Research on the influencing factors of human computer interaction on consumers' impulsive mobile shopping intention

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Abstract: Artificial intelligence technology and big data are widely used in mobile shopping, and the impact of human-computer interaction on consumer behavior has also received widespread attention from scholars. This study is based on the SOR(stimuli-organism-response) theory and proposes a theoretical model of human-computer interaction influencing consumers' impulsive mobile shopping intention, and conducts a questionnaire survey and empirical study on 279 mobile shopping consumers. The study finds that perceived personalization, perceived responsiveness, and perceived enjoyment have a positive effect on flow experience and consumers' impulsive mobile shopping intention; flow experience plays a mediating role in the relationship between perceived personalization, perceived responsiveness, perceived enjoyment and consumers' impulsive mobile shopping intention; and the mediating effect between perceived personalization, perceived responsiveness, perceived enjoyment and consumers' impulsive mobile shopping intention is still significant under the moderation of psychological resistance.

Keywords: Human computer interaction, Impulsive mobile shopping intentions, Flow experience, Psychological resistance

1 Introduction

The digital age has arrived, and artificial intelligence is playing an important role in our lives. From the traditional way of communication between mobile shopping merchants and customers through web pages, instant messaging apps, etc., to the way customers can communicate with computer systems through natural means such as voice, gestures, and eye contact. Not only that, the introduction of technologies such as intelligent recommendation and intelligent customer service has also provided consumers with more personalized and customized services and more efficient service efficiency. Although previous studies have explored the impact of web page interaction characteristics on consumers' intentions to use web Human computer interaction (HCI) for online shopping[1], most of them focus on a single technology such as the HCI[2], such as chatbot features, language style and the negative impact of AI's privacy and intrusiveness on consumers' intentions to make mobile purchases[3]. There is still a lack of exploration on the internal mechanism of how human-computer interaction perception affects consumers' intentions to shop on the go in mobile shopping.

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Meanwhile, in the process of shopping on mobile shopping platforms, in addition to searching and browsing for the goods they plan to buy, consumers often want to buy goods that differ from their expected shopping lists, generating impulsive buying intentions. Previous studies have explored the potential determinants of impulsive buying behavior from the perspective of consumer motivation, and found that hedonic shopping motivation is an important factor to promote consumers' impulsive purchase[4]. It has also been verified that the less time spent shopping, the more it can promote impulse purchase and make consumers feel urgent[5]. In addition, it has been found that the flow experience can positively promote consumers' impulse purchases[6] and that interactivity is an important prerequisite for consumers to enter the state of mindfulness[7]. Therefore, this study speculates that flow experience plays a mediates the relationship between human-computer interaction perception and consumers' impulsive mobile shopping intentions. Further, in order to explore the difference of consumers' psychological state on purchase intention, the variable of psychological resistance is included in the research model to explore the moderating role played by psychological resistance in the mediating mechanism.

Based on the SOR theory, this study constructs a structural equation model to explore the mechanism of the influence of human-computer interaction perception on consumers' impulsive mobile shopping intentions by investigating 279 consumers with mobile shopping experience.

2 Theoretical foundations and hypotheses development

2.1 Theoretical foundations

The SOR (Stimulus-Organism-Response) theory suggests that stimuli from the outside world evoke emotions or perceptions within the individual, prompting the individual to be motivated and to demonstrate this through a certain behavior[8]. Consumer emotions are complex and have an important impact on behavior. In addition, AR applications, AI customer service and other interactive technologies can not only have a direct effect on consumer behavior[7], but also have an indirect effect by enhancing consumer perception[9].

This study explores the effects of the human computer interaction elements, namely perceived personalization, perceived responsiveness, and perceived enjoyment, on the state of flow experience in the context of mobile shopping, and how they affect consumers' impulsive mobile shopping intentions, and further reveals the boundary effect of psychological resistance in the influence of human computer interaction perceptions on consumers' impulsive mobile shopping intentions.

2.2 Human computer interaction and consumers' impulsive mobile shopping intentions

By interacting with the system and receiving feedback on their preferences, the mobile shopping platform enables users to independently select the type and style of the product, thereby fostering a seamless "human-computer interaction" and enriching the user's overall experience[10], thereby promoting impulsive mobile shopping among consumers. At the same time, studies have shown that communicating with AI customer service with a higher degree of anthropomorphism can lead to a higher degree of personalized perception, and have an impact on consumers' intention to pay a higher price for products[11]. Thus, this study proposes the following hypotheses:

H1: Perceived personalization has a positive effect on consumers' impulsive mobile shopping intentions.

The responsiveness of an e-retailer is an important influence in engendering customer trust, and being responsive quickly and efficiently is also key to customer satisfaction[12]. Compared to traditional services, mobile shopping platforms can more efficiently fulfill consumer shopping needs through human-computer interaction, allowing customers to access services anytime, anywhere and receive timely responses, reducing consumer thinking time[13], and promoting consumers' impulsive mobile shopping intentions. Hence, this study formulates the following hypothesis:

H2: Perceived responsiveness has a positive effect on consumers' impulsive mobile shopping intentions.

Enjoyment is an important emotional response that determines consumer satisfaction[14], AI technology can help online retailers to increase the novelty and mystery of mobile shopping and thus create enjoyment in consumers[15]. Immersion through virtual reality technology can free consumers from the hustle and bustle of shopping malls, thereby reducing the perception of crowding, further influencing the way people experience their surroundings, and bringing consumers new experiences of immersion[16], thus promoting consumers' impulsive shopping intentions. Hence, this study formulates the following hypothesis:

H3: Perceived enjoyment has a positive effect on consumers' impulsive mobile shopping intentions.

2.3 The mediating role of the flow experience

Csikszentmihalyi introduced the theory of flow in 1975, defining it as "the total experience that people feel when they are fully engaged in an action". The flow experience reflects the state of total immersion that users experience during an activity. When in the state of "flow", the user focuses on the activity itself and exhibits a pleasurable, intrinsically positive psychological experience[17]. Prior research has revealed that perceived professional knowledge and similarity among interpersonal interaction factors positively influence the flow experience, ultimately shaping consumers' purchase intentions[9]. As personalization has become more prevalent, it has been found that the personalization of online advertisements has an impact on consumers' attitudes toward the advertisements, which is also mediated by the flow experience[18]. In mobile shopping, consumers' immersive state will further promote their impulsive purchase intention[19]. Therefore, the advantages of personalization, responsiveness, and experiential sense of human-computer interaction can make consumers more immersed in mobile shopping, which in turn generates impulsive mobile shopping intentions. Thus, the following hypotheses:

H4: The flow experience exerts a mediatly influenceon the linkage between perceived personalization and consumer impulsive mobile shopping intentions.

H5: The flow experience exerts a mediatly influenceon the linkage between perceived responsiveness and consumer impulsive mobile shopping intentions.

H6: The flow experience exerts a mediatly influenceon the linkage between perceived enjoyment and consumer impulsive mobile shopping intentions.

2.4 The moderating role of psychological resistance

Psychological resistance describes an individual's is deeply convinced in their right to make free choices in behavior and their high regard for this freedom. Once individuals feel that their freedom is restricted or at risk of loss, they will trigger a strong motivation to win that freedom back. This desire to restore freedom is psychological resistance[20]. Not only do temporal and spatial distances cause psychological resistance in consumers[21], and choice hesitation due to choice overload can also cause consumers to develop psychological resistance[22].

In today's marketing environment as well as marketing strategies are constantly updated, consumers increasingly expect products or services with personalization. However, AI algorithms based on big data can trigger consumers to psychologically resist and act contrary to the company's wishes due to their negative characteristics of privacy and intrusiveness. Some studies have revealed that the confidentiality of personal data, unauthorized reuse of personal details, and the sense of unwanted intrusion all contribute to consumers' reluctance towards embracing intelligence services or products[23]. Moreover, when businesses use self-service to completely replace human service, users might perceive a compulsion to utilize self-service options and demonstrate reluctance towards embracing the novel technology[24]. Therefore, when there are manipulative as well as coercive intentions towards consumers in human-computer interaction technologies such as personalized recommendations and intelligent chatbot, it may cause consumers to resist and thus affect their shopping status. Thus, this study proposes the following hypotheses:

H7: Psychological resistance exerts a moderately negative influence on the linkage between perceived personalization and the flow experience.

H8: Psychological resistance exerts a moderately negative influence on the linkage between perceived responsiveness and flow experience.

H9: Psychological resistance exerts a moderately negative influence on the linkage between perceived enjoyment and flow experience.

H10: Psychological resistance negatively moderates the mediating role of flow experience between perceived human-computer interaction and consumers' impulsive mobile shopping intentions.

According to the above assumptions and theoretical derivation, this paper constructs the research model is shown in Figure 1.

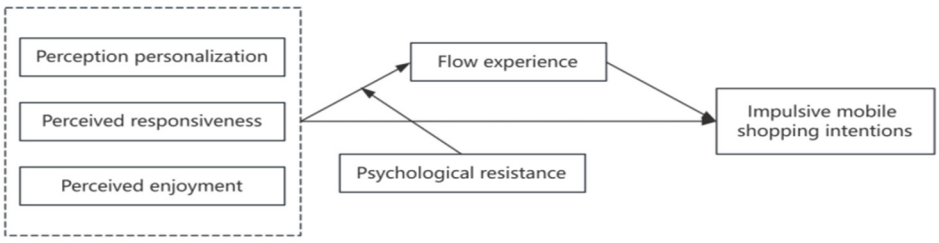

Figure 1 The research model.

3 Study design

3.1 Data collection

This study adopts a questionnaire survey method, selecting mobile shopping consumers as the survey subjects, and the questionnaire is collected online through the QuestionStar platform. Firstly, the respondents will be asked whether they have ever had mobile shopping experience, those who have experience in mobile shopping will continue to be investigated, and the questionnaire response is set up with mandatory requirements to avoid the data generating missing values. A total of 300 questionnaires were collected and 279 valid questionnaires were recovered after excluding the unqualified questionnaires, with an effective recovery rate of 93%. The sample is mainly composed of young groups, concentrated in Taobao, Jingdong and other important domestic mobile shopping platforms, this is also aligns with the fundamental characteristics of the mobile shopping audience group. The questionnaire consists of two parts, firstly, respondents are asked to provide demographic information such as gender and age; secondly, they fill in the relevant scales.

Variables were measured with reference to well-established scales, with three items for perceived individualization, with reference to the study of Wu[25]. There are three items for perceived responsiveness, refer to Yoo and Lee's study[26]. There were three items for perceived enjoyment, refer to the study of Ashfaq et al.[27]. Flow experience has three items, refer to the study of Shin et al.[2]. There are three items for psychological resistance, refer to the study of Donnell et al.[28]. There are three items for impulsive mobile shopping intentions, refer to the study of Park et al.[29]. All scales utilize a 5-point Likert format, where scores span from 1 to 5, indicating a progression from "complete disagreement" to "full agreement"..

3.2 Measurement model

First, the reliability of the questionnaire was examined by calculating the consistency reliability and combination reliability using Mplus 8.3 and SPSS26.0 software. The standardized Cronbach's alpha coefficients of the variables ranged from 0.677 to 0.909, all values exceeded 0.6, suggesting a strong internal consistency within the scale. This indicates that the scales used in this study were able to measure the variables reliably. And the standardized factor loadings of the measures are all greater than 0.7, the combined reliability of all variables ranges from 0.735 to 0.885, which is greater than 0.7, and the AVE of all variables is greater than 0.5 except for the AVE of psychological resistance which is slightly less than 0.5, which indicates that the convergent validity of the scale passes the test. The root mean square of the AVE for each variable is exceeds the correlation coefficients among the variables, which shows that the scale has good discriminant validity.

3.3 Structural model

In this paper, the main effects model was analyzed using Mplus 8.3 and SPSS26.0 software, and the fit indices were: $\chi 2$ /df=2.333<3, CFI(0.936), TLI(0.922) were all greater than 0.9, and RMSEA(0.043) was less than 0.08 standardized value, which made the model fit better. Table 1 shows the standardized path coefficients, the standardized paths are positive and significant, and hypotheses H1-H3 are supported.

Table 1 Results of hypothesis testing.

Trails	Standardized path factor	t-value
Perceived personalization → Impulsive mobile shopping intentions	0.164***	2.667
Perceived responsiveness → Impulsive mobile shopping intentions	0.294***	4.512
Perceived enjoyment → Impulsive mobile shopping intentions	0.369***	6.557
Perceptual personalization → Flow experience	0.433***	8.027
Perceived responsiveness → Flow experience	0.426***	7.475
Perceived enjoyment → Flow experience	0.392***	6.981
Flow experience → Impulsive mobile shopping intentions	0.630***	13.505

Note: *** p<0.001

3.4 Mediation effect

In this study, the mediation effect test is based on model4 in the Bootstrap test program, the sample size is set at 5000. The results are shown in Table 2, and none of the mediation test results include 0 under the 95% confidence interval. Among them, the indirect effects of flow experience in the paths of perceived personalization, perceived responsiveness, and perceived enjoyment on consumers' impulsive mobile shopping intention were 0.2654, 0.2496, 0.1932, and 0.1932 respectively. Hypotheses H4-H6 were validated.

Table 2 Results of the test for mediating effects of heart flow experience.

Trails	Efficiency value	SE	LLCI	ULCI
Perceived personalization → Flow experience → Impulsive mobile shopping intentions	0.2654	0.0419	0.1835	0.3479
Perceived responsiveness →Flow experience → Impulsive mobile shopping intentions	0.2496	0.0531	0.1483	0.3580
Perceived enjoyment → Flow experience → Impulsive mobile shopping intentions	0.1932	0.0290	0.1387	0.2518

Then the moderated mediating effects were analyzed by model8 to test whether the mediating effects of the flow experience between perceived personalization, perceived responsiveness, and perceived enjoyment on consumers' impulsive mobile shopping intentions were moderated by psychological resistance. Table 3 presents the outcomes of the analysis.

Table 3 Mediation effects test with moderation.

Trails	High psychological resistance			Low psychological resistance		
	Efficiency value	LLCI	ULCI	Efficiency value	LLCI	ULCI
Perceived personalization → Flow experience → Impulsive mobile shopping intentions	0.0290	0.0027	0.0650	0.1054	0.0335	0.1798
Perceived responsiveness → Flow experience → Impulsive mobile shopping intentions	0.0385	0.0031	0.0910	0.0888	0.0100	0.1710
Perceived enjoyment → Flow experience → Impulsive mobile shopping intentions	-0.0644	-0.1136	-0.0275	0.1214	0.0677	0.1870

Table 3 shows that the mediating effect of flow experience between perceived personalization, perceived responsiveness, perceived enjoyment and consumers' impulsive mobile shopping intention is significant under psychological resistance regulation, with each confidence interval not containing 0. And psychological resistance plays a negative moderate role in the mediating effect of flow experience between perceived personalization, perceived responsiveness, perceived enjoyment and consumers' impulsive mobile shopping intention. Hypothesis H10 was validated.

3.5 Moderating effect

The moderating effects of psychological resistance in the paths of "perceived personalization → flow experience", "perceived responsiveness → flow experience", and "perceived enjoyment → flow experience" were examined by Model 1 of process in SPSS. The interaction terms between perceived personalization, perceived responsiveness, perceived enjoyment, and psychological resistance are significantly negative, β= -0.3529 ($p<0.001$), β= -0.2820 ($p<0.001$), and β= -0.5365 ($p<0.001$), and the hypotheses H7-H9 were validated.

4 Conclusions

4.1 Research results

As the era of vast data and 5G networking advances, the technology of human-computer interaction, fueled by artificial intelligence, has increasingly integrated into every facet of consumers' mobile shopping experiences., which improves the shopping efficiency and brings better shopping experience for consumers. This article is based on the SOR theory and explores the impact mechanism and boundary conditions of human-computer interaction perception on consumer impulse mobile shopping intentions. The results of empirical analysis show that perceived personalization, perceived responsiveness, and perceived enjoyment have a positive influence on flow experience and consumers' impulsive mobile shopping intentions; flow experience plays a mediating role in the relationship between perceived personalization, perceived responsiveness, perceived enjoyment, and consumers' impulsive mobile shopping intentions, and in the case of psychological resistance conditioning, the mediating effect of flow experience between perceived personalization, perceived responsiveness, perceived enjoyment, and consumer impulsive mobile shopping intentions is still significant. And psychological resistance negatively moderates the effects of perceived personalization, perceived responsiveness, and perceived enjoyment on impulsive mobile shopping intentions.

4.2 Theoretical contributions

The theoretical contributions of this paper are primarily evident in the following three dimensions. First, based on the SOR theory, this paper explores the influence mechanism of human-computer interaction perception on consumers' impulsive mobile shopping intentions as well as the boundary conditions. Previous studies have mainly explored the influence on consumers' purchase intention from the aspects of human-computer interaction technologies such as intelligent recommendation and intelligent customer service. For example, exploring the impact of intelligent customer service personification on consumer purchasing decision from the perspective of consumer social needs[30], and the impact of intelligent customer service

anthropomorphism on consumer satisfaction[31]. This paper discusses the perceived personalization, perceived responsiveness, and perceived enjoyment of human-computer interaction from the perspective of flow experience, and the empirical results help to broaden the theoretical perspectives of the research on the factors influencing the perception of human-computer interaction, and to better understand the mechanism of the influence of human-computer interaction technology on consumers' willingness to shop. Second, this paper verifies the mediating role of flow experience in the relationship between human-computer interaction perception and consumers' impulsive mobile shopping intentions, which expands the research related to consumers' impulsive mobile shopping. Third, by exploring the moderating role of consumers' psychological resistance, this paper provides boundary conditions affecting consumers' impulsive mobile shopping intentions, which provides theoretical references for subsequent studies exploring the influence of human-computer interaction on consumer behavior.

4.3 Practical implications

When designing and applying human-computer interaction technology, enterprises should start from the perspective of user perceived interaction characteristics, optimize computer systems and software from personalized services, response speed, entertainment, and other aspects to promote consumer use. And enterprises should strive to reduce consumers' psychological resistance to algorithm technology, prevent and reduce mandatory and manipulative operations in human-computer interaction, weaken the positive perception of consumer autonomy and free choice, and reduce consumer rejection.

4.4 Research limitations

This study exhibits certain limitations. First, the factors considered in this study may not be comprehensive enough in exploring the effects of HCI perception on consumers' impulsive mobile shopping intentions. Second, this study adopts questionnaire data collection, and future research can consider collecting more objective data through data mining, behavioral data recording, and other methods, so as to enhance the applicability of the research findings and conduct a more in-depth exploration of the model's influence mechanism.

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