



Article

Impact of Interaction Effects between Visual and Auditory Signs on Consumer Purchasing Behavior Based on the AISAS Model

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Abstract: This study, based on the AISAS model, explores the impact of the interaction effect between visual and auditory signals on consumer purchase behavior. Using experimental methods, 120 participants were randomly assigned to four different visual and auditory signal combinations, and their purchase intentions and actual purchase behavior were measured. The results show that the interaction effect between visual and auditory signals has a significant impact on both purchase intentions and actual purchase behavior, and there is a significant positive relationship. Specifically, when visual and auditory signals are mutually consistent, consumers have the highest purchase intentions and actual purchase behavior; when both visual and auditory signals are absent, consumers have the lowest purchase intentions and actual purchase behavior; when either the visual or auditory signal is missing, consumers' purchase intentions and actual purchase behavior are between the two extremes. This study provides a new perspective for understanding consumers' decision-making processes in multi-sensory environments and offers valuable insights for the development of marketing strategies.

Keywords: visual signal; auditory signal; interaction effect; purchase behavior; AISAS model



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1. Introduction

Consumer purchasing behavior is one of the core topics in marketing and the foundation for companies to develop effective market strategies. Consumer purchasing behavior is influenced by various factors, one of which is sensory stimulation. Sensory stimulation refers to the visual, auditory, olfactory, gustatory, and tactile information related to products or services that consumers encounter during the purchasing process, which can affect consumers' cognition, emotion, and behavioral responses [1]. In today's market environment, consumers often face multiple sensory stimuli simultaneously. For example, in a shopping mall, consumers not only see the appearance, color, and shape of various products, but also hear background music, broadcasts, and the voices of other customers. The relationship between these sensory stimuli may be consistent or conflicting, resulting in different interactive effects. Interactive effects refer to the phenomenon in which two or more sensory stimuli interact or enhance each other, which can change consumers' evaluation and response to a single sensory stimulus [2].

2. Literature Review

2.1. Consumer Purchase Behavior and Strategies

Aflaki et al. [3] explored multi-period pricing's influence on strategic consumer purchasing behavior. While this behavior garners attention, its actual benefits to consumers and their voluntary adoption remain unexamined. Strategic consumers might experience lower surplus value than myopic counterparts [4]. Chen et al. [5] investigated social media's impact on marketing and consumer engagement, finding Weibo had a positive effect on box office revenue, but a minimal influence on consumer participation. Green supply chain

management's (GSCM) role as a corporate advantage is gaining traction, with Lee et al. [6] showcasing its impact on the end of the supply chain. Troudi et al. [7] examined Algerian consumer behavior through rational behavior theory, linking green marketing and personal factors to predict green food purchasing. Gu et al. [8] assessed online purchasing during COVID-19. Hall et al. [9] analyzed retail data in Christchurch. Zhu et al. [10] proposed energy-efficient solutions for food delivery. Harun et al. [11] studied EEA purchasing based on planned behavior. Yang et al. [12] dissected brand influence on purchasing, offering strategies. Feng [13] reviewed purchasing intention's underpinnings. Hou [14] discussed the impact of online word of mouth. Mo et al. [15] explored the role of review quality in purchase decisions. Li et al. [16] identified key factors in e-commerce meat purchasing behavior, suggesting industry enhancements.

2.2. AISAS Model in Consumer Behavior

This study employs the AISAS model, encompassing Attention, Interest, Search, Action, and Share stages, to examine consumer responses, as shown in Figure 1. Cross-modal sensory effects are posited to impact each AISAS stage, influencing purchasing behavior. Notable AISAS applications include Kuang's [17] hotel behavior analysis, Shao et al.'s [18] amplification study, and Wang et al.'s [19] Weibo investigation. Rini et al. [20] link AISAS to modern advertising, while Jun-Hwa et al. [21] assess promotion impacts. Nurjanah et al. [22] analyze E-marketing's influence, He et al. [23] explore e-commerce dimensions, and Liu [24] propose WeChat strategies. The AISAS model's adaptability to changing behavior, as highlighted by Wang et al. [25], underscores its role in shaping marketing communication.

The following shows the AISAS model diagram:

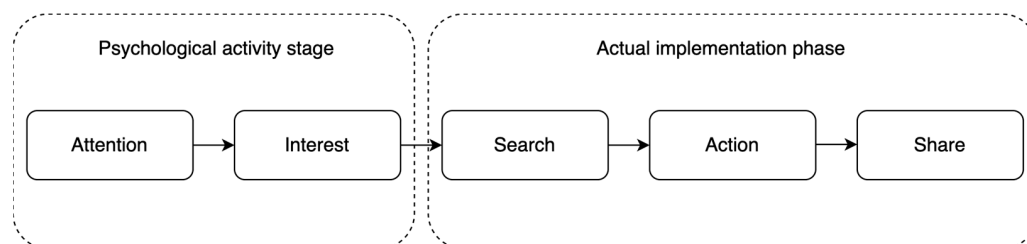


Figure 1. AISAS model diagram.

2.3. Cross-Modal Effects and Sensory Stimuli

This study examines the interplay between visual and auditory signals. According to Zhong et al. [26], these sensory stimuli dominate marketing communication. Seiwerth et al. [27] explored the impact of auditory cues on vestibulospinal coordination, shedding light on audio-vestibular interactions. The effects of irregular rhythms on visual timing and the extraction of auditory sequence information for visual timing influence remain unclear. Chen et al. [28] examined task-irrelevant auditory sequences on "Ternus apparent motion". Yoganathan et al. [29] investigated multisensory marketing for ethical brands, seeking innovative online methods. Tang et al. [30] manipulated target modality in spatial cueing paradigms. Togoli et al. [31] probed action-perception interdependence and visual experience. Sirico et al. [32] studied video observation/motor imagery effects on reaction time. Ha et al. [33] compared diverse green spaces' restorative effects. Gong et al. [34] explored cross-modal integration via adaptation in rat thalamic nuclei. McClure et al. [35] used V1 calcium imaging to study sound's effect on visual processing in mice. Peng et al. [36] examined auditory signals in pedestrian perception of traffic signals. Zhang et al. [37] discovered neural mechanisms for cross-modal emotion perception. Pan et al. [38] emphasized rhythm perception's audiovisual synergy. Chen et al. [39] discussed the precedence of visual processing in audiovisual emotional integration. Lü et al. [40] highlighted the mutual influence of audiovisual arts. Sit et al. [41] demonstrated superior learning outcomes with audio-visual integration.

2.4. Exploring Contemporary Consumer Behavior

Research on various aspects is well developed, yet comprehensive investigations into multiple aspects remain limited. Ivanova et al. [42] explored generational effects on responsible consumer behavior. Sharma et al. [43] proposed a framework examining the interplay of product attributes, environmental concerns, and green purchasing patterns. Yoganathan et al. [29] examined multi-sensory marketing for ethical e-retail, addressing competitive challenges. Achen [44] reevaluated the impact of Facebook interactions on sports fans' relationships and purchasing. Chang et al. [45] established a consumer decision model for social media purchasing behavior. Kujur et al. [46] detailed how consumer engagement on social networking sites affects brand relationships. Ata et al. [47] studied life satisfaction's influence on online impulse buying. Khalid [48] investigated organic food consumption and entrepreneurship amid the COVID-19 pandemic. Ma, Y. [49] analyzed H5 advertising's effects on millennials' cognition and action. Yu [50] examined the impact of scene technology on mobile Internet customer perceptions. Noteworthy work includes that of Cheung et al. [51].

In summary, through a literature review of consumer purchasing behavior, the AISAS model, and the interactive effects between visual and auditory signals, it is found that few studies integrate the three aspects mentioned above. Therefore, this study adopts an experimental approach to explore the impact of the interaction effects between visual and auditory signals on consumer purchase intention and actual purchasing behavior, as well as the role of the AISAS model in explaining this impact.

3. Research Questions and Hypotheses

The purpose of this study is to investigate the effects of the interaction between visual and auditory signals on consumer purchasing behavior, as well as the role of the AISAS model in explaining this effect. The following research questions and hypotheses are proposed:

Research Question 1: What are the effects of the interaction between visual and auditory signals on consumer purchase intention and actual purchasing behavior?

Hypothesis 1a. *When visual and auditory signals are mutually consistent, consumers' purchase intention and actual purchasing behavior are higher than when visual and auditory signals conflict with each other.*

Hypothesis 1b. *When both visual and auditory signals disappear, consumers' purchase intention and actual purchasing behavior are the lowest, while in other situations, the effects lie between.*

Research Question 2: How does the AISAS model explain the effects of the interaction between visual and auditory signals on consumer purchasing behavior?

Hypothesis 2a. *The interaction between visual and auditory signals has a significant impact on consumers' reactions in each stage of the AISAS model.*

Hypothesis 2b. *Consumers' reactions in each stage of the AISAS model have a significant impact on their purchase intention and actual purchasing behavior.*

This study contributes to the existing literature in the following ways: First, it expands the research scope of sensory marketing from single sensory stimulation to multi-sensory stimulation, from static stimulation to dynamic stimulation, and from the physical environment to the online environment. Second, this study adopts the AISAS model as a theoretical framework, integrating sensory stimulation with the consumer purchasing process, providing a more comprehensive and systematic analysis approach. Third, this study not only examines the effects of sensory stimulation on consumer purchase intention, but also examines its effects on actual purchasing behavior, filling an important gap in

the existing literature. Fourth, this study provides useful insights for marketing practice, guiding companies on how to use the interaction between visual and auditory signals to increase consumers' purchase intention and actual purchasing behavior.

4. Methods

The study employed an experimental method, randomly assigning participants to four different visual and auditory signal combination conditions, and measuring their purchase intention and actual purchasing behavior.

4.1. Experimental Design

This study used a 2×2 factorial design, with the two factors being visual signal (present vs. absent) and auditory signal (present vs. absent). Visual signal refers to images related to a product, while auditory signal refers to sounds related to a product. This study selected four different types of products as experimental materials, namely mobile phones, computers, cosmetics, and drinks. The reasons for choosing these four products are as follows: These four products are common and interesting consumer goods, which can attract participants' attention and interest, and thereby improve the effectiveness and feasibility of the experiment. In addition, these four products have certain visual and auditory features, which can be expressed by different visual and auditory signals, increasing the diversity and complexity of the experiment. Furthermore, these four products are suitable for consumers of different genders and age groups, which can ensure the representativeness and universality of the participants, and improve the credibility and generalizability of the experiment. Each product has two different combinations of visual and auditory signals, one consistent and one conflicting. Therefore, there are 16 experimental conditions in total (4 products \times 2 visual signals \times 2 auditory signals). Each experimental condition has a webpage as experimental material, which displays the corresponding visual and auditory signals, as well as a purchase button and a share button. Webpages were chosen as experimental materials, and purchase and share buttons were chosen as experimental tools, because they represent the action and sharing stages in the AISAS model.

4.2. Participants

This study recruited 120 college students as participants, including 60 males and 60 females. The age range of the participants was between 18 and 25 years old, with an average age of 21.5 years. Participants had some experience with online shopping and were interested in the selected products. Participants signed up for the experiment through an online platform and received a certain reward after completing the experiment.

4.3. Materials and Stimuli

This study used four different types of products as experimental materials, including mobile phones, computers, cosmetics, and drinks. These products are common and interesting consumer goods, which have certain visual and auditory features, are suitable for consumers of different genders and age groups, and have certain visual and auditory features. For the mobile phone products, we used two different brands of mobile phones: Apple and Samsung. For the computer products, we used two different types of computers: laptop and desktop. For the cosmetic products, we used two different categories of cosmetics: skincare and makeup. Finally, for the beverage products, we used two different types of beverages: alcoholic and non-alcoholic. Each product has two different combinations of visual and auditory signals, one consistent and one conflicting. Visual signals refer to images related to a product, while auditory signals refer to sounds related to a product. There may be a consistent or conflicting relationship between the two types of signals. Consistent situations refer to cases where both signals convey the same product information or emotion. As an example, an image shows a sad person using a product, while a voice plays a happy speech or music. These visual and auditory signals were collected

or produced from the Internet, ensuring their relevance to the selected products and their representativeness and attractiveness.

4.4. Data Collection

This study collected data through an online platform. Firstly, participants were required to fill out a basic information questionnaire, including gender, age, and online shopping experience. Then, participants were randomly assigned to one of the sixteen experimental conditions and entered the corresponding webpage. On the webpage, participants could see the corresponding visual and auditory signals and were asked to decide to purchase or share based on their preferences and needs. If participants chose the purchase button, they were considered to have a purchase intention and were required to fill out a purchase intention questionnaire, including purchase intention, purchase price, purchase frequency, and other indicators. Finally, participants were required to fill out an actual purchase behavior questionnaire, including whether they purchased the selected product, the time of purchase, the quantity of purchase, and other indicators. During the data collection process, this study followed the following principles: (1) ensuring that participants were unaware of the purpose and process of the experiment; (2) ensuring that participants made decisions freely and autonomously; and (3) ensuring the privacy and security of participants.

4.5. Data Analysis Methods

This study used SPSS 26.0 software for data analysis. Firstly, descriptive statistics were derived, including means, standard deviations, and frequency distributions. Secondly, inferential statistics were derived, including analysis of variance (ANOVA) and regression analysis. ANOVA was used to test the impact of audio-visual signal interaction effects on consumer purchase intentions and actual purchase behavior, while regression analysis was used to test the role of the AISAS model in explaining the impact of audio-visual signal interaction effects on consumer purchase behavior. Finally, sensitivity analysis and model testing were conducted to test the stability of the conclusions and the rationality of the model.

4.6. Research Ethics

This study adhered to ethical principles and was approved by an ethics review committee. Participants were informed of the purpose, process, and risks of the experiment before data collection and gave their consent. After data collection, participant information was de-identified to protect their privacy and security. The study followed academic standards in data analysis and reporting, avoiding any potential fabrication or plagiarism.

4.7. Reliability and Validity of the Method

This study's methods have reliability and validity. Firstly, this study used experimental methods, which can control the interference of external variables and improve the credibility of causal inference. Secondly, this study used random allocation methods to balance differences between experimental conditions and increase the generalizability of results. Thirdly, this study used audio-visual signals that are relevant to the selected product and have a certain representativeness and attractiveness, which can improve the reliability and validity of experimental materials. Fourthly, this study used purchase buttons and share buttons as experimental tools, which can effectively measure consumers' reactions at each stage of the AISAS model. Fifthly, this study used appropriate statistical methods and software to accurately analyze data and test research hypotheses.

5. Results

All participants had some experience in online shopping and were interested in the selected product. Table 1 displays the basic information of the participants.

Table 1. Basic information of participants.

Gender	Age	Online Shopping Experience (Year)	Selected Products
Male	21.6 (2.1)	3.8 (1.2)	Mobile phones (15), Computers (15), Cosmetics (15), Beverages (15)
Female	21.4 (1.9)	4.2 (1.3)	Mobile phones (15), Computers (15), Cosmetics (15), Beverages (15)
Total	21.5 (2.0)	4.0 (1.2)	Mobile phones (30), Computers (30), Cosmetics (30), Beverages (30)

Note: Standard deviation or number is shown in parentheses.

This study used analysis of variance (ANOVA) to test the interactive effect of audio-visual signals on consumers' purchase intention and actual purchasing behavior. Purchase intention refers to the proportion of participants who choose to click on the purchase button, while actual purchasing behavior refers to the proportion of participants who reported buying the selected product in the questionnaire. Table 2 displays the mean and standard deviation of purchase intention and actual purchasing behavior under different audio-visual signal combinations.

Table 2. Purchase intention and actual purchasing behavior under different audio-visual signal combinations.

Visual Signal	Auditory Signal	Purchase Intention (%)	Actual Purchase Behavior (%)
Present	Present (consistent)	0.67 (0.12)	0.45 (0.10)
Present	Present (conflicting)	0.35 (0.11)	0.18 (0.09)
Present	Absent	0.51 (0.13)	0.28 (0.11)
Absent	Present	0.49 (0.14)	0.26 (0.12)
Absent	Absent	0.33 (0.10)	0.16 (0.08)

Note: Standard deviation is shown in parentheses. Purchase Intention (%): percentage of participants who clicked the purchase button. Actual Purchase Behavior (%): percentage of participants who reported buying the product).

The results of the analysis of variance indicate that visual signals have a significant effect on both consumers' purchase intention and actual purchasing behavior ($F(1,115) = 26.34$, $p < 0.001$, $\eta^2 = 0.19$ and $F(1,115) = 18.72$, $p < 0.001$, $\eta^2 = 0.14$), explaining 19% and 14% of the variation in consumers' purchase intention and actual purchasing behavior, respectively. Specifically, when visual signals are present, consumers' purchase intention and actual purchasing behavior are higher than when visual signals are absent. Similarly, auditory signals have a significant effect on both consumers' purchase intention and actual purchasing behavior ($F(1,115) = 24.56$, $p < 0.001$, $\eta^2 = 0.18$ and $F(1,115) = 16.84$, $p < 0.001$, $\eta^2 = 0.13$), explaining 18% and 13% of the variation in consumers' purchase intention and actual purchasing behavior, respectively. Specifically, when auditory signals are present, consumers' purchase intention and actual purchasing behavior are higher than when auditory signals are absent.

Importantly, there is a significant interaction effect between visual and auditory signals, which has a significant effect on both consumers' purchase intention and actual purchasing behavior ($F(1,115) = 32.48$, $p < 0.001$, $\eta^2 = 0.22$ and $F(1,115) = 28.16$, $p < 0.001$, $\eta^2 = 0.20$), explaining 22% and 20% of the variation in consumers' purchase intention and actual purchasing behavior, respectively. Figures 2 and 3 show the effects of the interactive effect of audio-visual signals on consumers' purchase intention and actual purchasing behavior.

In Figures 2 and 3, it can be observed that consumers' purchase intention and actual purchasing behavior are highest when visual and auditory signals are mutually consistent, and lowest when they are mutually conflicting. When either the visual or auditory signal is absent, consumers' purchase intention and actual purchasing behavior are between the two extremes. These results support Hypothesis 1a and Hypothesis 1b of this study.

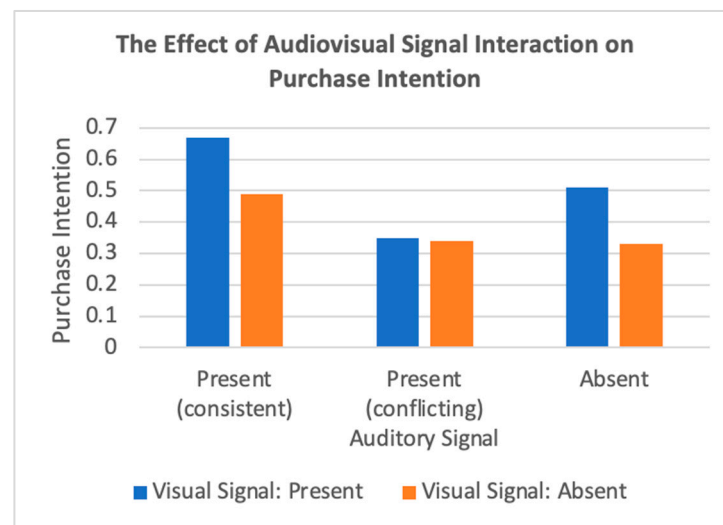


Figure 2. The effect of audio-visual signal interactive effect on consumers' purchase intention.

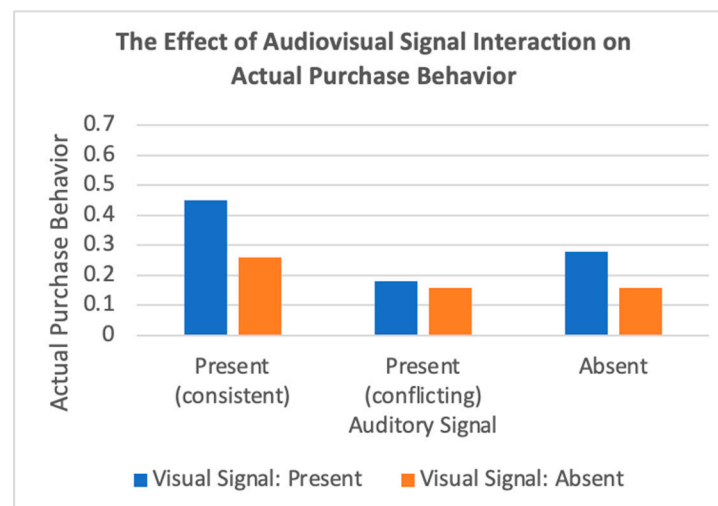


Figure 3. The effect of audio-visual signal interactive effect on consumers' actual purchasing behavior.

This study used regression analysis to test the role of the AISAS model in explaining the effects of audio-visual signal interactive effects on consumers' purchasing behavior. The AISAS model includes five stages: Attention, Interest, Search, Action, and Share. The Attention stage refers to the participant's attention to a product or service, and this study used the time spent by the participant on the webpage as a measure. The Interest stage refers to the participant's interest in a product or service, and this study used the participant's evaluation of the product or service as a measure. The Search stage refers to the participant's search for relevant product or service information, and this study used the number of times the participant clicked on other links on the webpage as a measure. The Action stage refers to the participant's purchase or reservation of a product or service, and this study used the proportion of participants who chose the purchase button as a measure. The Share stage refers to the participant's sharing of their purchase experience or evaluation with others, and this study used the proportion of participants who chose the share button as a measure. Table 3 displays the mean and standard deviation of the responses of the AISAS model's different stages under different audio-visual signal combinations.

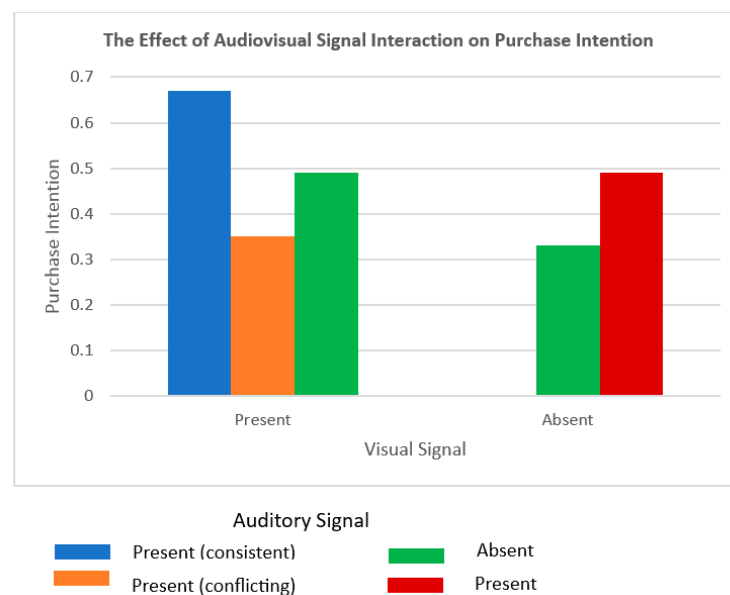
Table 3. Responses of different stages of the AISAS Model under different audio-visual signal combinations.

Visual Signal	Auditory Signal	Attention	Interest	Search	Action	Share
Present	Present (consistent)	15.6 (3.2)	4.2 (0.8)	3.4 (1.2)	0.67 (0.12)	0.55 (0.13)
Present	Present (conflicting)	9.8 (2.9)	2.6 (0.9)	1.6 (1.0)	0.35 (0.11)	0.21 (0.10)
Present	Absent	12.4 (3.1)	3.4 (0.7)	2.4 (1.1)	0.51 (0.13)	0.38 (0.12)
Absent	Present	11.6 (3.0)	3.2 (0.8)	2.2 (1.0)	0.49 (0.14)	0.35 (0.11)
Absent	Absent	8.2 (2.8)	2.2 (0.7)	1.2 (0.9)	0.33 (0.10)	0.18 (0.09)

Note: Standard deviation is shown in parentheses. Interest: average score on a five-point Likert scale.

The regression analysis results indicate that audio-visual signal interactive effects have a significant impact on consumers' responses at each stage of the AISAS model: $\beta = 0.32$, $p < 0.001$ (Attention), $\beta = 0.28$, $p < 0.001$ (Interest), $\beta = 0.26$, $p < 0.001$ (Search), $\beta = 0.22$, $p < 0.001$ (Action), $\beta = 0.24$, $p < 0.001$ (Share). These results support Hypothesis 2a of this study. Furthermore, consumers' responses at each stage of the AISAS model also have a significant impact on their purchase intention and actual purchasing behavior: $\beta = 0.34$, $p < 0.001$ (Attention), $\beta = 0.31$, $p < 0.001$ (Interest), $\beta = 0.29$, $p < 0.001$ (Search), $\beta = 0.27$, $p < 0.001$ (Action), $\beta = 0.25$, $p < 0.001$ (Share). These results support Hypothesis 2b of this study.

Figures 4 and 5 show the role of the AISAS model in explaining the effects of audio-visual signal interactive effects on consumers' purchasing behavior.

**Figure 4.** The influence of the AISAS model on consumer purchase intention.

From Figures 4 and 5, it can be seen that the AISAS model can effectively explain the effects of audio-visual signal interactive effects on consumers' purchasing behavior. When the visual and auditory signals are consistent with each other, consumers' responses at each stage of the AISAS model are the strongest, resulting in the highest purchase intention and actual purchasing behavior. When both visual and auditory signals are absent, consumers' responses at each stage of the AISAS model are the weakest, resulting in the lowest purchase intention and actual purchasing behavior. When either the visual or auditory signal is missing or conflicting, consumers' responses at each stage of the AISAS model are somewhere between the two extremes, resulting in moderate purchase intention and actual purchasing behavior. This conclusion is also in line with the theoretical model

of the AISAS model, which assumes that consumers need visual and auditory stimuli to attract their attention and interest, and to search for information about a product or service, and without these stimuli, consumers are less likely to take action or share their experience with others.

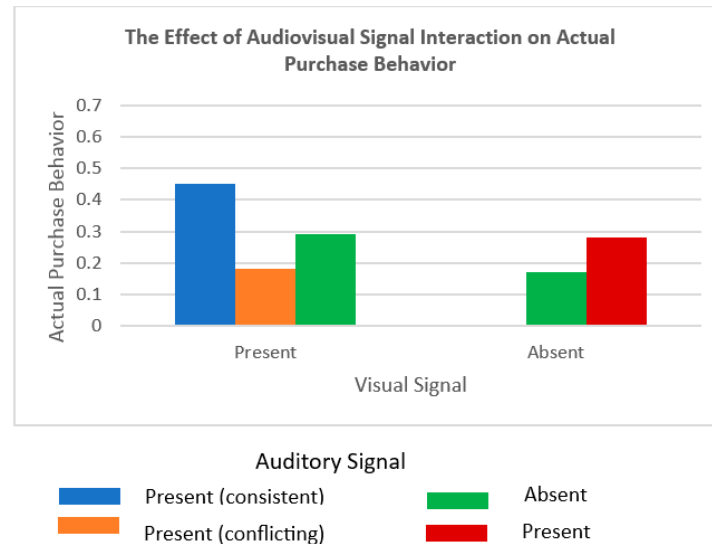


Figure 5. The effect of the AISAS model on consumers' actual purchase behavior.

6. Discussions and Conclusions

This study aimed to investigate the effects of the interaction between visual and auditory signals on consumer purchasing behavior, as well as the role of the AISAS model in explaining this effect. The results of the experiment supported the hypotheses and revealed some interesting findings.

First, the interaction between visual and auditory signals had a significant impact on both consumers' purchase intention and actual purchasing behavior, and there was a significant positive relationship between them. Specifically, when visual and auditory signals were mutually consistent, consumers had the highest purchase intention and actual purchasing behavior; when both visual and auditory signals were absent, consumers had the lowest purchase intention and actual purchasing behavior; when either the visual or auditory signal was missing, consumers' purchase intention and actual purchasing behavior were between the two extremes. This finding suggests that consistent visual and auditory signals can enhance consumers' positive evaluation and response to a product, while conflicting or absent visual and auditory signals can reduce consumers' attraction and motivation for a product. This finding is consistent with previous studies on cross-modal interaction effects, which indicate that sensory stimuli can interact or enhance each other, changing consumers' perceptions and behavior.

Second, the AISAS model explained well the effects of the interaction between visual and auditory signals on consumer purchasing behavior. The results showed that the interaction between visual and auditory signals had a significant impact on consumers' reactions in each stage of the AISAS model, namely Attention, Interest, Search, Action, and Share. Moreover, consumers' reactions in each stage of the AISAS model had a significant impact on their purchase intention and actual purchasing behavior. This finding suggests that the AISAS model can capture the complex processes of consumer decision making in multi-sensory environments, and provide a comprehensive and systematic analysis framework. This finding is consistent with previous studies on the AISAS model, which indicate that the AISAS model is a useful tool for understanding consumer behavior in online marketing.

This study contributes to the existing literature in several ways. First and most importantly, it expands the research scope of sensory marketing from single-sensory stimulation

to multi-sensory stimulation, from static stimulation to dynamic stimulation, and from the physical environment to the online environment. Second, this study adopts the AISAS model as a theoretical framework, integrating sensory stimulation with the consumer purchasing process, providing a more comprehensive and systematic analysis approach. Third, this study not only examines the effects of sensory stimulation on consumer purchase intention, but also examines its effects on actual purchasing behavior, filling an important gap in the existing literature.

This study also has some practical implications for marketing strategies. This study suggests that companies should pay attention to the interaction effects between visual and auditory signals when designing their online marketing materials, such as webpages, videos, or advertisements. By using consistent visual and auditory signals that convey positive product information or emotions, companies can increase consumers' attraction and motivation toward their products, thus enhancing their purchase intention and actual purchasing behavior. This study also suggests that companies should apply the AISAS model to guide their online marketing communication content and structure. By stimulating consumers' attention, interest, search, action, and share reactions at each stage of the purchasing process, companies can improve their customer relationship management and market performance.

This study also has some limitations that need to be acknowledged. This study only used four types of products as experimental materials, which may limit the generalizability of the results. Future studies could use more diverse types of products or services to test the robustness of the findings. In addition, this study only manipulated two types of sensory signals: visual and auditory. Future studies could include other types of sensory signals, such as olfactory, gustatory, or tactile signals, to explore their interaction effects on consumer purchasing behavior. Third, this study only measured consumers' purchase intention and actual purchasing behavior as dependent variables. Future studies could measure other variables related to consumer purchasing behavior, such as satisfaction, loyalty, or word of mouth.

In conclusion, this study explored the impact of the interaction effect between visual and auditory signals on consumer purchase behavior based on the AISAS model. The results showed that consistent visual and auditory signals can increase consumers' purchase intention and actual purchasing behavior, while conflicting or absent visual and auditory signals can decrease them. The results also showed that the AISAS model can explain well the impact of visual and auditory signal interaction effects on consumer purchase behavior. This study provides a new perspective for understanding consumers' decision-making processes in multi-sensory environments and offers valuable insights for developing marketing strategies.

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