

# Contextual cognition of product display from multiple perspectives

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The author researches data relationship between Convergence Index of demand and Dispersed Index of demand differences. In addition, the information about product images, demands of display image, core images and contextual demands is compared. In the research, the experiment about data verification of product display context is conducted. Five series of display plans are established and respondents are required to separately perceive and assess display contexts. Finally, the data are compared from mean value of context and satisfaction. The results show that differentiated contextual effects exist in the product display.

Keywords: context, cognition, multiple perspectives, product display

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## 1. INTRODUCTION

A context is used to describe how the human brain processes image information. As it is closely related to consciousness, psychology, life, experience, and cultural background, the context falls into the realm of mental activity. Display context is an implicit knowledge, which cannot be expressed by normal characters. It is a human being's instantaneous perception that can occur repeatedly. It is a skill, judgment, and intuition which cannot be simply duplicated. Examples include both visual perceptions and experiences. In general, it is subjective, random and ambiguous. Grounded on human's cognitive thinking and human's perception on products, product display

context refers to an instinctive association that users have on the products and neighboring forms with their own sensory organs.

Product context is an objective requirement of market competition and also an inherent one for products to be established and evolve. It is an essential element in affecting and determining product competitiveness. In the previous research into product display, the author finds that the minimal research into contextual existence and construction, and research on the differentiation of display context is insufficient. Hence, in this research, the author proves the differentiated contextual effects in product display by verifying demand differences of products context and the satisfaction of the display atmosphere.

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## 2. CONSTRUCTION MODEL OF PRODUCT DISPLAY CONTEXT

Product display context is a global concept, with its existence and development changing imperceptibly. This process can be summarized as importing factor information flow. The factor information flow works on all display media, generating its diffraction. Then all diffractions with the common orientation act on the same display space and converge into the targeted information group. The group gradually comes into play and develops information interaction. Then the psychological map, after undergoing the information interaction, constitutes culture information cluster in the definite environment, which is perceived as strong cultural-spatial field. In the display environment where information is repeatedly enhanced and communicated, the clear and strong cultural-spatial field can better represent the position and time. These are the spatial-time features. This strong sensory stimulus and psychological effect is usually called context. It refers to the exact cultural information clustering and feedback about the product display and is also consciously named the product display context. See Figure 1.

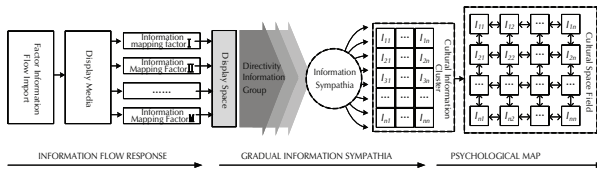


Figure 1 Cultural context expression model based on factor response.

## 3. DATA RESEARCH IN CONTEXTUAL DEMAND

This experiment selects 15 professional designers to conduct the research and takes the sampling of product images, demands of display image, core images and contextual demands.

### 3.1 Analysis of Data Sampling in Contextual Demands

According to core images and contextual demands of different products from various types of samplings, the author adopts the method of quantitative analysis and deduces the mathematical relationship of products in different types and levels. In the research, he separately introduces two mathematical concepts such as Convergence Index (CI) for common demands and Dispersed Index (DI) for demand differences to express the relationship. CI reflects common demands, showing the ratio of demand information from all the collected information in the sample. In the same type of sample, the lower CI shows that the common demands of product context are more accurate, concentrated and converging under the classification of this sample. In the same type of sample, the lower DI shows that common demands of product context are stronger and respond more to the classification of this sample.

### 3.2 Comparison of Sample Data in Contextual Demands

This experiment selects 15 professional designers to conduct the research and takes the sampling of product images, demands of the display image, core images and contextual demands.

The author collects and synthesizes all program assessments of classified samples at all levels, and takes them as a Requirement Evaluation Base (REB). He analyzes and compares the features of samples, determines the requirement coincidence degree under all sample classifications, and counts up the Common Demand (CD) and Individualized Demand (ID) of images that respondents have for each individual sample.

By calculating a specific value of CD and REB, the author deduces the Convergence Index (CI) of common demands. In addition, after calculating the ratio of ID and REB, he deduces the DI of demand differences.

$$CI = CD / REB \times 100\%$$

$$DI = ID / (REB \times 100\%)$$

Features presented by samples are as follows:

(1) (Classified sample A) Use differences refer to the differentiation of purposes among products. Type differences of product with different kinds are set as samples. Particularly, products about household, office, travelling, medical care as well as culture and education are selected for data collection. See Table 1.

CD of product images (CD=2) mainly includes environment-friendliness and practicability; ID (ID=5) refers to differences in health, quality, easy operation, safety and reliability. REB equals to 12; by operation, CI equals to 16.67 and DI equals to 41.67 in terms of this classification sample.

CD of display images (CD=2) mainly includes simplicity and individuation; ID (ID=4) is reflected by differences in warmness, neatness, individuation and simplicity. REB equals 10; by operation, CI equals 20 and DI equals 40 in terms of this classification sample.

CD of core images (CD=2) mainly consists in safety and practicality; ID (ID= 2) is reflected by differences in quality and portability. REB equals to 7; by operation, CI equals to 28.57 and DI equals to 28.57 in terms of this classification sample.

CD of contexts (CD=2) mainly includes care and convenience; ID (ID=5) is reflected by differences in warmness, seriousness, neatness, fashion and preciseness. REB equals to 9; by operation, CI equals to 22.22 and DI equals to 55.56 in terms of this classification sample.

(2) (Classified Sample B) Product differences refer to the differentiation among the same type of products. Residential lamps for daily lighting are set as samples. Particularly, table lamps, ceiling lamps, ceiling lights, floor lamps and wall lamps are selected for data collection. See Table 2.

CD of product images (CD=3) mainly includes reliability, softness and steadiness; ID (ID=6) is reflected by differences in health, safety, brightness, practicability, durability and energy-efficiency. REB equals to 12; by operation, CI of demand commonality equals to 25, and DI of demand differences equals to 50 in terms of this classification sample.

**Table 1** Comparison of contextual demands among different product categories (Sample A).

Product category	Product image	Demand of display image	Core image	Contextual demand
Household product	Healthy, environment-friendly and practical	Warm and human-friendly	Safe and practical	Warm and caring
Office product	Environment-friendly, quality and practical	Neat and simple	Quality and practical	Serious, neat and clean
Traveling product	Easy to operate and practical	Individualized and human-friendly	portable	Fashionable and convenient
Medical product	Safe and reliable	Simple and human-friendly	Safe	precise and caring
Cultural and educational product	environment-friendly and practical	Simple and human-friendly	Practical	Convenient

**Table 2** Comparison of contextual demands among different product categories (Sample B).

Product category	Product image	Demand of display image	Core image	Contextual demand
Table lamp	Reliable, soft and healthy	Warm, fashionable, and human-friendly	Safe and reliable	Warm, healthy and caring
Ceiling lamp	Safe and bright	Exquisite, fashionable and individualized	Safe and exquisite	Elegant and quality
Ceiling light	Practical, durable and energy-efficient	Simple and elegant	Concise and Practical	Simple and comfortable
Floor lamp	Reliable and stable	Beautiful and fashionable	Safe and stable	Warm and comfortable
Wall lamp	Soft and stable	Beautiful and decorative	Beautiful and stable	Stylish and elegant

CD of display images (CD=2) mainly includes fashion and beauty; ID (ID=7) is reflected by differences in warmness, human-friendliness, exquisiteness, individuation, simplicity, elegance and decoration. REB equals to 12; by operation, CI equals to 16.67 and DI equals to 58.33 in terms of this classification sample.

CD of core images (CD=2) mainly includes safety and steadiness; ID (ID= 5) is reflected by differences in reliability, exquisiteness, simplicity, practicability, and beauty. REB equals to 10; by operation, CI equals to 20 and DI equals to 50 in terms of this classification sample.

CD of contexts (CD=2) mainly includes warmness and comfort; ID (ID= 7) is reflected by differences in health, care,

elegance, quality, simplicity, taste and beauty. REB equals to 11; by operation, CI equals to 18.18 and DI equals to 63.64 in terms of this classification sample.

### 3.3 Data Direction of Contextual Demands

As shown in Table 3, CI and DI among different types of samples show the data relationship of samplings in terms of product images, demands of display image, core images and contextual demands under different classification of products. It is deduced that the data existence of contextual demands proves the actual universality and diversity of product display context under different classification of products.

**Table 3** Data relationship of classified samples based on sampling survey.

Sample Category	Product image	Demand of display image		Core image		Contextual demand			
		CI	DI	CI	DI	CI	DI		
User difference (Sample A)		16.67	41.67	20	40	28.57	28.57	22.22	55.56
Product difference (Sample B)		25	50	16.67	58.33	20	50	18.18	63.64

#### 4. IMAGE COGNITION OF DISPLAY CONTEXT

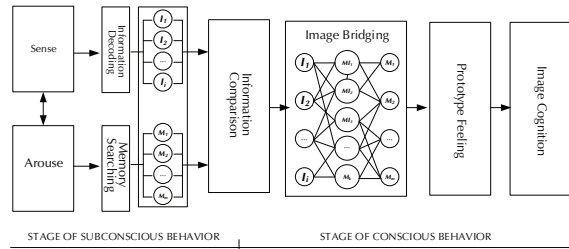
The abundant mental feelings and emotional needs embodied in the form of product and display environment has increasingly caught people’s attention. They are an important manifestation of cultural values of products and also become the core contents in the product display design. These mental feelings constitute display images and product images, affecting the cognition of brand management and being a part of the main spirits of product display design. They affect the “spirit” of the display product, which fall into the cognitive category.

From different spaces, the phenotypes of display form continuously or intermittently stimulate the human being’s cognitive system to arouse reactions physically and mentally, and develop the cognition of these “images” in the brain. During this process, all phenotypes of display form serve as a bridge between human and products to conduct the image conversations.

In cognitive psychology, the human being’s perceptual system is divided into three parts, namely, sensation, perception and consciousness. According to this psychology, the human individual is a system of information transfer, but it is definitely not a passive one. Instead, it can actively explain the external information. Personal knowledge and experience plays a vital role in this aspect, and applies the top-down information processing, different from the one that solely transfers the information from the bottom to the top. After interpreted by experience and knowledge, the external feelings can be recognized, which will then be meaningful and further be transferred to another form of information, stored and used by memory system. In this systematic process, Gestalt psychology plays a positive role.

##### 4.1 Features of image cognition

Image is a reactive cognition caused by external stimulations, and it is a consciousness of “cognition-association-memory-feeling”. The form images are developed by a psychological process of visual perception and psychological cognition, as well as form collection and stress response. The process goes through several cognitive nodes, including information coding, memory searching, image bridging, information comparison and prototype feeling as well as some conscious links from subconscious behavior to conscious one. See Figure 2.



**Figure 2** Image cognitive model.

In the cognitive process, users overlay and relate the psychological experience of form of products and their periphery, including the part of products and decorative symbols of display environment, and even virtualizing and interacting the dynamic process of display as well as the space process of crossing people flow line. All of these experiences develop the comprehensive cognitive images. The emotional coloring in the display clusters is transferred to the emotional languages of products and helps form product images.

The cognitive process of images can be expressed as a pointed memory evocation developed by image association due to the physical and mental feelings of external things; or the features of images lead cognitive memory to generate image association and then form the cognitive feelings of the certain object; and it can also be manifested as an image association of object brought by memory comparison that is made by direct image feelings.

Form cognition is the basic thinking activity of image cognition. Users’ image cognition of display form is based on the human’s visual and perceptual sense and prototype feelings, which is subconscious and adheres to the selective, simple, integral and constant Gestalt psychology.

##### 4.2 Mechanism features of image cognition

Based on the form image cognition of Gestalt psychology, the mechanism features basically refer to psychological features such as selective distinction, simplicity-based adjustment, integral organization and constant memory. See Figure 3.

###### (1) Selective distinction

A human being’s clear vision span fails to cover the whole information of things. In the perceptible range of visual perception, the conscious activities focus on the certain part of the object, which is clearly and profoundly perceived while

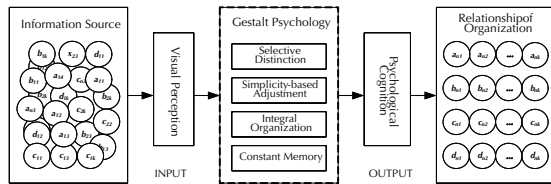


Figure 3 Cognitive model based on Gestalt psychology

the other parts are placed in the verge of consciousness, being vague or that become part of the background. The users' visual perception may only point to some objects and ignore the others, or may only perceive some attributes of perceivable parts while ignoring the others. When users perceive objects, the regular perception and integral presentation tend to be the most attractive because these are determined by the selective distinction of visual perception. This distinction is not a mechanical response to the external stimulation passively made by the brain. Instead, with the external stimulation, it actively selects the stimulated information. Actually, it is an active thinking ability to make information logic with more obvious features.

In the product display, quantities of information contained in the product simultaneously acts on the visual perception, but users cannot feel this information or clearly perceive each detail at the same time. Instead, their thinking will help them highly select, filter and reject any dispensable information according to the personal experience, preference and interest. In other words, users actively choose part of characteristic form information as the perceptual object and generate the obvious perceptual images.

Simplicity-based adjustment

The simplicity-based adjustment of the Gestalt's psychological effect manifests as the visual cognition process both maintains the overall structure of visual information and simplifies the screening of visual information. A human being's eyes try to see any kind of stimulus information as the simplest form of the existing conditions. In order to demonstrate the simplicity-based adjustment of visual perception, Gestalt psychologists conducted related experiments. The legend shown in Fig. 5-3 is displayed to a group of subjects in a very short period of time. When they see the black solid figure, the subjects will naturally describe the figure as a whole (a) (See Fig. 5-3 a) stacked by a rectangle and a triangle rather than (b) (See Fig. 5-3 b) along the outline of itself as shown in the figure. And this is because (a) is a simpler and easier-to-be analyzed structure than (b) considering the nature of human's brain. It can be seen from the experiment that the figures drawn by the subjects show their simplification, regularity and enhancement processing to the original shape features to varying degrees. It shows that visual perception and psychological cognition have a tendency to simplify the stimulus information. The essence of morphological imagery cognition is a process of recognizing, perceiving and memorizing the distinctive features of things. The simplicity-based adjustment is an important means of summarizing and acquiring the essential structural features of things for visual perception.

In reality, the cognitive thinking of users has the psychological characteristics of simple cognitive adjustment, and it

is easy to perceive and accept simple and clear information. When faced with complex visual information group of the product on site, the users firstly incorporates the information of strong integrity, prominent imagery and distinctive features into the visual and cognitive range. Therefore, in terms of the product display, the user has a demand for simplifying the brand and the product, and the information transmitted and displayed by the clustering brand or product display is presented more quickly, directly and simply in the thinking.

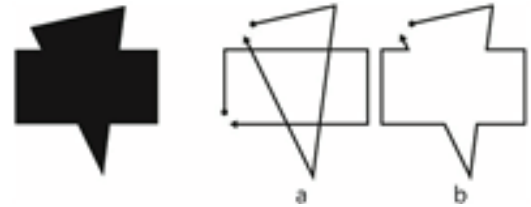


Figure 4 Simplicity-based psychological experiment.

(3) Integral organization

The overall organization is the basic point of view of Gestalt psychology. When the subjects see a figure consisting of 8 points as shown in Fig. 5-4, they will see it as (a, b, c) (See Fig. 5-4 a, b, c) rather than seeing it as (d) (See Fig. 5-4 d), and the reason is that (a, b, c) has a stronger overall organizational structure.

In the process of visual perception, people pursue the integrity of the structure of things (also known as gestalt), which is the overall organization of gestation (configuration). The perceived object is generally composed of many parts with its own characteristics, but the human brain does not perceive and reflect these parts and their features in isolation, but combine the various parts into an organic whole or complete shape through thinking processing. Here, the whole is not a simple addition of the various parts and their features, but an overall image which is integrated from the original components.

The large-scale product display often consists of different display product clusters. The user's perception of products and brands is not from a single product, but from the same or even different product cluster cognitive images. In cognitive thinking, users do not perceive several products as isolated or prominent parts, but always perceive them as an organized whole. In terms of visual perception, the way to treat a product is first to scan the whole to get an overall pre-impression quickly, and then to observe and sort out individual products. The pre-cognitive process has the priority of overall imagery and has a dominant influence on individual cognition.

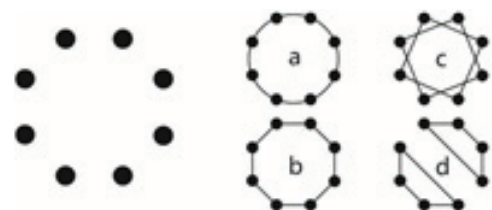


Figure 5 Psychological experiment with integral organization.

(4) Constant memory

Constant memory means that when the perceptual object of perception changes relatively within a certain range, the overall cognitive image remains relatively unchanged. Human being's perceive things based on the impressions, knowledge, and experience of things within the perceptual image. The constant memory of visual perception is particularly obvious. The correlation between the impressions of the shape, size and color of cognitive objects and the objective stimuli is not completely consistent with the physical laws. When the environmental factors tend to be consistent, the individual cognitive images are relatively stable.

Morphological imagery perception has a constant memory because objective things enjoy their own unique and relatively stable structure and characteristics. When the external environment or state changes, the human being's cognition of things tends to be decentralized and individual and tends to differentiate cognitive images. When the external environment or state shows potential connection or similarity, the human being's cognition of things tends to be the whole unity and tends to be related to cognitive images. The cognitive experience of observing the correlation features of things several times will inductively correcting for the different or incomplete information received by each receptors. When observing objects lack correlation, and there is no familiar object for reference all round, the constant memory of cognitive imagery fails.

When users perceive brand or product cluster display, though the direct stimulus received by visual perception may vary due to different product characteristics, or change because of the difference in the scale and volume of the certain individual's display form, the overall cognitive imagery of the user can still remain relatively stable since form, experience, and imagery react in cognitive behavior and create constant memory. Users will recognize products based on the characteristics of their constant memory. Therefore, even if the local environment may be different due to individual characteristics, it is also possible to be consistent with the perception of the brand or product cluster by setting the external form and the environmental form, to remain relatively stable.

### 4.3 Cognitive Demand under the Influence of Gestalt's Psychological Effect

Form is the expression of content presented by things under certain conditions, and enjoys the concept and characteristics of time and space. "Shape" is inseparable from "state", which refers to the spatial appearance of things affected and determined by environmental variables in a certain period of time. It is a space-based conceptual expression, which can be expressed as a specific feature of contour scale and appearance. It is an external objective existence and falls into the category of matter. "State" is the sum of the spatial appearance of different levels of things in a non-restrictive full-time period. It is an imagery perception and subjective description of the overall and integrated nature of things. It is a time-based conceptual expression, with a strong sense of time and instability, and is rich in inheritance, continuation and sense of life, belonging to the spiritual category. In a word, the form is a combination of shape and appearance, including the characteristics of the

visible image and the connotation of the hidden image.

Form serves as the language and medium that expresses cognitive thought and realizes cultural orientation. Through form, it not only expresses the characteristics of the appearance but also conveys the meaning and symbolism of the spirit and culture. Therefore, the form medium of product display is the imagery correlation and spiritual proposition between the peripheral environment and the product itself.

From the cognitive characteristics of human being's selective resolution, simplicity-based adjustment, overall organization, and constant memory, we can see that in the perception process of product display, users first organize many product display elements into a system, and then consciously simplify and select important related information and overall features to form a perceptual image of the cluster of products displayed as shown in Figure 6.

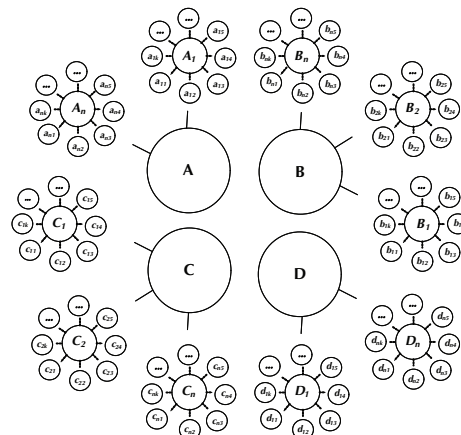


Figure 6 Affective image model of cluster product display.

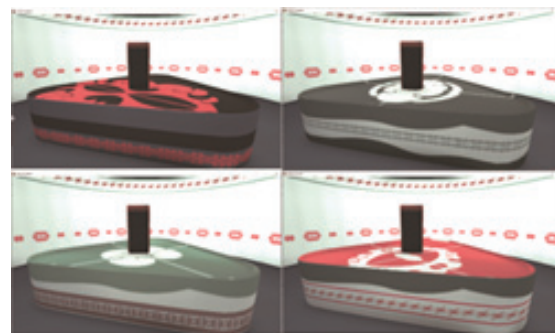


Figure 7 Various intended display effects of display elements.

## 5. EVALUATION AND VERIFICATION OF PRODUCT DISPLAY CONTEXT

To verify whether construction model of product display context is viable, the research, based on the current architecture of this research, selects five designers to set and match five sets of systematic plans for display forms. Table 4 shows the combination of Set I, Set II, Set III, Set IV and Set V respectively set by five designers. Ten respondents numbered from A to J (non-professional designers) evaluate the context in different

**Table 4** Different combinations for contextual evaluation and verification.

Verification of contextual evaluation					
Category	Set I	Set II	Set III	Set IV	Set V
Encoding of decomposed patterns					
Encoding of derived sets					

**Table 5** Data of contextual evaluation test.

Data of contextual evaluation											
Respondent No. Set	A	B	C	D	E	F	G	H	I	J	Average value
Set I	3	-5	1	5	-7	1	3	7	5	-1	1.2
Set II	3	5	-1	5	-3	9	1	-3	1	-5	1.2
Set III	-3	7	-3	3	9	-1	3	-5	3	0	1.3
Set IV	0	7	-1	5	-5	3	7	1	-7	-1	0.9
Set V	9	3	-1	0	-5	7	-3	1	0	1	1.2

**Satisfaction value:**

(Very unsatisfactory)										(Very satisfactory)
-9	-7	-5	-3	-1	0	1	3	5	7	9

**Table 6** Grouping sheet of data in context test.

ShowRoom No.	Set					Mean value of satisfaction
	Set I	Set II	Set III	Set IV	Set V	
ShowRoom 1	1.8	1.5	1.9	2	1.3	1.7
ShowRoom 2	1.2	1.2	1.3	0.9	1.2	1.16
ShowRoom 3	0.9	0.9	1.8	2	2.3	1.58
ShowRoom 4	1.8	2.1	0.2	1.5	1.9	1.5
<b>Mean value of context</b>	1.425	1.425	1.3	1.6	1.675	

rooms and Table 5 shows the different evaluating data after statistics.

Figure 2 shows expected effects of four display forms operated by the System when display elements are touched off. As is shown in Table 6, according to the test on context evaluation given to ten respondents numbered from A to J on exhibition areas, it can be concluded that in the analysis of context and atmosphere, showroom 1 gets the most score in satisfaction while showroom 2 gets the least. In addition, in terms of the context plan, score of Set V is the highest while that of Set III is the lowest. From the test above, we can find that differentiated contextual effects exist in product display.

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