A Design Methodology for the Product Design Development Based on Design Coding & Design Semantics

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Abstract

The market uniformity of cultural and creative items is severe and disregards the rate of cultural diffusion and the reflection needs of users. In product design, the manner of narrative design can reflect emotions, feelings & psychology. The method is discussed in this paper. After that, it collects and organize the design components and content that people pay the most attention to, as well as the design content that generates the most criticism. This aim requires conducting an investigation into the level of comprehension that designers and the general public have of the function that design language performs in the design process. this study investigates and assesses the comprehensive design method. We assess and combine each component in this work by applying a number of methodologies and tools, performing a literature investigation and citing applicable sources, and creating preliminary conclusions and analysis. The output of this study is a set of design methodology or guidelines for the designer references.

Keywords: Product Design Methodology; Design Semantics; Design Coding.

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1. Introduction

Accelerating social and technical change has become synonymous with modern living. Functionality, aesthetics, usability, affordability, recyclability, and safety are all characteristics that should already be present in the design works. The new perspective on design prioritizes the creation of meaningful and relevant designs over the efficient deployment of useful and useable outcomes [1]. The significance of the strong relationship between design and social culture is becoming increasingly recognized.

The Postmodernism began its critique of modernism in the 1960s and 1970s. This was done in an effort to deconstruct modernism's logical base and build a new civilization on a foundation that was more pluralistic than a single rationality. This caused the social foundation for the production of design forms to shift during this time period. This was done in an effort to build a new civilization on a foundation that was more diverse than a single reason for its existence. Because postmodernism places such high emphasis on "emotional worth," it might be characterised as being "service-oriented." This results in a growing number of symbols being produced. Within the framework of modern society, the symbolic significance of design is widely spread, and one is able to realise a more nuanced and complex emotional expression through the use of design [2]. As an illustration of this topic, its typical representative, product design, requires the substitution of functional needs with emotional and aesthetic needs in the form of architecture. This substitution is necessary since product design prioritises aesthetics over functionality. Creative expression strategies, such as decorating and metaphor, are given a greater priority when it comes to the form expression of commodities. Even functional aspects are accentuated for the purpose of creating a symbolic effect, which endows the products of industrial design with an increased sense of aesthetic value and significance [3].

The problem arises that postmodern design is open to being misunderstood, which results in a disconnect between the coding of the design and the public's interpretation of it. This is because postmodern design usually uses a huge amount of hypothetical, metaphorical, and ritualistic coding symbols, and these cryptic information codes create obstacles that prevent decoding from taking place [4]. As an illustration, the designer Archizoom parodies the work of Ludwig Mies van der Rohe from 1929 by utilising industrial materials such as chrome-plated square steel, rubber sheets, and sharp triangles. In a similar vein, Robert's "Barcelona chair," which is considered to be a classic example of modern furniture design, uses the coding process to extract hilarious banter and historical components of design. The general public, however, is unable to decipher the reference code of Archizolm coding because they are unable to appreciate the historical context in which it was created. Thus, this paper aims to analyse the significant values of narrative study of design language among as well as proposed a guidelines or methodology of narrative study of design language.

2. Literature Review

The ground theory technique of qualitative research was developed by [5], who are credited as the method's creators. When conducting qualitative research using this method, standardized processes are used to generate and induce grounded theories for a specific phenomenon. Grounded theory is developed through the process of investigating and categorizing observed events utilizing the inductive research approach. Researchers who use

this methodology typically do not have any preconceived assumptions going into their investigation, as this is the first step in the process. They get right in with some hands-on experience, then build up to some theoretical understanding by synthesizing previous knowledge with new information. According to this method of study, a "theory" needs to be "based" in the facts that were gathered and examined in the field. These facts should primarily concern the behavior, interaction, and social process of individuals. In order to bridge the gap that exists between theory and actual research, grounded theory was developed. It is the principal method utilized in this design sociology study and is widely utilized in sociological research overall.

2.1. Coding as the Foundation of Grounded Theory

Coding is considered to be at the foundation of grounded theory. It is a process that first deconstructs and conceptualizes the data, and then recombines the concepts in new and interesting ways [6]. The analysis component of the grounded theory research method is comprised of three distinct coding strategies: open coding, axial coding, and selective coding. These strategies are also referred to as open login (primary code), related login (secondary code), and core login (tertiary code). The process of deconstructing, analyzing, contrasting, conceptualizing, and categorizing the initial data is referred to as open coding; On the basis of open coding, axial coding connects the two categories by means of a coding model, that is, with the assistance of the conditions, context, action/interaction strategies, and results of the analyzed phenomenon. This process, which is the process of reorganizing the data, is known as selective coding. Selective coding is the process of identifying the core category. It completes the conceptualization category that has not yet been formed while also connecting the system to other categories, verifying the relationship during the period, and doing so during the time period. The boundaries of one form of programming are not always the same as others. During the process of coding, the coding methods are going to be cross-replaced so that we can satisfy the requirements of the data induction [7].

The act of dissecting, testing, comparing, conceptualising, and categorising the original data is referred to as open coding; On the basis of open coding, axial coding joins the two categories through a coding model, which is to say with the assistance of the conditions, context, action / interaction methods, and consequences of the analysed phenomena. Selective coding is the process of selecting the core category. It validates the relationship during the period, connects the system to other categories, and finishes the conceptualization category that has not yet been developed. All of these functions are performed by the system. The limits of other programmes of the same type are not always set in stone. During the coding process, the coding methods are going to be cross-replaced so that we can satisfy the needs of the data induction.

In other relevant domains, [8] used grounded theory to determine that the key category of tourist items and their experience is "seeking and experiencing happiness." They then developed a narrative to replicate the entire experience process of tourism behaviour. Other researchers explore the placement and shaping of urban image based on grounded theory and present the narrative, fundamental concepts, and overall picture forming strategy for urban image shaping. This is done in order to better understand urban image shaping. Other researchers conduct research on the growth of a brand and the factors that influence it, and they use grounded theory as the primary research method. These researchers come to the conclusion that the theoretical research content has

significant implications for the rapid expansion of businesses. However, it is still experimental and tentative in the research and application of design theory, particularly design connotation, and it has not been investigated extensively and in depth. Grounded theory is generally utilised significantly in the field of cultural innovation.

2.2. Coding as the classification methods

Coding in qualitative research is not at all the same as coding in quantitative research. Coding in qualitative research is the method of classification that is most commonly utilised. The major goal of determining the frequency of generation in each category is served by the categorization of data in quantitative research according to pre-established, distinct categories [9]. This is accomplished by classifying the data according to the categories. The purpose of coding in qualitative research is not to count, but rather to "deconstruct" the data, form conceptual data, and reorganise the data into several categories in order to make it easier to make comparisons within a single category and to develop theoretical conceptions [10].

The connection between the many aspects of the qualitative research problem shouldn't be linear; rather, it should be cyclical and dynamic. In this study, the connotation of design semantics is anchored in the material and spiritual demands of users [11]. This means that the essential characteristics of user wants and cognition are investigated layer by layer with the design content in order to obtain the essential characteristics of design semantic connotation. This analysis process will continue to develop and extend as a result of the constant development of new wants and events, which will drive imaginative design. This will be the case because inventive design will be driven by the creation of new demands and events.

3. Methodology

3.1. Design & Development Questionnaires

To verify the validity of the theoretical system, the author formulates questionnaires and distributes them in batches to design students and design stakeholders so that they can evaluate and supplement the system from the standpoint of case restoration and the psychological process of design cognition.

3.2. Implementation process

3.2.1. Group Survey

The author determines which whole process design cognitive psychological response, based on the table established by the research elements obtained in the previous section, where the horizontal is the sequence of corresponding category guided by axial coding, i.e. the sequence of the general public's design cognitive psychological response. The vertical annotation represents the main meaning of each code to help participants rapidly understand the phrase. The bottom column is the area that participants must evaluate and mark, with certainty items representing ", prominent / significant items denoting ", and doubtful or problematic items denoting '?' After that, the cognitive ratio of these design semantic features as seen by the participants is established. Furthermore, the survey form included open-ended questions in the open-response column in the hope that respondents would contribute additional ideas and opinions on the study's topic.

The processes are as below:

1. Divide into groups of 5-10 people
2. The author introduces the theme and purpose of the survey, and explains the overall framework of the survey table
3. Interpret and give examples of some nouns involved in the survey that require the subject's judgment
4. Collect the questionnaire and make statistics.

Because the entire study content is professional, the author concentrates on design students, design related workers, and design amateurs when selecting respondents, as they are more likely to understand the research content and theoretical method. Furthermore, the author employs the strategy of small meetings and groups to ensure the quality of the survey feedback. Each survey should have a limited number of participants, and the author should explain and interpret the information to ensure that the respondents comprehend the study questions.

4. Findings & Discussion

4.1. Open coding - Define design semantic content

The technique of registering and recombining data for early conceptualization is referred to as open coding. Open coding is done sentence by sentence. The original data from the design evaluation are analysed in this study, which results in the production of a total of original words and starting conceptions. On top of this foundation, 14 categories are constructed, including wants, expectations, preferences, visual intuition, discrimination, form perception, technical cognition, comprehension, memory, emotional triggers, cultural differences, experience processes, white space, and aftertaste and reflection.

4.2. Selective coding—Theoretical model and relationship

The process of axial coding involves the investigation of the logical connections that exist between categories, as well as the construction of the primary category by building on the categories that are produced via open coding. The major category is identified by first clustering the 14 categories that were produced through open coding, then integrating those categories, and finally conducting an in-depth analysis of those categories. Finally, the relationship between each category is investigated to identify the major category. Table 1 presents the subcategories that correspond to each main category along with the meanings that are associated with them.

Table 1: Sub-categories that correspond to each main category & its meaning

| Main category	Corresponding category	The meaning of category
Mental anchor	needs	The framework for material function and spiritual culture is provided by design.
	expectations	Offer a more robust, diverse, and unexpected design for addressing the specified difficulties.
	preferences	Personality, emotion, and interest-related needs and interests.
Logical relationship	visual intuition	The visual accessibility and consistency of design objects enable buyers to rapidly distinguish the essential distinctions across products.
	discrimination	Identify and recognise the general characteristics of things, i.e., know "what is this object?" and "what is its function?"
	form perception	The decision-making, organisation, and interpretation of sensory information by humans.
	technical cognition	Pay close attention to the design's specialised technologies, materials, and processes.
Emotional node	understanding	Integrate design into your life and make it your life's content or experience.
	memory	Arousing memories of past people, places, or emotional experiences.
	emotional trigger	It can elicit a range of feelings and evoke a variety of emotional memories.
	cultural differences	Taking into account the cultural characteristics and preferences of mainstream and minority groups, regular and power users, and people from various countries, regions, cultures, genders, ages, etc.
Value collective	experience process	The entire design process must incorporate psychology from conception to execution, experience from beginning to end, the simplicity of material use and the sense of connection between events, as well as the total psychological imprint content.
	white space	Behind the surface clamour, ostentatiousness, and overwhelming material want is a manner of mind based on moderation, simplicity, and subtraction, as well as the treasure of ephemeral beauty formed by the world's cyclical transformations.
	aftertaste / reflection	This study examines the connection between the individual, design, society, and the environment.

4.3. Selective coding—Theoretical model and relationship

Selective coding is the process of analysing the relationship between categories via spindle coding and then modifying the typical relationship structure. It unearths the "core category" via the "storyline" characterising the phenomenon, explores its connection with the primary category and other categories, and then constructs the typical relationship structure. The typical relationship structure and connotation derived from this analysis are presented in Table 2.

Table 2: Summary of the narratives surrounding the study's core categories

Typical relational structure	Connotation of typical relational structure
mental framework ➡ logical relationship	The needs, expectation and preference for design are the logical essential factors that guide and affect the cause and effect, structure and content of design.
mental framework ➡ emotional node	Whether the design needs, expectations and preferences are met is the core factor affecting the triggering of design emotion.
Logical relation ➡ value collective	The logical connotation of design embodies the core content of design value.
mental framework logical➡ relationship emotional node ➡ value collective	The elements that are progressive and nested each other finally converge into the value embodiment of the design, and the content of this collection can be continuously expanded.

In order to accomplish the objectives of analysing the significant values of narrative study of design language - the research content described above evaluates the fundamental pieces of design semantics derived from open coding as well as their relationship (See Figure 1). This allows for the successful completion of the research. These essential categories of design semantics display mutual tolerance and correlation, and the fundamental aspects of design semantics reveal a linear evolution based on the cognitive system of humans. The entire scenario contains a wide variety of emotional turning points, starting from the very beginning. The connotation of design semantics can be established with a reasonable amount of ease; yet, the interaction between individual elements continues to be exceedingly complicated and detailed. First and foremost, you should think of this schema as a rough draught that will thereafter need to be reviewed and improved.
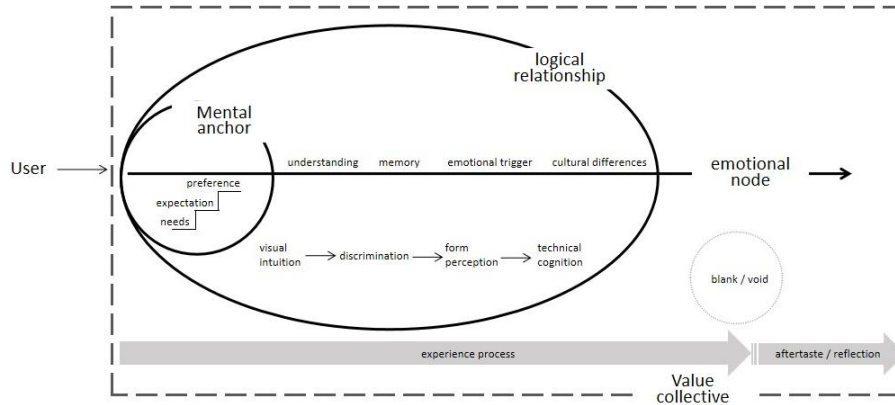
Figure 1: The research model of story lines around the core categories

5. Conclusion

This paper focuses on the search for and review of pertinent earlier literature, during which the essential theories, claims, and frameworks are examined at length to support the major emphasis of this investigation. Using design semiotics and design narratology as a method of thought, this study analyses and evaluates the comprehensive design procedure. We analyse and combine each component in this work by employing a variety of approaches and tools, completing a literature study and citing pertinent sources, and developing preliminary conclusions and analysis.

This article's analysis approach is taken more from the designer's subjective information transmission process to consumers than from the impression of the design produced by various aspects during the entire design process; thus, it provides a foundation for future research. This article provides a foundation for future study from a methodological aspect, as its analytical approach is more derived from the designer's subjective information transmission process to customers. Proposed is a method of thinking that approaches the topic from a different aspect; nonetheless, future research must still take into account the overall limitations provided by a variety of circumstances.

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