

# The Influence of Contextual Clues on Consumers' Attitudes towards Products

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**Abstract**—Display is the link between products and consumers in online shopping. Designing better displays for products is the main content that retailers are concerned in the event of communicating with consumers. Previous studies focused on how clues affect consumers through perceptions of quality and price, while few studies explored this problem from the combination of consumers' visual activities and cognitive responses. This study focuses on the contextual clues of clothing and explores the influence of contextual clues richness on consumers' attitudes to products in clothing displays through eye movement experimental data and questionnaire data. Studies have shown that moderately rich contextual clues can obtain the best product attitudes, and visual attention and cognitive response play an intermediary role in this process. This study enriches the research on the influence of multi-clues on consumers' behaviors in the clothing field and provides guidance and suggestions for online retailers' product displays design.

**Keywords**-contextual clues; visual attention; cognitive response; product attitude; eye tracker

## 1 INTRODUCTION

Amidst the advancement of information technology and e-commerce, online clothing retailers display various clues of clothing to consumers through images, such as models and picture backgrounds<sup>[1]</sup>, which influences consumers' attitudes towards products. Clue displays serves as one of the important bases for consumers to judge and evaluate products<sup>[2]</sup>. In the face of displayed image information, there exist a lot of problems: how do consumers browse and use this information? what images are displayed? how many images are appropriate? how do consumers react to clues with different richness? and whether the more images displayed, the better it is?

At present, the research on clothing clue displays fails to answer this question well. On the one hand, the existing research literature mostly focuses on the influence of price, sales volume, store atmosphere, evaluation<sup>[3]</sup>, and other clues on consumption decision-making. Contextual clues can form a whole with products, to help consumers establish a more comprehensive and stereoscopic understanding of products<sup>[4]</sup>. Although a small number of studies demonstrate that multi-image background displays of clothing can increase consumers' willingness to buy<sup>[1]</sup>, such articles are still limited to the image background, ignoring the role of collocation and model

displays as contextual clues of clothing. In addition, different types and numbers of contextual clues constitute different richness of clue displays, but the impact of contextual clues richness on consumers is still unclear.

On the other hand, previous studies mainly explored the impact of clues on consumers from the aspects of quality<sup>[5]</sup> perception, price perception<sup>[6]</sup>, and hedonic perception<sup>[7]</sup>, while few studies paid attention to the visual attention and cognitive response of clothing image clues at the same time. According to the theory of information processing, the cognitive process of human beings is the process of information processing, and the cognitive process of consumers to information includes two parts: attention receiving and processing<sup>[8]</sup>. The process of information extraction and information processing jointly affect the cognitive results of consumers. In this paper, visual attention is the fixation behavior of eyes, eye fixation will guide attention, and attention will increase the cognitive processing of object meaning<sup>[9]</sup>. Fashion perception and educational perception are consumers' cognitive responses to clues. Fixation data can reflect consumers' fixation preference and clue attraction<sup>[10]</sup>. However, fixation data alone cannot effectively explain consumers' cognitive situation during eye movement. Combining visual attention with cognitive response can better reveal the influence of clues on consumers' fixation and cognition, as well as the relationship between them and the influence on consumers' attitudes.

Based on the above research gaps, firstly, starting from consumers' attention to clues and cognitive response to clues, this study integrates clothing allocation displays, model wearing displays, and background displays into contextual clues of clothing. With visual attention and cognitive response as intermediaries, this study investigates and explains the influence of clothing contextual clues display richness on consumers' attitudes towards main products.

The research contribution of this paper lies in the following aspects. First, there are few studies on contextual clues of clothing in the past, and they are still limited to the background of clothing images. This study considers more contextual clues of clothing and the influence of their richness on consumers' attitudes towards main products. Second, previous studies mainly investigated the influence of clues from one aspect of quality perception, price perception, hedonic perception, or attention and imagination. From the perspective of visual attention and cognitive response, this study explores and explains the effect of clothing contextual clues richness on consumers' attitudes towards products, and obtains the best richness level. In this study, eye movement experiments and questionnaires were used to carry out empirical research, which not only accumulated new empirical evidence for contextual clues, but also enriched and expanded the research topics and perspectives of research literature on contextual clues of clothing.

## **2 LITERATURE REVIEW**

### **2.1 Contextual Cues of Clothing**

Clue utilization theory<sup>[11]</sup> points out that consumers can get information related to their quality through the external characteristics of products such as brand, price, and comment. Context carries information about products and their identities, which can help consumers generate personalized stories, promote product identification<sup>[12]</sup> and contribute to a good impression of consumers on products<sup>[13]</sup>. Based on Olson and Jacoby's classification of clues, the contextual

clues of clothing belong to external clues<sup>[2]</sup>, so it can help consumers better understand and evaluate products.

The contextual clues of clothing displays refer to the clues that can help consumers understand the characteristics and functions of clothing. Studies have shown that multi-context displays can positively boost consumers' evaluation<sup>[1]</sup>, the integration of contextual clues can positively affect consumers' evaluation<sup>[6]</sup>, and the background with contextual richness has a positive role in the e-commerce environment<sup>[4]</sup>. These articles all take the background of clothing displays as a contextual clue, but they are not comprehensive. The display of allocated products in clothing displays can make clothing more three-dimensional in style, which is beneficial for consumers to further understand and evaluate<sup>[14]</sup>. The display of the mannequin can show the wearing effect and close-fitting degree of clothing, and show the characteristics of clothing through the figure and posture of the model<sup>[15]</sup>.

Therefore, this study believes that the contextual clues of clothing should be composed of collocation displays, model wearing displays, and clothing background displays. Moreover, the existing research lacks exploration and investigation on the influence of contextual clues composed of multiple clues and their richness on consumers. Contextual clues richness refers to the richness of types and quantities of clues. Based on the above research gaps, this study focuses on the influence of the contextual clues richness of clothing, in which contextual clues are composed of three types of clues, which are divided into three richness levels: low, medium, and high according to the color, type of clues, number of clues and file memory size<sup>[16]</sup> in the display.

## **2.2 Visual Attention**

Visual attention is the fixation behavior of human eyes, and eye fixation will guide attention<sup>[9]</sup>. The movement of human eyes includes two basic movement phenomena: saccade movement of eyes and fixation<sup>[17]</sup>. Keeping the eyes relatively still is called fixation, which represents focused eye movement and indicates consciousness and attention<sup>[18]</sup>; saccade, that is, the movement of the eyeballs between the fixation points, is manifested as the sudden change of the fixation point or fixation orientation of the eyeballs; total fixation time refers to the total time of browsing each area of interest; fixation time percentage refers to the percentage of browsing a certain area of interest in the total visit time of all areas of interest.

In the early stage of consumer perception, visual clues will attract more attention<sup>[19]</sup>. Previous studies have shown that fixation leads to attention, and attention increases the perception of product meaning<sup>[9]</sup>. Fixation information can be used to measure the degree of individuals' attention to stimulus, and the time of focusing on the main product can predict consumers' attitudes and actual purchase behaviors<sup>[10]</sup>. Therefore, this study selects eye movement indicators related to users' cognitive activities and visual attention, including the fixation time percentage and total fixation time.

## **2.3 Cognitive Response**

The visual clues of products are the key factors to promote consumers' cognitive response<sup>[20]</sup>, and cognitive response can change people's attitudes<sup>[21]</sup>. Visual clues not only affect consumers' initial impression of products, but also affect their subsequent cognitive reactions, such as thoughts and judgments<sup>[22]</sup>. Clothing, as a fashion product, can stimulate consumers' fashion

perception and educational perception. Fashion perception in this study is the cognitive judgment of fashion and trend direction. Educational perception is an educational cognition of contextual clues.

In clothing displays, the display of allocated products can make clothing more three-dimensional in style<sup>[14]</sup>, and the allocation background shows the use and functional scene of clothing. Therefore, the style reflected by allocated products and background displays can affect consumers' perception of fashion. At the same time, consumers will learn how to wear and allocate online, which will enhance consumers' educational perception when fashion perception is enhanced. Hence, in this study, fashion perception and educational perception are taken as the research variables of cognitive response to explore the influence of contextual clues richness on consumers' cognitive response, and the role of cognitive response between clue richness and consumers' attitudes.

### 3 MODELS AND RESEARCH HYPOTHESES

#### 3.1 Research Model

Based on clue utilization theory<sup>[11]</sup>, information processing theory<sup>[8]</sup>, and cognitive response theory<sup>[21]</sup>, this paper chooses contextual clues richness of clothing as a research variable, studies the relationship between contextual clues richness and consumers' attitudes towards main products, and discusses the role between visual attention and cognitive response. The research model diagram of this paper is shown in Figure 1.

#### 3.2 Research Hypothesis

##### 3.2.1 Cue richness and visual attention

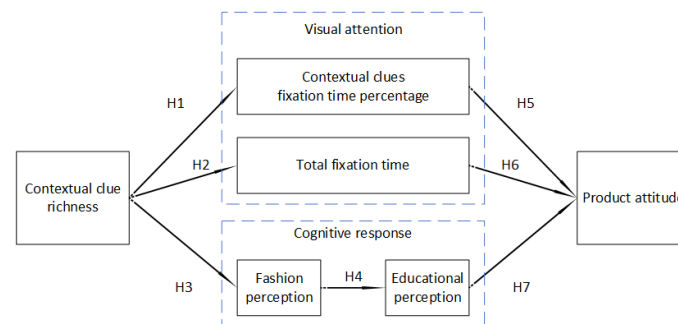


Figure 1: Research model

Information processing theory points out that consumers' cognitive process of information includes two components: attention receiving and attention processing<sup>[8]</sup>. Clue utilization theory points out that is one of the important bases<sup>[2]</sup> for consumers to judge and evaluate products, and contextual clues will be noticed and received by consumers as clothing information. Therefore, this study argues that contextual clues can not only attract consumers' visual attention, but also cause different visual attention with different contextual clues richness. Previous studies have shown that visual clues attract more attention<sup>[19]</sup>. For one thing, images

with various information can make individuals feel more awakened and inspire people to continue browsing<sup>[23]</sup>. For another thing, specific to the whole image, there is a competitive relationship between the focus product and its background, and the background with high complexity will shift attention from the focus product<sup>[16]</sup>.

In this study, the experimental page is divided into two regions of interest according to whether it is a contextual clues or not. In the non-contextual clues area, fixed clues such as main pictures, titles and prices of clothing are displayed. Under different clue richness, the non-contextual clues are the same and unchanged. In the contextual clues area, contextual clues such as clothing allocation, model wearing displays and image scene are displayed, and the richness is divided into three categories according to the number and types of contextual clues: low, medium, and high. In this study, the measurement dimensions of fixation time percentage and total fixation time in visual attention were selected. As the richness of contextual clues increases, consumers will pay more attention when browsing clues. Therefore, the following hypotheses are put forward:

H1: Contextual clues richness positively affects consumers' fixation time percentage on the display area of contextual clues.

H2: Contextual clues richness positively affects consumers' total fixation time.

### **3.2.2 Cue richness and cognitive response**

Clue utilization theory points out that external clues are beneficial to consumers' cognition of products, and contextual clues as external clues can help consumers fully understand the characteristics and functions of clothing. From the perspective of information processing theory and cognitive response theory, fashion perception and educational perception are cognitive processing of contextual clues. Therefore, this study argues that contextual clues can not only cause consumers' cognitive responses, but also cause different cognitive responses with different contextual clues richness. Allocation background indicates the purpose of clothing, so the style reflected by allocation and background displays can affect consumers' fashion perception. At the same time, consumers will learn how to wear and allocate online, which will enhance consumers' educational perception when fashion perception is enhanced. Therefore, the following hypotheses are put forward:

H3: Contextual clues richness positively affects consumers' fashion perception.

H4: Fashion perception positively affects consumers' educational perception.

### **3.2.3 Visual attention and product attitude**

Eye tracker data provide important insights in understanding consumers' choice processes<sup>[24]</sup>. Researchers have confirmed that increasing visual attention increases the likelihood of choice, and the probability that a commodity is selected and purchased depends on the relative time that consumers pay attention to the commodity in the decision-making process<sup>[10]</sup>. Some studies have pointed out that the final selected product will get more eyeball attention than the unselected product<sup>[25]</sup>. However, because the contextual clues include allocated clothes, models, and scenes, consumers' attention may be attracted by other clues, thus reducing the attention time of the main product information, which will affect the perception of the main product. Therefore, the following hypotheses are put forward:

H5: Fixation time percentage in the contextual clues display area negatively affects consumers' attitudes towards the main product.

H6: Total fixation time of pages positively affects consumers' attitudes towards the main product.

### **3.2.4 Cognitive response and product attitude**

The cognitive response can change people's attitudes, and positive cognitive response can improve people's attitudes. Studies have shown that cognitive emotion is an important factor in determining attitudes<sup>[26]</sup>. When consumers learn allocation skills and adaptability of different styles of clothing from product displays, consumers will enhance their sense of identity and increase their goodwill towards products. According to the influence of cognitive response on consumers, this paper puts forward the hypothesis:

H7: Educational perception positively affects consumers' attitudes towards main products.

## **4 RESEARCH METHODS**

### **4.1 Experimental Design**

In this study, an eye movement experiment was carried out with Tobii T120 eye tracker.

#### **4.1.1 Subject selection**

The subjects are undergraduates and postgraduates from different majors and grades in a university in Hefei. The subjects fully considered the following factors: First, the demographic characteristics of the target user group, such as gender, age, disposable income level and so on. Secondly, whether the subjects have online shopping experience and are familiar with online shopping. Finally, considering the eyesight of the subjects, the subjects are required to have normal eyesight or corrected eyesight and can clearly see the display content.

#### **4.1.2 Experimental materials**

This study imitates JD.COM Mall to design the presentation form of experimental materials, and the experimental products are T-shirts, which belong to hedonic products. Consumers have a better understanding and wearing experience of this kind of product, which is conducive to consumers' judgment. The selected clothing products come from fashion clothing brands in JD.COM. Six experimental materials, namely six different product pages, are constructed under the condition of eliminating the original brand traces and considering different genders to watch different T-shirts. Due to the requirements of the eye trackers for images, this study modified part of the layout of the display image, so that clues can be displayed on one page, to better record the eye movement data of the subjects. All images were shown in the same area.

#### **4.1.3 Experimental Process**

The specific experimental process is as follows: Firstly, the subjects were required to read the experimental requirements and fill in the basic information. Secondly, they read the prompts, that is, the experimental situation. Then, the subjects were seated in front of the eye tracker for

a 5-point line of sight correction, and started the experiment after the correction was qualified. The subjects read the experimental situation again, and then clicked the mouse to enter the experimental stimulation presentation interface. The subjects could browse the product display freely, and the experimental time was controlled by the subjects themselves without restriction, until the subjects thought that browsing was over or had judgment, and then they clicked the left mouse button to end. Finally, the subjects filled out the questionnaire according to the feelings of eye movement experiment and completed the measurement of clue richness perception, fashion perception, educational perception, and product attitudes. Finally, the subjects could take registration and receive a 50-yuan experimental remuneration.

#### **4.2 Manipulation of Independent Variables**

According to the experimental design of visual complexity research, the clue richness was measured by the color complexity, texture complexity, file memory size, the number of clues, and type of image displays, and the displayed clues were divided into three categories: low, medium, and high richness, and the classification accuracy of richness was tested in the questionnaire. 174 subjects were scored for four items, and the average scores of each richness category were 3.16, 4.44, and 4.76, respectively. Through variance homogeneity test and variance analysis, it was concluded that there were significant differences in the richness scores.

#### **4.3 Variable Definition and Measurement**

The experiment includes six variables: contextual clues richness, educational perception, fashion perception, total fixation time, contextual clues fixation time percentage, and product attitudes. Clue richness is obtained as an independent variable according to corresponding indicators, and the contextual clues display fixation time percentage and total fixation time in visual attention are measured by eye trackers. The perception of clue richness, educational perception, fashion perception, and product attitudes in the questionnaire were measured by a Likert 7-point scale (1 represents few, totally disagree, 7 represents many, totally agree). The specific items of variables refer to the scale of existing research conclusions of corresponding scholars, which has good content validity and can effectively reflect the reality and requirements of measurement objectives. See TABLE I for specific items and sources.

### **5 EXPERIMENT AND RESULTS**

#### **5.1 Experiment**

A total of 180 subjects participated in this experiment, among which 6 subjects that were unqualified and failed eye movement data records were eliminated. Finally, 174 samples entered the data analysis. 48.85% of the subjects were boys and 51.15% were girls. 21-25 years old accounted for 89.65%; The disposable monthly income is 1001-2000 yuan, accounting for 67.24%; Online shopping familiarity scores of 3-5 points accounted for 35.06%, and 5-7 points accounted for 57.47%. It can be seen that the subjects represent the main group of online shopping at present, which meets the requirements of this study. The subjects were divided into 58 people in the low richness group, 57 people in the medium richness group, and 59 people in the high richness group.

TABLE I contains the validity and reliability indicators of the experimental scale, which has a good degree of aggregation; except that Cronbach's coefficient of perception of clue richness is 0.779, the reliability of other variables is greater than 0.8, which indicates that the questionnaire reliability is very good, and the internal consistency meets the research requirements and has reliability.

## 5.2 Main Effects Test

In this paper, a series of variance analyses were carried out to test these hypotheses. Firstly, the variance homogeneity test was carried out on the results of variable measurement. The data showed that the results of each variable in different richness groups met the requirements of the variance homogeneity test ( $P > 0.05$ ). After satisfying the homogeneity test of variance, the analysis of variance was carried out, and the results of the analysis of variance were as follows:

It can be seen from the results of variance analysis that, first of all, the higher richness of the contextual clues leads to a higher fixation time percentage in contextual clues display area (as shown in TABLE II), and non-context under different richness can also be seen through eye movement hotspot map.

There is no obvious difference between fixation points and fixation time in clue area. With the increase of richness, the fixation points in context increase and the total fixation time lengthens, so Hypotheses 1 and 2 are supported.

**TABLE I.** SCALE VALIDITY AND RELIABILITY ANALYSIS

Variable	Item	Factor 1	Factor 2	Factor 3	Factor 4	Cronbach's $\alpha$	Source of the items
Perception of contextual clue richness	1.The display of the visual information contained in the interface	0.703				0.779	González (2021) <sup>[27]</sup>
	2. The display of other information around the T-shirt in the interface	0.777					
	3. The display of the environmental information around the T-shirt in the interface	0.803					
	4. The display of allocation information around the T-shirt in the interface	0.706					
Fashion perception	1. I can learn about fashion in the process of browsing products		0.812			0.905	Fister SE (2009) <sup>[14]</sup>
	2. Product displays have increased my understanding of fashion		0.869				
	3. Product displays give me a better grasp of fashion trends		0.891				
	4. The product display provides me with fashionable allocation ideas		0.632				
Educational perception	1. The product display makes me understand the applicable situation knowledge of the product			0.831		0.810	Pine BJ (2011) <sup>[28]</sup>
	2. The product display teaches me the knowledge of collocation skills			0.589			



	3. Product display creates an educational shopping experience			0.625			
	4. The product display stimulates my curiosity to learn new things			0.555			
Product attitudes	1. Attitudes towards the T-shirt (1 very negative-7 very positive)				0.906	0.940	Fan Xiaoping (2013) <sup>[29]</sup>
	2. Attitudes towards the T-shirt. (1 dislikes it very much. 7 likes it very much.)				0.908		
	3. Attitudes towards the T-shirt. (1 very dissatisfied-7 very satisfied)				0.913		
	4. Attitudes towards the T-shirt. (1 very bad-7 very good)				0.886		

**TABLE II.** ANOVA RESULTS

Variable	Contextual Cue Richness (mean ± standard deviation)			F	P
	<i>Low (58)</i>	<i>Medium (57)</i>	<i>High (59)</i>		
Contextual clues fixation time percentage (%)	0.18 ± 0.11	0.28 ± 0.11	0.42 ± 0.11	65.78	0.000**
Total fixation time	26.16 ± 18.56	30.66 ± 19.89	38.47 ± 22.38	5.48	0.005**
Fashion perception	3.17 ± 1.49	3.93 ± 1.36	3.94 ± 1.34	5.88	0.003**
Product attitudes	4.01 ± 1.074	4.40 ± 1.01	3.89 ± 0.95	4.14	0.018*

\* P < 0.05, \*\*P < 0.01

### 5.3 Mediating Effect Test

In order to verify the mediating effect of the model and test Hypothesis 4, the confidence interval after bias correction is used to test the mediating effect<sup>[30]</sup>. From the mediating path of “contextual clues richness, fashion perception, educational perception, and product attitudes”, 95% interval does not include the number 0, which shows that this mediating effect path exists. The results are shown in TABLE III below.

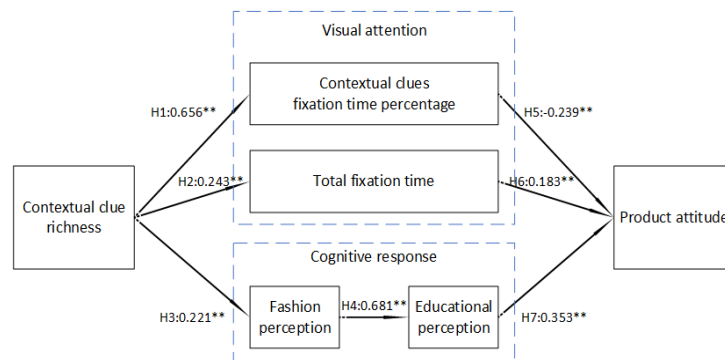
**TABLE III.** RESULTS OF CHAIN MEDIATIONE TEST OF COGNITIVE RESPONSE

	Effect	Boot SE	Boot LLCI	Boot ULCI	z	p
Contextual clues richness ⇒ Fashion perception ⇒ Educational perception ⇒Product attitudes	0.027	0.006	0.006	0.031	4.260	0.000

## 5.4 Model Path Analysis

In order to test Hypotheses 4, 5, 6, and 7, the path analysis of the model is significant, and the regression coefficient of the model is shown in Figure 2:

Combined with goodness fitting index  $GFI=0.958$ , standard fitting index  $NFI=0.923$ , non-positive fitting index  $TLI=0.903$ , comparison fitting index  $CFI=0.949$  and approximation error  $RMSEA=0.1$ , it shows that the research model has a good fitting degree..



Note: The numbers in the figure are standardized path coefficients, and \* indicates significance (\* $p<0.05$ , \*\* $p<0.01$ )

Figure 2: path analysis

From the path analysis, it can be concluded that fashion perception positively affects educational perception, the contextual clues fixation time percentage negatively affects consumers' attitudes towards main products, and the total fixation time and educational perception positively affect consumers' attitudes towards main products, thus supporting Hypotheses 4, 5, 6 and 7. It is found that the direct influence of contextual clues richness on the main product attitudes is inverted U-shaped, and the contextual clues with moderate richness are most beneficial to consumers' product attitudes, which is the result of the joint action of visual attention and cognitive response of contextual clues. It is not difficult to imagine that the appropriate contextual clues can better attract consumers' attention and stimulate appropriate cognitive responses, thus improving consumers' attitudes towards the main products.

## 6 CONCLUSION

### 6.1 Results of The Study

Different from the previous research on text, the purpose of this study is to integrate three types of clothing display clues, using clue utilization theory, visual attention, and cognitive response model to analyze and explain the online shopping environment. The empirical study confirms the hypotheses of the influence and mechanism of contextual clues richness of product display on consumers' main product attitudes. The main conclusions are as follows: 1) Contextual clues richness of clothing display has a significant impact on consumer's attitudes towards main products. Under the display of contextual clues with moderate richness, consumers' attitudes

towards the main product score the highest; the influence of low, medium, and high clue richness on the attitudes of main products is inverted U-shaped as a whole. 2) The richness of contextual clues positively affects consumers' cognitive response. Cognitive response positively affects consumers' attitudes towards main products. 3) The visual attention mediates the relationship between the clue richness and the attitudes of the main product by recording the consumer's fixation on the page under different clue richness by eye trackers. Clue richness positively affects the fixation time percentage and the total fixation time of contextual clues display. The contextual clues fixation time percentage negatively affects consumers' attitudes towards the main product.

## 6.2 Theoretical and Practical Significance

The theoretical value of this study mainly lies in as follows: 1) Scholars mainly consider the background of clothing displays in the event of studying clothing clue displays, and do not make full use of the contextual clues of clothing. This paper considers clothing collocation displays, model displays and background displays, and studies the influence of different contextual clues richness on consumers' attitudes towards main products. 2) In the research of clue displays, the research on intermediary mechanism mainly focuses on perceived price, perceived quality, and hedonic perception. On the basis of the existing research on consumers' attitudes towards products, this study enriches the theoretical chain of influence mechanism. According to the information processing theory, the intermediary is constructed from the perspective of consumer information processing. Visual attention is the reception of information, and cognitive response is the processing and processing of information, which improves the explanation of the influence of multiple clues on consumers' behaviors.

In terms of practical significance, this study provides management enlightenment for online shop marketing practice. 1) According to the influence of clue richness on consumers' attitudes towards main products, retailers should consider the richness of contextual clues display when setting up product displays, and the richness should not be too low or too high. Retailers should use contextual clues to strengthen consumers' cognition of products and provide more collocation and use scenarios for products, which can strengthen consumers' cognitive response, and help to enhance consumers' attitudes towards products.

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