of the restriction of logical mind and linear thinking to free their imagination and feelings in order to arouse the imagination and achieve better creative effects with intuition. The following aspects are important in the thinking process: ①know the dominant concept; ②find different ways to observe things; ③get rid of the orderly linear thinking; ④be good at using contingent factors and seize the inspiration of “epiphany”. Compared with the “lateral thinking” put forward by Edward de Bono, it has different approaches but achieves equally satisfactory results.

The design thinking with the unordered perspective features divergent thinking. Epiphany, inspiration, and imagination are the impetuses which gives birth to the unordered perspective. The design thinking with the unordered perspective to some extent is rebellious and revolutionary. Designers with which dare to break the rules and regulations, shake off the constraints of habits, experience, principles, laws, and regulations, and catch up with sudden changes and skips in the thinking direction of the thinking process.

Interaction and cooperation between ordered and unordered perspectives. Ordered and unordered perspectives have different thinking methods upon observation

as shown in Fig. 7. For the ordered perspective, it is the logic that controls the whole thinking; for the unordered perspective, the logic is on stand-by. With the ordered perspective, designers are required to observe and think based on some certain thinking routes, within a specific range, and according to a certain established rule, which stresses on learnt experience and knowledge, and generate creative ideas by reconstructing the old experience and knowledge. In this way, the given demands of the public can be satisfied with creativeness, but designers fail to make a breakthrough in design forms which are relatively similar to each other. However, using this perspective for creativity, designers can study and express profoundly on things, and design can be easily systematic. Unordered perspective is unpredictable and applied upon thinking. Designers with which need to get rid of established knowledge and old experience, break the rules, be good at seizing the occasional ideas, expand the cognitive range, and come up with creative ideas, opinions and solutions. The application of cognition mode basically follows divergent thinking and depends on designer's intuition and inspiration. In the creative process of design, in most cases, the ordered is included in the unordered. Once creative points are found in the unordered, ordered steps for moving forward are taken gradually. The unordered is required in the ordered. Only with the interaction and cooperation of both perspectives, the best solution can be provided.

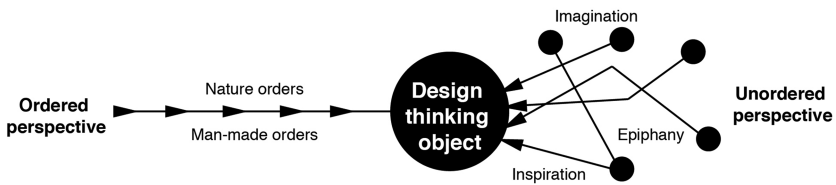


Fig. 7. Mind mapping of ordered and unordered perspectives

3.5 Cognitive Mode of Traditional and Future Perspectives

Adding innovation to Chinese forms with the traditional perspective. With the traditional perspective, one inspects the origins and development of things and concepts from the dimension of history in order to master the past and know better about the present. In the design thinking, the traditional perspective requires us to take in the wisdom from traditions, through traditional forms to observe the thinking mode, traditional culture, reading habits, living styles, traditional design ideas, craft skills and materials, and communication media, and to design based on it so as to enlighten the modern innovative design. Meanwhile, we need to make it clear that thinking with the traditional perspective is not to fully follow and conservatively copy traditions and transplant symbols, but to discard what has outlived its time and develop the new, to follow the tide of the times, and to explore the interaction between inheritance and innovation, nationalization and internationalization, traditional methods and modern science and technology based on the current living style, so as to revitalize the design.

At present, there are many designers with the traditional perspective among the famous designers of visual communication design. For example, Chinese designer Jin

Daiqiang appeals “to integrate the Chinese and the West, and poetize the design”; Chen Shaohua points out that “traditional factors are effective tools for communication”; Chen Youjian delivers “charm of the east and melody of the west” in his works; Han Zhanning thinks about “traditional images”; Lu Jingren shows “implication” which is peculiar to Chinese people and also presents his “humility and low profile” in his works. He holds an attitude of “inheriting the spirit and expanding the forms” towards the traditional culture; and Zhu Yingchun “seeks for experience from traditions” in book design.

With the traditional perspective, one can find innovation inspiration and visual elements in the traditional culture. The process of which is not to simply transplant symbols and reproduce images, but to integrate traditional elements and traditional culture spirits with current design based on the exploration for traditional thinking modes, traditional culture, and traditional living styles and to endow the design with new ideas and the spirit of the times. In other words, it is a way to inspire innovation design with traditional wisdom. In the actual design expression, we need to pay attention to the interaction between traditional methods and modern science and technologies, in order to achieve “inheriting the spirit and expanding the forms”.

Exploring the developing tendency based on the future perspective. With the future perspective, designers think of the developing tendency of things and concepts in the future to seek for the transcendence in design. They are required to measure the current “trend” in design, explore the tendency of the times, and lead the future development based on the design practice and experience summary. On one hand, the rapid development of science and technology pushes forward the future of design. On the other hand, the advancing thinking of design continuously plays a leading role in our future creation.

We can have a look at “The Football Experience” device in Cristal Arena KRC Genk as shown in Fig. 8. It shows the cases of sport injuries with life-sized 3D dummies. The device comes into “life” with the touch-sensitive interface and the friendly interactive design as well as pictures, images, short films, words, and cartoons. The interactive experience enables sport injuries as the content of popular science to be easily understood. With the future perspective, the visual information communication becomes increasingly interesting.



Fig. 8. “The Football Experience”/ART + COM

The future perspective is mainly experimental, prospective, and scientific, which features forward thinking. We cannot avoid the great influence on every aspect of people's life brought by computers, and must put emphasis on the combination of science and technology and humanity. Artificial intelligence will definitely be a development tendency in the future while the visual communication design domain also plays a leading role in the change. However, designers with the future perspective need to make the world be more higher-technology and also more human again. In the interrelation of human – information – environment, designers also need to think how to show the ecological view and make our lives better with design!

Penetration and integration between traditional and future perspectives. Traditional and future perspectives are varied according to time dimensions as shown in Fig. 9. In the modern society, people's requirements for interaction of information communication have been higher and higher, design methods take lessons from and are integrated with the science and technology domain, and computer software programs, holographic display, and artificial intelligence have been increasingly grafted into design, the application scope of which has been expanded to virtual vision from physical presence. Design modes in the future will be more free and personalized, just as mentioned by David Carson, "I believe that the next graphic design approach comes from other non-design fields". Looking into the future based on the traditional culture, we can make design be more adaptable to the modern society with acceptable methods of information communication.

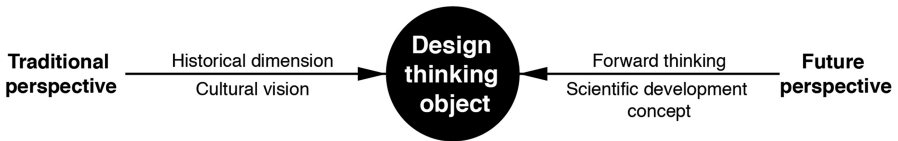


Fig. 9. Mind mapping of traditional and future perspectives

Traditional culture and modern design, even future design are supposed to be penetrated into each other and integrated with each other. For the traditional culture, we should deeply probe into its charm of history, philosophical ideas, culture spirits, and traditional wisdom other than simply transplant the symbols. The future design is also probably rooted in the thinking with the traditional perspective. It is now an important task for Chinese designers to think about this pair of perspectives and also an inevitable problem which cannot be avoided in seeking an innovation path for Chinese design.

4 Conclusion

The fast speed of the aging of the population makes people concern more about old people's health conditions. The improvement of sleep quality can directly affect their health status. This paper mainly analyzed the sleep quality of the elderly from the perspective of physiology and furniture. However, there are many factors that can influence their sleep quality such as mental condition 'daily habits' interpersonal

relationship and economic status. When designing furniture for the elderly, we must have a clear understanding of their needs and design products that are fit for their use so as to improve their quality of life.

“Complementary understanding” provides us with a cognitive mode to cognize the universe in philosophy. The paper introduces it into design and gives cognitive modes of five pairs of complementary perspectives for observing, analyzing, and summarizing design problems, so as to have profound and comprehensive knowledge of design thinking objects.

Constructing the cognitive mode with the “complementary” perspective, basically is an activity for cognizing objective items under the guidance of dialectical thinking. With the cognitive mode, we can avoid the defect of failing to profoundly and comprehensively conduct the research in the same research perspective, observe objects with opposite, exclusive, and contradictory “complementary” perspectives, and master objects in a dynamic, developing, associated, and comprehensive way. In thinking activities of design, we can arouse the thinking and design intelligence, boost the creativity with the convergence and divergence of thinking, abstract summary and specific description, scientific rational thinking, and intuitive epiphany, and therefore achieve the purpose of creative design.

The purpose of the “complementary” perspective is to observe objects from different points of view, discard the old visual and perceptual experience, break the obsolete rules and regulations, and find innovative points in design for constructing new rules. This process is as follows: selection – breakthrough – reconstruction. The cognitive mode of forward and reverse perspectives can help us break thinking barriers from the opposite side and obtain the “impossible” creativity; the cognitive mode of commonness-seeking and difference-seeking perspectives enables us to have profound and comprehensive knowledge upon the commonness and individuality of design thinking objects, and lay a foundation for the translation and generation of visual images through heterogeneous assimilation and homogeneous alienation together with analogy and association; the cognitive mode of self and non-self perspectives requires designers to recognize the difference perspectives between themselves and design targets. In most cases, changes of the neutral position and perspectives in design can bring different design ideas and concepts; the cognitive mode of ordered and unordered perspectives tells that the nature world is the best source of design inspirations. Designers can cognize design thinking objects between nature and artificiality, regulations and freedom, and rules and imagination. The cognitive mode of traditional and future perspectives enables us to view from different time dimensions, appeal to protect and actually take in the traditional culture, continuously explore new directions in design, and lead the future of design, which makes design indeed adapt to people’s life style in a more reasonable and perfect way.

The digital information era is calling for an associated, integrated, systematic, and diversified thinking mode of design. We need to cognize problems in design from multiple perspectives, and solve them with comprehensive methods. With the cognitive modes of the “complementary” perspective, we can dialectically think about the complementarity between contradictory ideas meanwhile our innovative thinking ability can be developed comprehensively and profoundly.

Acknowledgements. The authors are grateful for the financial support provided by “the Fundamental Research Funds for the Central Universities”. (No.30915013107)

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