

The Effect of Inductive Information on Consumer's Cognitive Bias

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Abstract: The article focuses on the effect of inductive information on consumers' cognitive bias when shopping online. Based on the survey of university students, the empirical results indicate that inductive information coming from sales manipulation, weakening showing disadvantageous issues and recommendation systems cause consumers' cognitive bias when shopping online. According to the research conclusion, this paper puts forward corresponding countermeasures and suggestions from the following four aspects: recommendation system, business manipulation behavior, consumer protection system and the promotion and guidance of consumers.

Key words: inductive information; cognitive bias; persuasive knowledge

1 Introduction

With the rapid development of e-commerce, online shopping has become the mainstream shopping mode of many consumers. It organically links the real economy and the virtual economy and creates huge economic value. At the same time, it also has some negative effects. For example, the transactions between consumers and businesses are completed in the virtual space, because it is impossible to observe and touch the goods themselves, Coupled with the one-sided exaggeration and manipulation of product comments on the display of product pages, consumers are prone to cognitive bias when making shopping decisions, which is harmful to improving consumers' online shopping experience and shopping satisfaction. Therefore, it is of great theoretical significance and practical value to study the influencing factors of online shopping consumers' cognitive bias, which not only helps to improve consumers' rational decision-making level, reduce or even avoid the negative impact of cognitive bias, but also helps to improve the supervision level of online shopping platforms and further standardize the market behavior of merchants in online shopping.

2 Literature review and theoretical assumptions

2.1 Cognitive bias

Cognitive bias originates from cognitive psychology. According to the experimental analysis of cognitive psychology, individual information processing ability has limitations, so individual judgment and decision-making will have bias [1]. The result of natural selection will evolve human beings to rely on bounded rationality to reduce the cost of thinking [2]. Cognitive bias

in psychology has different effects on different populations [3]. Cognitive bias has a general impact on the decision-making of economic actors and plays a central role. According to the general understanding of cognitive psychology, the cognitive process of economic actors is divided into information acquisition, information processing, information output and information feedback [4]. Each process may produce cognitive bias, that is, cognitive bias is universal. The existence of cognitive bias makes the decision-maker appear inconsistent with the optimal plan, and causes the implementation of the plan to deviate from the original direction [5].

Li Fujun et al. (2006) believed that the cognitive bias of investors can be divided into the bias of information processing before decision-making, the bias of decision-making and the bias of analysis of results after decision-making according to the time of generation. According to the different situations: ① The deviation of information processing before decision-making may include: narrow viewfinder, easy-to-handle effect, representative deviation, easy-to-obtain deviation, anchoring, framing effect, conservative deviation, significance and effectiveness effect, and information stream; ② Deviations in decision-making may include: overconfidence, convergence effect, thinking rigidity, fantasy thinking, fuzzy aversion, regret aversion, loss aversion, separation effect, emotion and feeling; ③ The deviation of the result analysis after decision-making may include: cognitive dissonance, self-deception, and confirmation deviation. The conditions and situations of the above cognitive bias are different, which need to be determined according to the specific behavior of the economic behavior subject in the specific situation, not at the same time.

2.2 Inductive information

Consumers' online shopping decisions are often affected by the behavioral environment and situation [6]. In order to achieve their own economic benefits, businesses often use inductive information to influence consumers' perception and judgment, so as to increase product sales [7]. The information manipulation theory explains why information is deceptive from multiple perspectives, and believes that any information that violates one or several of Grice's four criteria will easily be induced or even deceived. The four criteria are quantity, quality, relevance and method [8], of which ① quantity: whether the information provided is complete compared with the expectations of consumers; ② Quality: whether the information provided is true and correct; ③ Relevance: whether the information is relevant to existing topics; ④ Method: whether the way of providing information can make consumers understand the content of information without confusion. Obviously, the inductive information of merchants in online shopping is likely to make consumers have cognitive bias. Combining the views of information manipulation theory and cognitive bias theory, this paper believes that when a business violates one or more of the four IMT criteria, it will affect the three decision-making stages of consumer online shopping, namely, before, during and after decision-making, and cause specific cognitive bias at each stage.

2.3 Persuasion knowledge

With the increase of online shopping experience, consumers have a certain degree of understanding of various behavioral motivations, persuasion skills or strategies of merchants, that is, there is a persuasive knowledge model [9]. Cui Geng et al. (2014) believed that in the

online shopping environment, compared with the inexperienced consumers, the persuasive knowledge of the experienced consumers will be activated when the merchants have induced behaviors, thus offsetting the influence of cognitive bias induced by the merchants to a certain extent. The higher the level of persuasion knowledge, the smaller the impact of the induced behavior of the merchant on the cognitive bias of the consumer, that is, persuasion knowledge plays a regulatory role in the impact of the induced information on the cognitive bias.

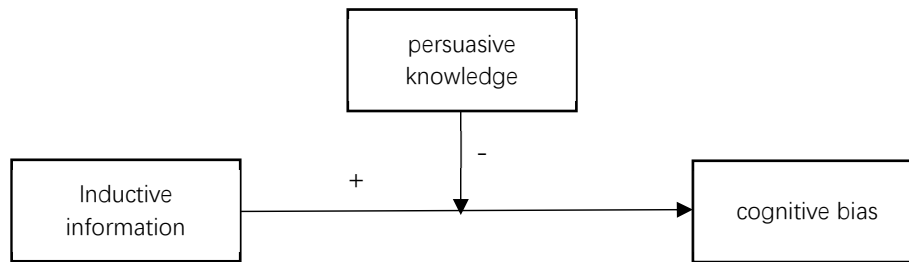


Figure 1 Theoretical Framework

To sum up, the theoretical framework of this study is shown in Figure 1. Based on the above theoretical overview, this paper then puts forward relevant theoretical assumptions.

2.4 Theoretical assumptions

2.4.1 Cognitive bias before decision-making

In the online shopping environment, the information published by businesses on the web page includes text, pictures, audio and video, etc. The rich marketing means make the consumer's processing of information tend to be fragmented, and the consumer's processing of a variety of suggestive information will appear the thinking feature of deliberate choice, that is, narrow view in cognitive bias. Lin Yin et al. (2016) found that compared with the complete picture, consumers will have a higher desire to eat and purchase when facing the incomplete picture in the food advertisement. Merchants unilaterally emphasize the advantages of goods by means of words, pictures, audio and video. These behaviors with hidden action clues will lead to more psychological simulation of consumers [10], which will lead to cognitive bias and violate the quantitative criteria and mode criteria in information manipulation theory. Therefore, this paper puts forward the following assumptions:

H1: The inductive information highlighting the advantages of goods will lead to cognitive bias of narrow view.

One of the important characteristics of online shopping is that there is no space and geographical restrictions. A commodity is sold by thousands of merchants. Consumers are limited by their own information processing ability to process massive amounts of information. They usually focus on easily available information. At the same time, unconscious association will also make people have a selective focus of attention [11], that is, the easy-processing effect in cognitive bias, which affects consumers' decision-making. In order to make their products stand out from many competitors, businesses usually pay promotion fees to shopping platforms or professional recommendation websites, display products to consumers through the recommendation system and induce them to buy. Due to the lack of information processing ability to shop around on the

Internet, consumers are likely to passively accept the products recommended by the recommendation system, which will inevitably lead to cognitive bias and violate the quality criteria in the information manipulation theory. Therefore, the paper puts forward the following assumptions:

H2: The inductive information released by merchants through the recommendation system will lead to cognitive bias of the easy-to-handle effect.

2.4.2 Cognitive bias in decision-making

Fuzzy aversion was initially applied to the field of financial investment. Health and Tversky (1991) found that economic actors often perceive higher risks when they lack an obvious reference coefficient, and only when the game probability is constant will they prefer gambling activities that can bring sense of achievement. In the online shopping environment, businesses often use the psychological characteristics of consumers' aversion to uncertainty to artificially create reference coefficients through sales volume manipulation and comment manipulation, causing consumers to have cognitive bias. Merchants who use sales volume manipulation usually do the following: use the recommendation website to brush the order at a low price; Brush the order with small size; Or combine the sales volume of similar products and display it under a certain product page. These practices cater to the psychological characteristics of consumers' fuzzy aversion. By artificially creating a reference coefficient, consumers mistakenly believe that a certain product has good sales volume and high market recognition, thus generating purchase intention. These practices violate the quality criteria and relevance criteria of information manipulation theory. Merchants who use comment manipulation usually do the following: increase favorable comments by swiping orders; Reward consumers to give favorable comments by stimulating economic interests; Delete negative comments. These practices create a false image in the website evaluation system, and also cater to the psychological characteristics of consumers' fuzzy aversion. They artificially create reference coefficients to induce consumers to buy. These practices violate the quality criteria, mode criteria and quantity criteria in the information manipulation theory. To sum up, this paper puts forward the following assumptions:

H3: The induced information generated by sales manipulation will lead to cognitive bias of fuzzy aversion.

H4: The induced information generated by comment manipulation will lead to cognitive bias of fuzzy aversion.

2.4.3 Cognitive bias after decision-making

Self-deception means that people tend to attribute good results to their own abilities and bad results to the bad external environment [12], that is, people tend to build a hindsight rule that can prove that their decisions are correct. In online shopping, consumers' psychological characteristics of self-deception will be used by businesses to avoid the punishment of platform websites for their violations. For example, businesses will mark "defective goods, no return and no exchange after purchase" and other terms detrimental to consumers on the product information page, but the position of the mark is usually not eye-catching and is not easily perceived by consumers. When a consumer finds a problem after purchasing and wants to return or exchange goods or give a negative comment, the merchant will reject it on the ground that

the consumer did not read the purchase terms carefully, or even punish the consumer by shielding the consumer's financial number or appealing to the shopping platform. However, consumers can only blame themselves for not carefully reading the terms of purchase, and become the "silent majority" in the evaluation system, which violates the rules of information manipulation theory. Therefore, this paper puts forward the following assumptions:

H5: Weakening the inductive information showing adverse terms will lead to cognitive bias of self-deception.

2.4.4 Adjustment of persuasive knowledge

With the accumulation of shopping experience and lessons, consumers will take precautions against various tactics of merchants in advance, and the purchase decision will gradually be biased towards rationality, that is, with the improvement of the level of persuasion knowledge, the probability of consumers' cognitive bias when facing the inductive information of merchants will be reduced. Therefore, this paper puts forward the following assumptions:

H6: Persuasion knowledge regulates the influence of inductive information on cognitive bias. When the level of persuasive knowledge increases, the positive impact of inductive information on cognitive bias decreases.

3 Scale development

In order to ensure the convenience of data analysis, this paper will code the construct measurement items involved in the study. The different variable codes, meanings and literature sources of the measurement items are shown in Table 1.

Table 1 Variable definition

Construct	Variable code	meaning	Item source
Inductive information	PMQD	One-sided emphasis	Guiso (2008)
	TJXT	Recommendation system	Kornell and Rhodes etl (2011)
	PLCK	Comment manipulation	Escobal and Leszlo (2011) 、Yaqin Liu (2008) 、Zhiyong Dong and Xu Han (2008) 、Yanqing Wang et al. (2016)
	XLCK	Sales control	Escobal and Leszlo (2011) 、Yaqin Liu (2008) 、Zhiyong Dong and Xu Han (2008) 、Yanqing Wang et al. (2016)
	RHXS	Weakening display	Metcalf (1998)
Cognitive bias	XZQJ	Narrow viewfinder	Guiso (2008)
	YCLX	Easy to handle	Kornell and Rhodes etl (2011)
	MHYW	ambiguity aversion	Escobal and Leszlo (2011) 、Yaqin Liu (2008) 、Zhiyong Dong and Xu Han (2008) 、Yanqing Wang et al. (2016)
	ZWQP	Self-deception	Metcalf (1998)
Persuasion knowledge	SFZS	Persuasion knowledge	Geng Cui et al. (2014)

Table 2 Test results of regression model

Variable	Constant term	Non-normalization coefficient (B)	T value	Adjusted R square	F value	Durbin-Watson
XZQJ=a+b PMQD	3.831	0.114	1.519	0.006	2.306	1.992
YCLX=a+b TJXT	3.692	0.184**	3.425	0.046	11.731	1.821
MHYW=a+b XLCK	3.316	0.253**	3.212	0.040	10.314	2.150
MHYW=a+b PLCK	4.264	0.043	0.713	-0.002	0.509	2.132
ZWQP=a+b RHXS	2.653	0.407***	5.929	0.132	35.154	1.637
GENDER	Control variables					
AGE	Control variables					
NUMBER OF SAMPLES	225					

A total of 225 valid questionnaires were collected from college students in Guiyang in both offline and online ways. Among them, 71.56% were women and 28.44% were men. The age distribution was as follows: 4.89% were under 18 years old, 44% were 18-22 years old, 45.33% were 22-27 years old, and 5.78% were above 27 years old.

4 Hypothesis test

4.1 Main effect test

The formula of univariate regression equation is $Y=a+bX+ \epsilon$, Where X and Y are independent variables and dependent variables, and a is a constant term, ϵ Is the residual item. This paper uses SPSS 20.0 to analyze the sample data, the regression analysis results are shown in Figures 2, 3, and 4. Impact of inductive information on cognitive bias: The impact of inductive information on corresponding cognitive bias in different situations is shown in Table 2. From the above regression analysis results, the regression coefficient of equation 1: $XZQJ=3.831+0.114 * PMQD$ (hypothesis 1) is ideal, but the adjusted R square, F value and T value are small and not significant ($p>0.05$), so hypothesis 1 is rejected.

Equation 4: $MHYW=4.264+0.043 *$ The regression coefficient, adjusted R square (-0.002), F value and T value of PLCK (hypothesis 4) are very small and not significant ($p>0.05$), so hypothesis 4 is also rejected.

The regression coefficients of Equation 2: $YCLX=3.692+0.184 * TJXT$, Equation 3: $MHYW=3.316+0.253 * XLCK$ and Equation 5: $ZWQP=2.653+0.407 * RHXS$ are ideal, and the adjusted R, F and T values are also large and significant. In addition, the Durbin-Wattson values of Equation 2 and Equation 5 are between 0-2, which is ideal. Although the Durbin-Wattson value of Equation 3 is higher than 2, it is acceptable within the range of [2-DW, 2+DW]. Therefore, Hypothesis 2, Hypothesis 3 and Hypothesis 5 are supported.

Table 3 Model Summary

Model	Adjusted R Square	Change Statistics				Durbin-Watson	
		Changed R Square	Changed F	df1	df2		Changed Sig. F
1	0.051	0.059	6.975	2	222	0.001	2.179
2	0.955	0.897	4472.312	1	221	0.000	

A. Prediction variables: (constant), SFZS, TJXT B. Prediction variables: (constant), SFZS, TJXT, JHX2 C. Dependent variable: YCLX

Table 4 Regression coefficient table

Model		Non-normalized Coefficients		Normalized Coefficients	t	Sig.
		B	Standard Deviation			
1	(Constants)	3.455	.273		12.663	.000
	TJXT	.143	.061	.173	2.356	.019
	SFZS	.095	.065	.108	1.469	.143
2	(Constants)	4.345	.061		71.447	.000
	TJXT	-1.053	.022	-1.280	-47.429	.000
	SFZS	-.012	.014	-.014	-.840	.402
	JHX2	.243	.004	1.785	66.875	.000

a. Dependent Variables: YCLX. b. Interactive Items JHX2=TJXT* SFZS

4.2 Adjustment effect test

Since Hypothesis 1 and Hypothesis 4 are rejected, this paper only tests the moderating effect of Hypothesis 2, Hypothesis 3 and Hypothesis 5.

5 Conclusions and suggestions

This paper takes the college students in Guiyang as the research object to study the influence of various inductive information used by merchants in online shopping on consumer cognitive bias. The research results show that: ① The inductive information released by merchants through the recommendation system will cause consumers to have cognitive bias when shopping. Consumers are limited by their own information processing capabilities and cannot process massive amounts of information. They usually focus on easily available information. It is precisely by taking advantage of this weakness of consumers that illegal businesses lure consumers to buy through the recommendation system. ② Merchants' control of sales volume of goods will cause consumers' cognitive bias when shopping. Consumers often perceive higher risks when they lack an obvious reference coefficient. Merchants often use the psychological characteristics of consumers' aversion to uncertainty to artificially create reference coefficients through sales manipulation, causing consumers to have cognitive bias and inducing them to buy. ③ By weakening the display of adverse terms, businesses will make consumers have cognitive bias. For some management rules of the shopping platform, businesses adopt the treatment method of "having policies at the top and countermeasures at the bottom", that is, weakening the terms that are unfavorable to consumers. Consumers find problems after purchasing, but can't appeal to shopping websites, and can only become "silent majority". It is the merchants who take advantage of the psychological characteristics of consumers' self-deception to avoid the punishment of platform websites for their illegal behaviors. ④ With the accumulation of consumers' online shopping experience and lessons, the impact of the above induced behaviors on consumers' cognitive bias will be weakened.

In response to the above conclusions, this paper puts forward the following suggestions: ① The shopping website should further strengthen the review of the qualification of the merchants in the recommendation system, improve the access threshold, purify the shopping environment in the recommendation system, and prevent illegal merchants from defrauding consumers through the recommendation system. ② Shopping websites must strengthen their efforts to crack down on the manipulation of business sales, and must not take a "one eye, one eye" attitude towards

businesses because of the need to improve performance. Otherwise, it will not only harm consumers, but also poison the overall online shopping environment, causing harm to shopping websites and law-abiding businesses. ③ Clarify the consumer rights and interests protection system, improve the consumer complaint handling mechanism and the online shopping dispute arbitration system, strengthen efforts to crack down on the acts of weakening the adverse terms infringing on consumer rights and interests, and take warning, punishment and even closure sanctions against the illegal businesses that have the above behaviors. ④ Shopping websites should strengthen the publicity and education of consumer rights and interests protection, help consumers with insufficient online shopping experience to improve their awareness of rights and interests protection through the establishment of special columns or sections, and fundamentally weaken the negative impact of cognitive bias generated by inductive information on consumer online shopping behavior.

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