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The Effects of Artificial Agents (AA)

on Consumer Attitudes:

Resisting AA recommendation in symbolic consumption

인공지능이 소비자 태도에 미치는 영향:

인공지능의 상징적 제품 추천에 대한 소비자의 저항을 중심으로

2019년 2월

서울대학교 대학원

경영학과 경영학 전공

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ABSTRACT

The Effects of Artificial Agents (AA) on Consumer Attitudes:

Resisting AA recommendation in symbolic consumption

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Using a new product necessarily entails risk, which can cause resistance to adoption. A marketing recommendation system may decrease the psychological risk associated with purchases by guiding the decision-making process to be more efficient for the consumer. Artificial agents (AAs) have been becoming smarter and, currently, are widely applied to various recommendation systems. For example, even while one is browsing on Facebook, AAs recommend products that one may like based on a customized analysis of personal interests. However, do people always love to adopt the smart AA recommendations? The obvious answer is that they do not. In this research, we seek to answer the fundamental question of why people are reluctant to accept artificial intelligence (AI) recommendations. Specifically, we expected that people are reluctant to accept recommendations from AA where the recommended products or services are imbued with personal identity. Because identity-related symbolic consumption is perceived as a uniquely human area, AI intervention can cause consumers to experience feelings of discomfort. In eight lab experiments and one field experiment, we consistently found that consumers were reluctant to accept a recommendation from an AA when the recommended product or service was based in a uniquely human area and where

meaning and human identity was attached and considered a critical factor in the purchase. This effect was further explained by demonstrating, through serial mediation, consumers' need for distinctiveness; if this distinctiveness is threatened, consumers tend to feel discomfort.

Student Number: 2014-30167

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1. INTRODUCTION

Are artificial agents (AAs) a threat to humans, or a cooperative partner? Do AAs threaten human uniqueness, or help humans obtain greater happiness? Recently, AAs have held the spotlight in a number of diverse research areas, but have received very little attention from the field of marketing. This does not mean that AAs are a less important issue for marketing; on the contrary, AAs are applied in marketing much more than one might imagine. Even now, when people browse the various apps on their smartphones, AAs constantly recommend products or services they might like. For example, from recommending routes to help users get from point A to B, new television shows to watch on Netflix, or even potential new relationships to pursue in dating applications (apps), AAs consistently help consumers make decisions in their daily lives. However, the difference between the popularity of AA recommendations and their actual adoption by consumers should be distinguished. In other words, does the AA recommendation system always work successfully? We assume that, in some areas, consumers do not care about whether the recommendation agent is human or not; however, AA recommendations are not universally desirable in every situation. In specific fields, such as areas of symbolic consumption, where human uniqueness is highly reflected and possesses meaning beyond a tangible or physical presence, people might not always welcome the adoption of recommendations from a non-human entity.

Innovative Technology Solutions (ITS) surveyed 2,000 Americans to find out how consumers perceive AA recommendations. The survey evaluated consumer trust for seven types of AA-driven apps including global positioning system (GPS); television (TV) and music streaming; restaurant and bar; job search; dating; and news feed apps. Among these, the only category in which people trust AA-informed recommendations over the recommendations of their human friends is when it comes to GPS routes: 46% said they trust an AA's recommendation more than that of a friend. However, in the other six categories, people rely more on the recommendation of humans than of an

AA. From these survey results, we can conclude that, when it comes to functional aspects, such as those highlighted in GPS apps, people highly trust AA. In contrast, when uniquely human experience is related to the product or service, people's trust in AA decreases. This is nowhere more apparent than in dating apps, for which only 13% said they trust AA's recommendations more than those of a friend.

Further, some people experience fear—either conscious or unconscious—of the advancement of autonomous technology, as evidenced by the recent chaos following AlphaGo's defeat of the world's top human Go player, Lee Sedol. Thus, to defend human dignity, many people wish to protect the distinctiveness of uniquely human contributions. We expected that this type of unconscious fear can be reflected in the consumption context. To be specific, consumers may resist suggestions from non-human entities, such as AAs, especially in the context of symbolic consumption, which is considered a uniquely human area. Thus, in this research, we will evaluate when people accept and reject recommendations from an AA and explore the underling mechanism that drives this decision.

2. THEORETICAL BACKGROUND

2.1 The Hallmark of Humanity is the Mind

The hallmark of humanity is the mind. Spanning a period from ancient history to early modern history, Aristotle (350 BC) and Descartes (1641) believed that only humans can have minds, and this belief has long been staunchly protected (Searle 1983). However, this firm belief is now being threatened. Modern technology has developed to allow for the creation of more and more humanlike entities (Breazeal and Scassellati 2002; Brooks 2002); as such, artificial humans are no longer locked in the realm of science fiction. Robots that are perhaps too humanlike are becoming more common, and some people feel discomfort about them. This feeling of discomfort may result not only from the humanlike appearance but also from the belief that only a human can possess a mind. As Gray and Wegner (2012) proved, this unnerving feeling by applying the concept of the "uncanny valley."

The concept of the "uncanny valley" was first suggested by Mori (1970), who insisted that a robot with too humanlike an appearance will become unnerving after a point. At first, the robot will inspire a positive response from a human (i.e., a certain liking of the robot), but this liking will dip once the robot becomes too humanlike (see Figure 1). The uncanny valley has captured many researchers' and laypeople's interest (Wayne and Pasternack 2011), and there is empirically supported evidence that this valley does exist (Hanson et al. 2005; Ho, MacDorman, and Pramono 2008; Saygin, et al. 2011).

However, there are conflicting accounts about why the uncanny valley exists. Some researchers insist that a humanlike robot is uncanny because it reminds people of dead body (MacDorman and Ishiguro 2006). Another reason a robot is uncanny may be abnormal facial features (Seyama and Nagayama 2007). Yet an even more fundamental reason may be that humanlike robots could challenge the categorical distinctions between human and non-human entities (Ramey 2005). To illustrate, Kaplan (2004) insisted that the reason why we resist new technology is the fear that

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human uniqueness will be threatened, pushing us to redefine our existential self and the essence of humanness. MacDorman, Vadusevan, and Ho (2009) took it one step further by suggesting the possibility of creating perfect human replicas and exploring its effect on human existence. Note, however, that most of the previous literature only focused on unnerving feelings in terms of the humanlike appearance of robots, until Gray and Wegner (2012) suggested that the uncanny feeling actually arises because the humanlike robot prompts the attribution of a mind. When a robot is perceived to have its own mind, people feel unnerved. Similarly, a human may be seen as strange (and may even be called "robotic) when the mind—or rational self—is removed from emotion. Gray and Wegner (2012) concluded that what makes us human is having a mind, and this is what distinguishes us from non-human entities.
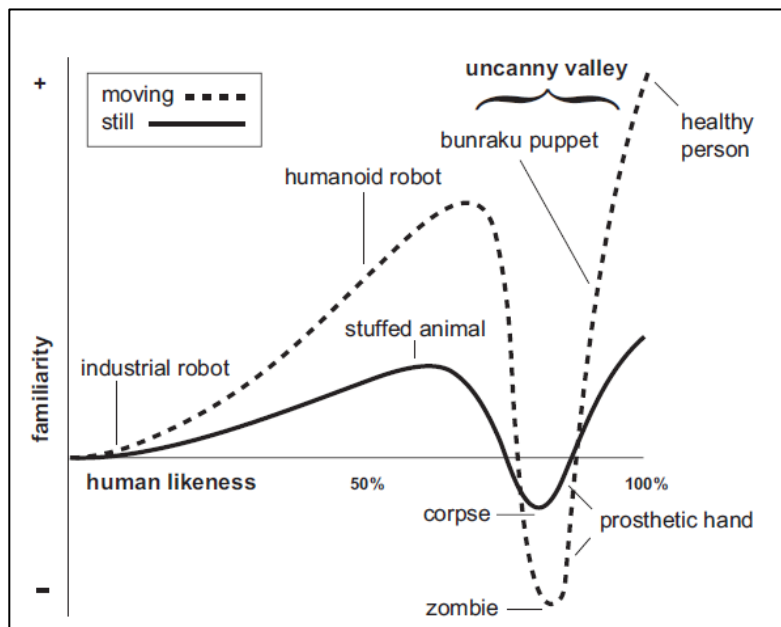
FIGURE 1 Graph of the relationship between human likeness and perceived familiarity (Mori, 1970)

2.2 Search for Symbolic Meaning in Symbolic Consumption

What, then, is a human mind? The essentiality of the human mind exists in the search for symbolic meaning, which is considered fundamental to human existence. To accomplish the existential self by adopting the perspective that the self emerges from emptiness or nothingness, it is essential that we persistently fill up this emptiness with search for meaning, which finally constitute a symbolic self (Watsuji in Odin 1996; Satre 1998). Thus, the pursuit of symbolic meaning is vital to the essence of creation, persistence and communication between the self and the world (Wattanasuwan 2005).

"The bond of symbolic possession is an internal bond of being" (Sartre, 1998, p. 588). This sentence expresses symbolic consumption well. We come to know who we are through symbolic possession. We obtain, produce, endure, and represent a sense of existential self by expressing our symbolic possessions. This is because we believe symbolic consumption can create meaning beyond the physical world.

Because of the close relationship between searching for meaning and symbolic consumption, consumers regard products having symbolic meaning as a part of themselves; symbolically, the self extends into possessions (Csikszentmihalyi and Rochberg-Halton 1981). This is why symbolic meaning embedded in a product may greatly affect its acquirement process and use (Wattanasuwan 2005). For instance, the decision to buy a wearable item such as jewelry may be influenced by the symbolic meaning attached to which can be considered as more critical factor compared to physical value of the jewelry given configuration of the tangible features. This symbolic meaning is not only important for the users but also observers who recognize the symbolic goods. Further, the symbolic meaning imbedded in the product may overwhelm its technical performance as a critical factor of consumption.

This is particularly likely if the product is often utilized as a means to signal self-identity, social position, and/or overall symbolic image (Wattanasuwan 2005). First, symbolic meaning–

imbued consumption may portray essences of the consumer's own identity (Kleine, Kleine, and Allen 1995). For example, using recycled paper may represent the sentiment "I care about the environment"; purchasing products supporting lesbian, gay, bisexual, transgender (LGBT) rights could signal "I am an open-minded person"; or purchasing consumption goods while on sales promotion may express "I am a smart consumer." In addition, one's social class can be signaled by what one wears. The luxury brands Rolex and Chanel, for example, can be considered as symbolic brands because wearing them can signal one's own social class or image to others. Further, symbolic consumption can indicate other symbolic images to others, such as stylish vs. simple; outgoing vs. subdued; exciting vs. calm; or educated vs. unintelligent (Bhat and Reddy 1998). Thus, by consuming symbolic brands, people fulfill their own symbolic meaning in different ways (Elliott and Wattanasuwan 1998). Nevertheless, this does not mean that a particular object embraces only a specific inherent meaning. An object may carry diverse meanings to different people because the creation of meaning is non-deterministic and multi-directional, and each person may confer unalike and dissimilar personal meanings to an object (Ritson, Elliott, and Eccles 1996).

2.3 Symbolic, Functional, and Hedonic Consumption

Besides symbolic consumption, functional (Bhat and Reddy 1998) and hedonic consumption (Hirschaman and Holbrook 1982) are the other two main consumption goals. Every brand has the main orientation of fulfilling consumption goals. For functional brands, the product must satisfy the practical need to maximize utility. For example, the brand Casio highlights a functional consumption goal because its main value lies in practicality (i.e., to tell the accurate time), solving specific and practical consumption problems. The goal for hedonic consumption is providing an affective and sensory practice of aesthetic or fleshly and myopic fun and pleasure. The decision to buy a product in this brand category is not mainly logical or objective but is instead based on feeling; rather than functionality, it is based mainly on emotions. In summary, hedonic consumption denotes the purchase of a product for the "sensation derived from the experience of using the products," on the other hand, functional or utilitarian consumption satisfies consumers derive from "the functions performed by the products" (Voss, Spangenberg, and Grohmann 2003, p. 310). It seems complex, but one thing is clear: for both functional and hedonic consumption, the search for symbolic meaning is not a critical factor in purchase decision-making process (Park, Jaworski, and MacInnis 1986).

2.4 Threat to Human Distinctiveness

The "threat to distinctiveness" hypothesis (Jetten, Spears, and Manstead 1996), like the uncanny valley theory, tries to solve the question of why robots that have an appearance that is too humanlike or anthropomorphic appear threatening. However, its approach is based more on the social psychology examining the responses of threat to distinctiveness in intergroup relations. The research stream of social identity theory (Tajfel and Turner 1979) has demonstrated that people perceive their social membership as unique and different from that of other groups (Tajfel and Turner 1979; Brewer 1991). The concerns arise when the clarity of a group's identity is threatened and challenged by blurry intergroup boundaries. One way to manage this threat is to reestablish a group's uniqueness by determining the aspects of the group that distinguish it from other groups (Jetten, Spears, and Manstead 1996; 1997).

A similar process creates need for human distinctiveness in relations between humans and social robots. In the computers-are-social-actors (CASA) framework, people perceive the robot as a genuine social agent whose social interaction is in the same level of real human agent (Reeves and Nass 1996; Krämer, Pütten, and Eimler 2012). Thus, in this research stream, robots represent a comparable group for humans (Haslam 2006; Vaes et al. 2012). Robots, although created by humans, are considered a new entity that are comparable to humans in appearance. Anthropomorphic robots, for example androids, have been perceived to be even more threatening than are humanoids, as their humanlike appearance undermines the distinction between humans and mechanical agents (Ferrari, Paladino, and Jetten 2016, see Figure 2). Along these lines, recent research has indicated that social robots are met greater resistance because they present challenges in the area of symbolic meaning. According to Enz, et al. (2011), participants in their survey responded in a more negative way when given a fictitious scenario that describes robots as having equal rights to humans, being qualified to have protection through human laws (e.g., basic liberties, freedom of expression, or electoral law), or

being qualified to take on the role of educating children.

FIGURE 2. The android on the left, named Geminoid DK, was developed by Kokoro for Aalborg University in northern Denmark; the humanoid on the right, named HRP-4, was developed by AIST and Kawasaky Heavy Industries (Ferrari, Paladino, and Jetten 2016).

2.5 Artificial Intelligence as an Agent with Autonomy

The development of full artificial intelligence could spell the end of the human race.

– Stephen Hawking (2015)

We are summoning the demon.

– Elon Musk (2015)

The above two quotes about AI come from an erudite scholar and a famous businessman. People commonly depict the future as it appears in films such as *Terminator* and *The Matrix,* where humans must fight against demonized AI and technology that aims to dominate and manipulate the human minds that created it. In spite of this fear, technology has continued to develop, enabling humans to create robots and other forms of AI. AI is often referred to as ''AA'' by researchers to highlight its autonomy as an agent (Cohen and Levesque 1995; Floridi and Sanders 2004; Russel and Novig 2016) and can be defined as ''a nonhuman entity that is autonomous, interacts with its environment and adapts itself as a function of its internal state and its interaction with the environment'' (Grodzinsky, Miller, and Wolf 2011). AAs are spread out on diverse platforms and utilized in applications to support human decision making. Especially in the consumer decision-making process, AAs are increasingly incorporated in the recommendation system by suggesting products and services. Even in the medical field, IBM's Watson has been proven superior to human doctors in diagnosing certain diseases, including skin cancer (Esteva et al. 2017; Leachman and Merlino 2017; McFarland 2016).

Despite the attractions of this advanced technology, interacting with AAs is still not universally welcome. In previous research into human–robot interaction (HRI), researchers have explored people's responses to autonomous and intelligent technology. The factors affecting the acceptance of autonomous technology include trustworthiness (Lewandowsky, Mundy, Tan 2000),

degree of controllability (Jameson and Schwarzkopf 2002), the transparency of the system (i.e., having the robot's actions explained) (Kim and Hinds 2006), robots' prior experience interacting with humans (Kirchbuchner et al. 2015), and sharing driving goals and information (Verberne, Ham, Midden 2012). Recently, Złotowski, Yogeeswaran, and Bartneck (2017) conducted research by presenting an autonomous machine that posed a threat to human identity. However, it is noteworthy that the research of Złotowski et al. (2017) approached the question only through the lens of social psychology. Still, none of the above studies have addressed how people respond to suggestions from autonomous machines (i.e., AAs), especially in the consumption decision–making context.

2.6 Social Power and Autonomy

According to Galinsky, Rucker, and Magee (2015), personal autonomy depends on one's level of social power. Those with higher social power can enjoy greater autonomy. In psychology literature, social power is defined as "asymmetric control over valued resources in a social relationship" (Magee and Glinsky 2008), and this can be applied in the context of HRI, where robots are considered social agents because interaction with humans is possible. If a robot has autonomy (i.e., is an AA), humans may have less control over them. Norman (1994) suggested that the high autonomy of AAs can induce negative emotions. Consider, for example, the implications of a home being controlled by AAs, news articles people should read being selected by AAs, the priority of daily emails—including which to respond to and delete—being determined by AAs, and scheduling being done by AAs. People may feel discomfort when AA appears to have control over them.

Robots are created to serve humans to make our lives more efficient and successful. Assistance in coping with our busy lives is welcomed only if the control is in the hands of a human. However, autonomous machines make their own decisions, signaling that they may threaten the hierarchy of social power. When people meet unpredictable factors, such as an autonomous AA, their confidence about their social power to control the environment is reduced (Landau, Kay, and Whitson, 2015). Indeed, people may perceive autonomous robots as threatening their power and control over technology. Because power cues are often unconsciously understood and subjectively perceived power (rather than objective power) is often more influential, it is not difficult for people to believe their control over AAs may fail. Thus, in present study, we will analyze how autonomy-imbedded AAs, which are different from other robots in that they enjoy greater autonomy, are accepted in a consumption context, especially with regard to recommendation AAs.

3. RESEARCH MODEL & HYPOTHESES

3.1 Hypotheses

Thus, in light of Gray and Wegner's research (2012), we proposed that if a non-human entity crosses the line by mimicking a human mind, people might feel discomfort as a result. Our predicted assumption can be applied to the marketing recommendation system used in the product or service. Especially in the area of symbolic consumption whose attached meaning is considered essential, we predict that, people are reluctant to accept the recommendation from AA. In other words, it is plausible that for symbolic consumption where considered as uniquely human area of individual identity is imbued, recommendations from AA may not be adopted smoothly. However, for functional brands, there is no reason to hesitate to accept recommendations from smart AA. Based on the literature review, we developed the following research hypotheses and research model is developed (see Figure 3).

> **H1** : For symbolic consumption, consumers will show higher product liking when it is recommended by a human (vs. AA).
>
> **H2** : The proposed effect of product liking in H1 will be serially mediated via discomfort increased by undermining distinctive human capacity.

3.2 Research Model
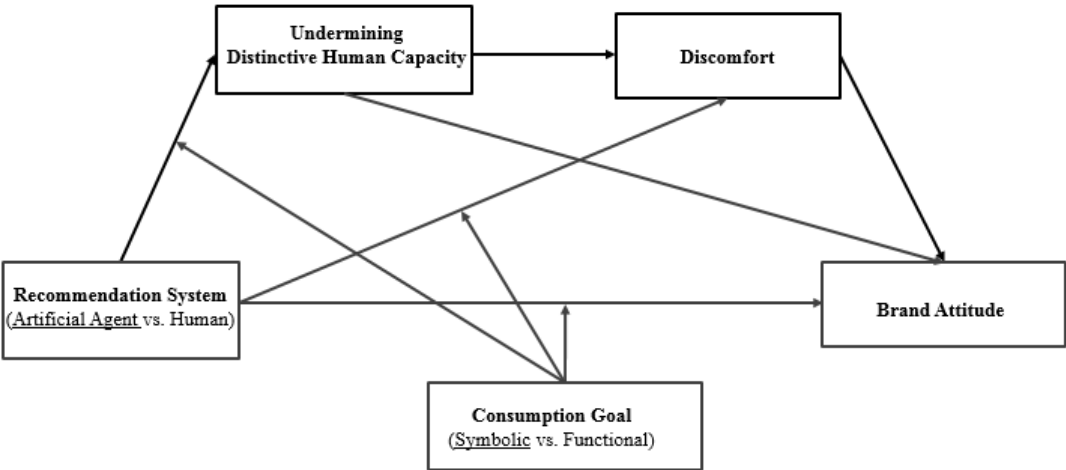
FIGURE 3 Conceptual model for the interaction effect between recommendation agent and consumption goal on product liking and serial mediation effect of undermining distinctive human capacity and discomfort on product liking

4. EMPIRICAL STUDIES

4.1 Study Overview

We explored our hypotheses via eight lab experiments and one field study. The primary objective of Study 1 (cosmetic context) and Study 2 (automobile context) was to examine consumers' product preferences based on the type of recommendation agent and consumption goal. Study 3 focused on finding the underlying mechanism to explain consumers' resistance to AA recommendations by replicating the effects explored in Study 2. Study 4 employed another consumption goal type as hedonic as well as symbolic and functional goals. Study 5 explores the serial mediation of increased discomfort from undermining the uniquely human capacity. In Study 6, we demonstrated that consumers' resistance to the recommendation agent is an AA-specific result by comparing the control condition with a simple recommendation system. To increase the strength of our propositions, we conducted two more lab experiments by providing extra information that the AA recommendation is based on human data (Study 7) and manipulating the consumption situation in a high-complexity condition to consider multiple alternatives (Study 8). Finally, the results explored in the lab experiments were applied in a real consumption environment in the field experiment.

4.2 Study 1: Symbolic Cosmetic Consumption

The primary objective of Study 1 was to examine how the recommendation system affects consumers' product preferences based on the consumption goal. Since the symbolic consumption domain reflects a unique human ability, people might not want a non-human entity to influence their consumption decisions. Thus, we predicted that consumers reluctantly accept recommendations from an AA when a symbolic consumption goal is pursued.

Method

A total of 172 female undergraduates in Korea (M_{age} = 23.84, SD = 3.13) participated in an online experiment using Qualtrics software. The participants were randomly assigned to one of four conditions in a 2 (recommendation agent: AA vs. human) × 2 (consumption goal: symbolic vs. functional) between participants design. For this study, the consumption goals were introduced in a cosmetic consumption context being manipulated as types of cosmetics to purchase. Color cosmetics (e.g., color lipstick, cheek blusher, and eye makeup) were presented for the symbolic consumption goal scenario and cosmetics such as toner, essence, and cream were described in the scenario for functional consumption goal. After being first exposed to one of the two types of cosmetic consumption goals, participants were then presented with recommendation scenario where recommendation agent is either from AA or from a human employee. The participants then completed three 7-point product liking scales to provide their perceptions of the cosmetics recommended by either AA or by a human agent depending on the consumption goals (1 = very negative, 7 = very positive; 1 = very bad, 7 = very good; 1 = unfavorable, 7 = favorable) (Batra and Ahtola 1991; Folkes and Kamins 1999). In addition, demographic information was collected.

Results and Discussion

Consumers' preference toward the product

A 2 (recommendation agent) × 2 (consumption goal) ANOVA on product likeness ($\alpha = .89$) as dependent variable revealed a significant two-way interaction ($F(1, 168) = 8.19, p = .004; p = .052$ for main effects of recommendation agent and $p = .105$ for consumption goal). Further, consistent with our hypotheses, the planned contrasts indicate that in the case of the symbolic consumption goal of color cosmetic scenario, participants liked the products recommended by human employee more than AA ($M_{\text{human}} = 5.75, SD = 0.78; M_{\text{AA}} = 5.01, SD = 1.07; t(168) = 6.30, p = .001$). However, there was no significant difference in product likeness depending on the agent types ($M_{\text{human}} = 5.56, SD = 0.92; M_{\text{AA}} = 5.70, SD = 1.16; t(168) = 0.66, p = .508$) for the functional cosmetics (see Figure 4), supporting hypothesis 1.
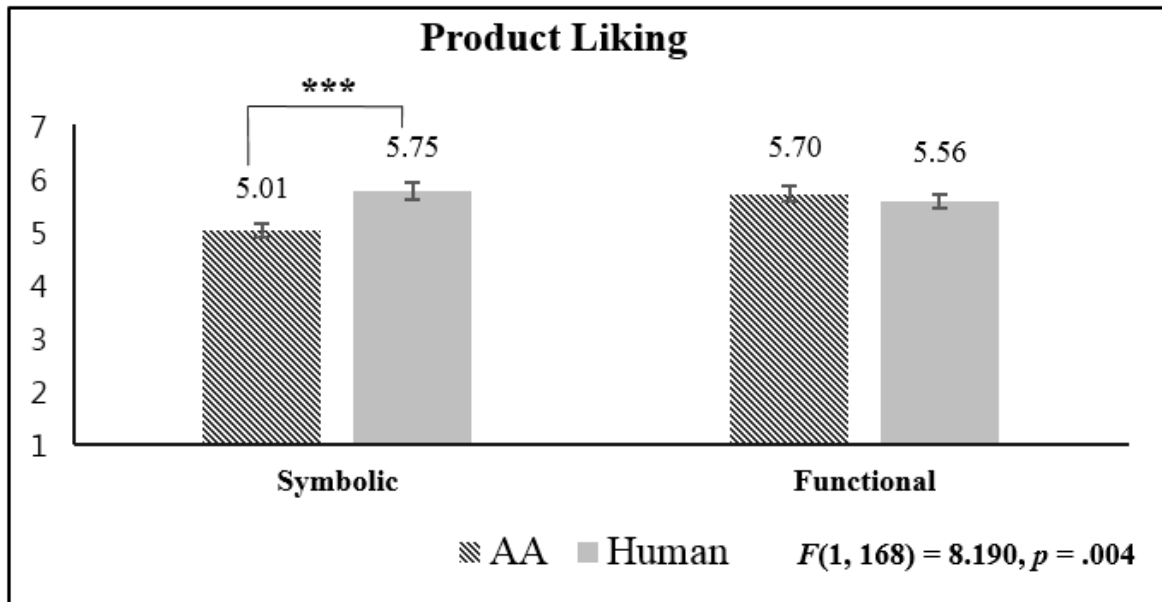

FIGURE 4   Interaction effect of recommendation agent and consumption goal type on product liking in cosmetic context (Study 1)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

4.3 Study 2: Automobile Consumption Context

Study 2 was designed to replicate the results demonstrated in Study 1 in an automobile consumption context, and two types of consumption goals were manipulated accordingly (adapted from Bhat and Reddy, 1998). In the symbolic consumption scenario, the consumption goal was instructed to reflect one's own identity, but in the functional consumption goal, the practical needs were highlighted as critical factors when purchasing an automobile.

Method

An online experiment was set up with 139 undergraduates in Korea as participants (73 female, M_{age} = 24.70, SD = 3.18). The participants were randomly assigned to one of four conditions in a 2 (recommendation agent: AA vs. human) × 2 (consumption goal: symbolic vs. functional) between participants design. First, participants read a consumption goal scenario. For the symbolic consumption goal, participants were manipulated to purchase an automobile by reflecting their self-identity, symbolic image, and personality. On the other hand, the functional consumption goal scenario highlighted how functional needs are important when to purchase an automobile; economic utility such as fuel efficiency, practicality, functionality were emphasized in the scenario. After that, participants were randomly assigned to one of the two recommendation scenarios varying agent types either from an AA or human employee. Finally, participants reported their product likeness toward the recommended automobile and also provided demographic information.

Results and Discussion

Consumers' preference toward the product

A 2 (recommendation agent) × 2 (consumption goal) ANOVA on product likeness (α = .90) yielded a significant two-way interaction ($F(1, 135)$ = 8.36, p = .004; p = .565 for main effects of

recommendation agent and $p = .586$ for consumption goal). Further, the planned contrasts show that in the case of the symbolic consumption situation, participants liked an automobile recommended by a human agent compared to AA ($M_{human} = 5.42$, $SD = 0.95$; $M_{AA} = 4.73$, $SD = 1.43$; $t(135) = 2.40$, $p = .020$). However, participants didn't show any significantly different preference either the automobile is recommended by an human employee or AA ($M_{human} = 4.74$, $SD = 1.16$; $M_{AA} = 5.20$, $SD = 1.11$; $t(135) = 1.66$, $p = .102$) for the functional consumption goal was manipulated (see Figure 5), supporting hypothesis 1.

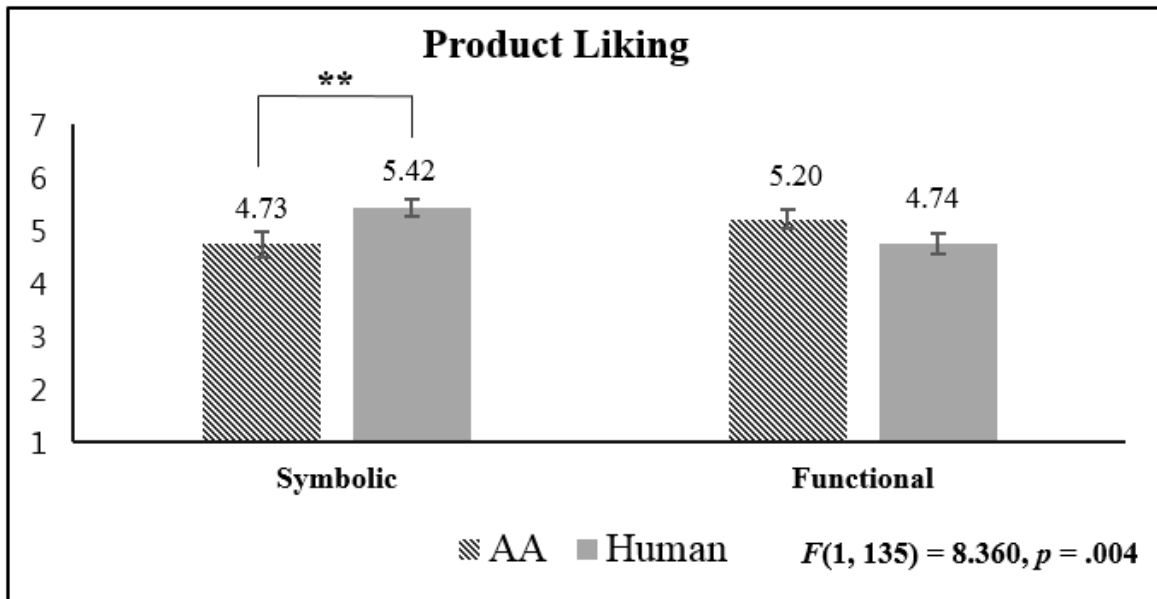
FIGURE 5 Interaction effect of recommendation agent and consumption goal type on product liking in automobile context (Study 2)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

4.4 Study 3: Underlying Mechanism of Discomfort

For the previous two studies, we recruited participants in Korea. To erase the limited results based on Korean participants, in Study 3 the hypotheses were tested with participants from the U.S. We followed the same study design as in Study 2, but additional scales were included to explain the reluctantly accepted recommendations, especially when symbolic consumption is manipulated. We predicted that increased consumer discomfort toward the recommendation agent would mediate consumers' resistance to the AA recommendation when a symbolic consumption goal is manipulated. Since symbolic consumption represents a uniquely human ability by reflecting individual identity with attached meaning, AA's intervention in this area can produce uncomfortable feelings for consumers. People are anxious about advanced technology and how it might become a threat to the human race. Thus, we expected that consumers' subconscious fears of advanced technology, reflected as AA in the scenario, would be captured as experiencing discomfort.

Method

We recruited 112 U.S. residents (64 female, M_{age} = 35.65, SD = 11.52) from Prolific Academic and randomly allotted them to one of four conditions in a 2 (recommendation agent: AA vs. Human) × 2 (consumption goal: symbolic vs. functional) between participants design. We followed the same procedure as in Study 2, but this study employed U.S. residents and, we additionally evaluated consumers' affective response while getting recommendation: "I felt uncomfortable," "I had unpleasant feeling," "I had an awkward feeling" on an 7-point scale (1= not at all, 7 = very much), adapted from Gray et al. 2012. As manipulation checks, both scenarios were tested. For the types of recommendation agents, participants were asked: "In this scenario a human employee recommended an automobile model," "In this scenario Artificial Agent recommended an automobile model" (1 = strongly disagree, 7 = strongly agree). For the manipulation check of consumption goal type,

participants indicated the importance of the following aspects of the automobile while purchase decision in the scenario. For functional consumption goal the manipulation checks included (1) product quality of the automobile, (2) economic efficiency of the automobile, (3) function of the automobile and for symbolic consumption goal ($\alpha = .85$) manipulation checks include (1) reflects self-identity, (2) reflects symbolic image, and (3) reflects one's personality" (1 = not at all important, 7 = very much important). Finally, demographic information was collected.

Results and Discussion

Manipulation Checks

A 2 × 2 ANOVA on the manipulation check for the types of recommendation agents showed that participants who read the scenario described with human employee recommendation marked higher scores on the first question ($M_{\text{human}} = 6.26$ versus $M_{\text{AA}} = 1.87$; $F(1, 108) = 230.15$, $p < .001$; No other effects were significant, $p > .07$) and the participants who read the scenario with AA recommendation indicated higher scores on the second question ($M_{\text{AA}} = 6.71$ versus $M_{\text{human}} = 1.89$; $F(1, 108) = 486.36$, $p < .001$, No other effects were significant, $p > .07$). Further, the same ANOVA for consumption goal type also confirmed that participants perceived the functional consumption goal scenario includes more functional aspects ($M_{\text{functional}} = 6.68$ versus $M_{\text{symbolic}} = 3.89$; $F(1, 108) = 218.40$, $p < .001$, No other effects were significant, $p > .07$) and the symbolic consumption goal scenario has more symbolic aspects ($M_{\text{symbolic}} = 4.88$ versus $M_{\text{functional}} = 2.66$; $F(1, 108) = 61.13$, $p < .001$, No other effects were significant, $p > .07$).

Consumers' preference toward the product

A 2 (recommendation agent) × 2 (consumption goal) ANOVA on product likeness ($\alpha = .93$) exposed a significant two-way interaction ($F(1, 108) = 4.03$, $p = .047$; $p = .221$ for main effects of recommendation agent and $p = .818$ for consumption goal). For the symbolic consumption situation

manipulated with identity related symbolic consumption, participants showed higher preference toward the product recommended by a human agent compared to AA (M_{human} = 6.01, SD = 0.97; M_{AA} = 5.36, SD = 1.15; $t(108)$ = 2.31, p = .023). However, there was no significant prefeerence difference between human and AA for the functional consumption goal was manipulated (M_{human} = 5.56, SD = 1.07; M_{AA} = 5.72, SD = 1.08; $t(108)$ = 0.54, p = .588, see Figure 6), supporting hypothesis 1.

Perceived discomfort

A 2 (service type) × 2 (brand biography) ANOVA on perceived discomfort (α = .91) produced significant two-way interaction ($F(1, 108)$ = 4.63, p = .034; p = .540 for main effects of recommendation agent and p = .626 for consumption goal). For the symbolic consumption, when the recommendation is suggested by an AA, it gained higher perceived discomfort than recommended by a human employee (M_{AA} = 2.54, SD = 1.65; M_{human} = 1.75, SD = 0.81; $t(108)$ = 4.07, p = .051), whereas there was no significantly different discomfort feelings between the AA and the human for the functional (M_{AA} = 2.06, SD = 1.66; M_{human} = 2.50, SD = 1.73; $t(108)$ = 1.08, p = .343).

Mediation analysis

To demonstrate whether perceived discomfort mediated the moderating effect of consumption goal on product likeness, we employed a bootstrapping analysis using the PROCESS 3.0 macro (model 8) with 5,000 resamples (Hayes 2017). The model uses type of recommendation agent as the independent variable (1 = AA, 0 = Human), consumption goal as the moderator (1 = symbolic, 0 = functional), perceived discomfort as the anticipated mediator, and product likeness as the dependent variable. The overall mediation outcome of perceived discomfort was found to be significant (95% CI = [−.64, −.10]). Further, the conditional indirect outcome of consumption goal on product likeness was only significant for the symbolic (95% CI = [−.36, −.01]), but not for the functional (95% CI = [−.04, .35]).
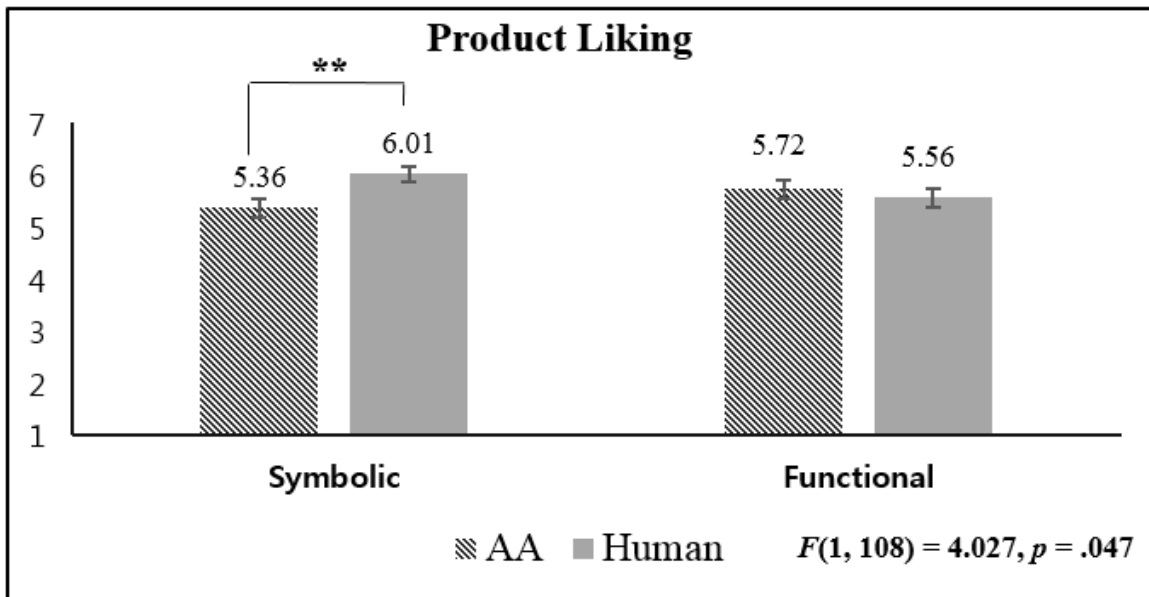
FIGURE 6   Interaction effect of recommendation agent and consumption goal type on product liking in automobile context (Study 3)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

4.5 Study 4: Symbolic vs. Functional vs. Hedonic Consumption Goals

Study 4 had two objectives. The first was to test our proposition in different consumption contexts. Study 1 examined cosmetics, and in Studies 2 and 3 the automobile consumption context was utilized to test our hypotheses. In Study 4, we wanted to replicate the results from previous studies in a wristwatch consumption context. The second objective was to examine consumers' resistance to AA recommendations as a unique pattern by incorporating a hedonic consumption goal in the study design. As discussed in the literature review, symbolic consumption is considered a uniquely human ability, as opposed to functional or even hedonic consumption; thus, we predicted that consumers may resist AA recommendations particularly when a symbolic consumption goal is manipulated.

Method

One hundred twenty U.S. participants (76 female, $M_{age} = 26.47$, $SD = 5.71$) were recruited via Prolific Academic and randomly assigned to one of six conditions in a 2 (recommendation agent: AA vs. Human) × 3 (consumption goal: symbolic vs. functional vs. hedonic) between participants design. We followed the same procedure as in Study 2, but this study employed consumption context as in the wrist watch and hedonic consumption goal is additionally explored. For the hedonic consumption goal, participants were manipulated to purchase a wrist watch bring pleasure, joy with trendy sensibility.

Results and Discussion

Consumers' preference toward the product

A 2 (recommendation agent) × 3 (consumption goal) ANOVA on product likeness ($\alpha = .84$) indicated a significant two-way interaction ($F(2, 114) = 3.16$, $p = .046$; $p = .479$ for main effects of recommendation agent and $p = .328$ for consumption goal). As we predicted only in the symbolic

consumption situation manipulated with meaning attached symbolic consumption, participants showed higher preference toward the wrist watch recommended by a human agent compared to AA (M_{human} = 5.09, SD = 1.08; M_{AA} = 4.47, SD = 1.07; $t(114)$ = 1.81, p =.074). However, there was no significant preference difference between human and AA for the functional consumption goal (M_{human} = 4.87, SD = 1.08; M_{AA} = 5.39, SD = 1.00; $t(114)$ = 1.60, p = .112) and hedonic consumption was manipulated (M_{human} = 5.08, SD = 1.10; M_{AA} = 4.77, SD = 1.07; $t(114)$ = 0.91, p = .364, see Figure 7).
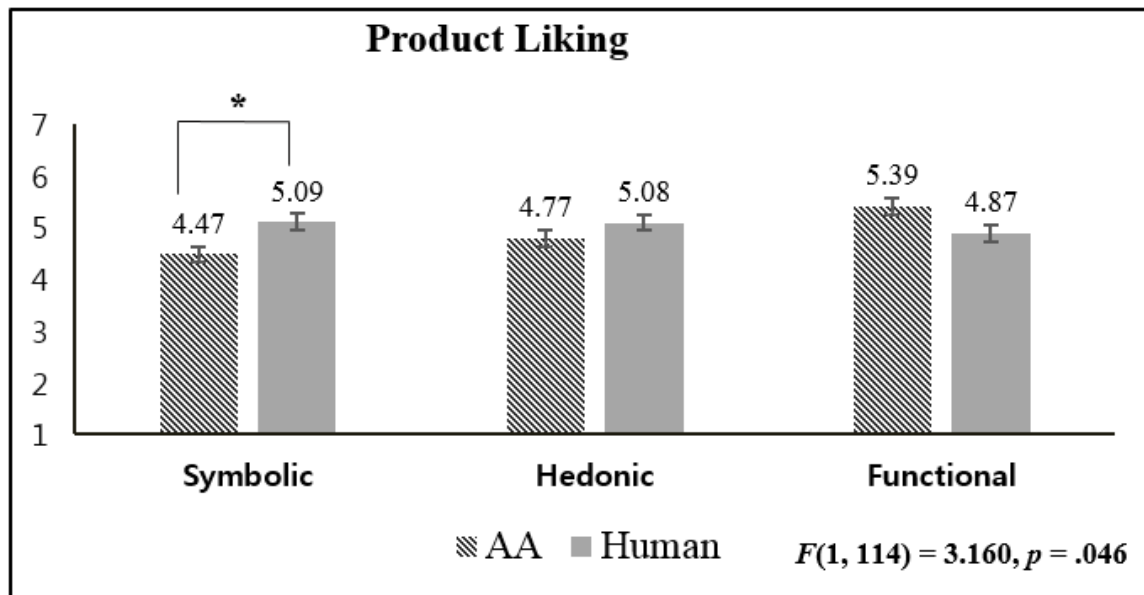

FIGURE 7 Interaction effect of recommendation agent and consumption goal type on product liking in wrist watch context (Study 4)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

4.6 Study 5: Serial Mediation Model

Two critical objectives were explored in Study 5. The first was to find and explain the fundamental underlying mechanism producing feelings of discomfort associated with AA recommendations in the symbolic consumption area. As discussed in the literature review, we expected discomfort to increase when people perceive that human distinctiveness is infringed upon. Thus, we proposed a serial mediation model to explain the process of interaction effects between the recommendation agent types and consumption goals. Specifically, we hypothesized that when a symbolic consumption goal is manipulated, participants will be less likely to adopt AA recommendations, and this effect will be serially mediated by undermining distinctive human capacities, resulting in perceived discomfort. Further, Study 5 aimed to demonstrate individual differences in perceiving AA recommendations. We expected people with robust human uniqueness beliefs to show stronger resistance to the AA recommendation. Thus, we additionally measured innate human uniqueness beliefs.

Method

One hundred and ninety U.S. participants (106 female, M_{age} = 27.04, SD = 4.93) were recruited via Prolific Academic and randomly given to one of four conditions in a 2 (recommendation agent: AA vs. Human) × 2 (consumption goal: symbolic vs. functional) between participants design. We followed the same procedure as in Study 2 in automobile consumption context, but to demonstrate serial mediation effect, we additionally measured undermining human capacity (adapted from Ferrari et al. 2016): "The recommendation system in the scenario makes the boundary of distinctive human capacity become increasingly flimsy" and discomfort feeling (adapted from Gray et al. 2012): "I felt uncomfortable," "I had unpleasant feeling," "I had an awkward feeling" in 7-point scale (1= not at all, 7 = very much). Furthermore, to demonstrate the individual difference in human uniqueness belief, we additionally evaluated consumers' human uniqueness belief (adapted from Kamide et al. 2012):

"Only human should have their own free will" (1= not at all, 7 = very much).

Results and Discussion

Consumers' preference toward the product

A 2 (recommendation agent) × 2 (consumption goal) ANOVA on product likeness (α = .89) indicated a significant two-way interaction ($F(1, 186) = 5.74$, $p = .018$; $p = .461$ for main effects of recommendation agent and $p = .382$ for consumption goal). As we predicted only in the symbolic consumption situation by highlighting the meaning attached to the product, participants showed higher preference toward the automobile recommended by a human agent compared to AA ($M_{human} = 5.48$, $SD = 1.05$; $M_{AA} = 4.98$, $SD = 1.09$; $t(186) = 2.21$, $p = .029$). However, there was no significant preference difference between human and AA for the functional consumption goal ($M_{human} = 5.24$, $SD = 1.18$; $M_{AA} = 5.50$, $SD = 1.07$; $t(186) = 1.18$, $p = .240$, see Figure 8).
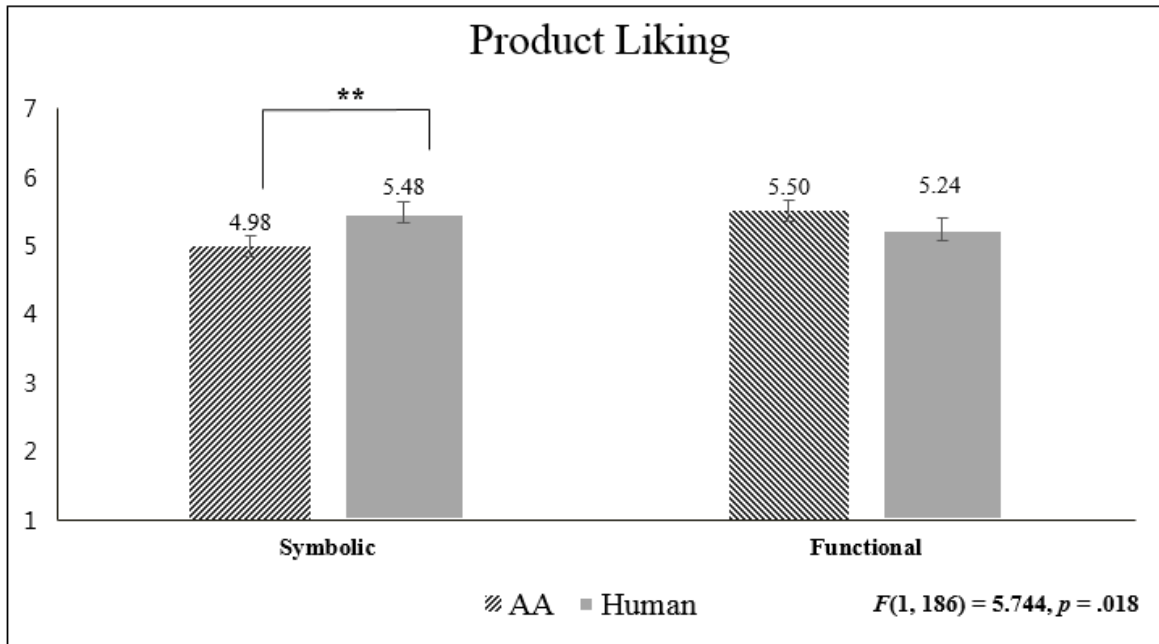

FIGURE 8   Interaction effect of recommendation agent and consumption goal type on product liking in automobile context (Study 5)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

Undermining distinctive human capacity

A 2 (service type) × 2 (brand biography) ANOVA on distinctive human capacity produced significant two-way interaction ($F(1, 186) = 5.60$, $p = .019$; $p = .001$ for main effects of recommendation agent and $p = .057$ for consumption goal). For the symbolic consumption, when the recommendation is suggested by an AA, participants felt it undermines distinctive human capacity compared to human employee recommendation situation ($M_{AA} = 4.25$, $SD = 1.73$; $M_{human} = 2.76$, $SD = 1.66$; $t(186) = 4.14$, $p < .001$). However, participants didn't show significant difference between AA and human employee in undermining distinctive human capacity score in functional consumption goal ($M_{AA} = 3.17$, $SD = 1.83$; $M_{human} = 2.88$, $SD = 1.75$; $t(186) = 0.82$, $p = .413$).

Perceived discomfort

A 2 (service type) × 2 (brand biography) ANOVA on perceived discomfort ($\alpha = .87$) produced significant two-way interaction ($F(1, 186) = 6.50$, $p = .012$; $p = .147$ for main effects of recommendation agent and $p = .052$ for consumption goal). For the symbolic consumption, when the recommendation is suggested by an AA, it gained higher perceived discomfort than recommended by a human employee ($M_{AA} = 3.17$, $SD = 1.65$; $M_{human} = 2.33$, $SD = 1.25$; $t(186) = 2.82$, $p = .005$), whereas there was no significantly different discomfort feelings between the AA and the human for the functional consumption goal is manipulated ($M_{AA} = 2.23$, $SD = 1.29$; $M_{human} = 2.46$, $SD = 1.55$; $t(186) = 0.78$, $p = .439$).

Mediation analysis

In order to examine whether undermining distinctive human capacity and perceived discomfort serially mediate the interaction effect of recommendation agent type and consumption goal on product likeness, a serial mediation analysis was performed using the PROCESS 3.0 macro (model 85) with 5,000 resamples (Hayes 2017). The model uses type of recommendation agent as the independent variable (1 = AA, 0 = Human), consumption goal as the moderator (1 = symbolic, 0 = functional), undermining human distinctive capacity and perceived discomfort as anticipated mediators, and

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product likeness as the dependent variable. The findings suggested an interaction effect of recommendation agent and consumption goal on product likeness was mediated serially via undermining human distinctive capacity and perceived discomfort (95% CI = [−.15, −.01]). Further, the conditional indirect outcome of consumption goal on product likeness was only significant for the symbolic (95% CI = [−.17, −.01]), but not for the functional (95% CI = [−.06, .02]).

Human Uniqueness Belief

There was a significant three way interaction between recommendation agent, consumption goal, and human uniqueness belief on product liking performed with the PROCESS 3.0 macro in model 3 (95% CI = [−.68, −.01]). We conducted a floodlight analysis to see at which level of human uniqueness belief ($M = 4.75$; $SD = 1.95$) the interaction become significant where in symbolic consumption goal is manipulated. Participants whose human uniqueness belief was 5.2 or higher showed greater resistant tendency toward AA recommendation compared to human employee recommendation. There was no interaction exist when functional consumption goal is manipulated (95% CI = [−.27, .19], see Figure 9).
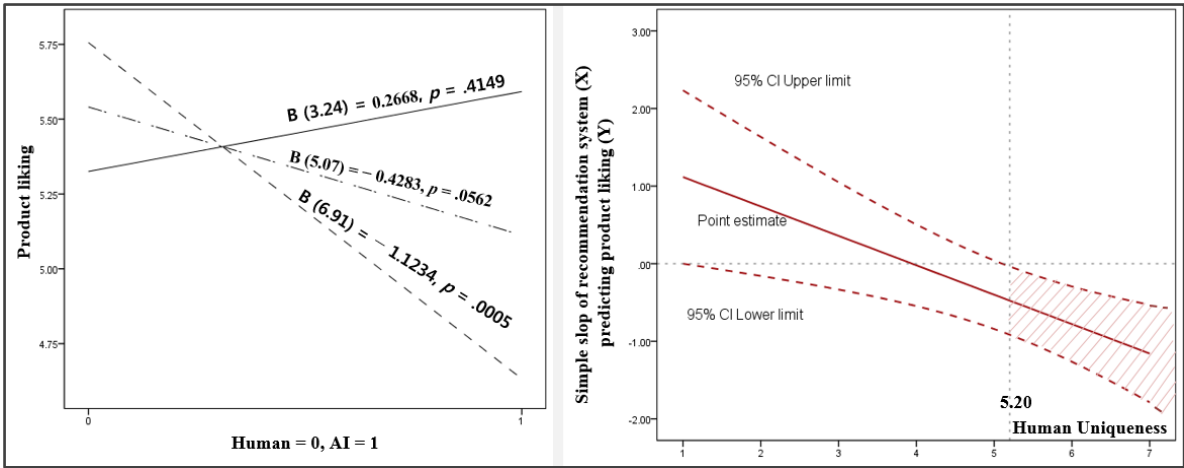

FIGURE 9   The results of floodlight analysis; participants whose human uniqueness belief was 5.2 or higher showed greater resistant tendency toward AA recommendation compared to human employee recommendation (Study 5).

4.7 Study 6: Artificial Agent Specific Results

Study 6 was designed to determine if consumers' resistance in the symbolic consumption area is an AA recommendation–specific result. We found consumers' negative responses to AA recommendations in the symbolic consumption area. However, it can be questioned that it is an AA-specific result when the recommendation agent is portrayed as an Artificial Agent with intelligence. When the recommendation system does not emphasize the Artificial Agent, we expect that consumers might not resist as strongly to the recommended products. The harsh judgments against AA and its recommendations might be amplified because of Artificial Agent–specific attributes in imbedded autonomy, the potential for growing beyond human control, and overwhelming human capacity. Thus, Study 6 includes a control condition described as a recommendation system without highlighting the intelligence of the Artificial Agent.

Method

Two hundred and twenty four U.S. participants (130 female, $M_{age} = 35.17$, $SD = 12.21$) were recruited via Prolific Academic and randomly given to one of six conditions in a 3 (recommendation agent: AA vs. Human vs. control) $\times$ 2 (consumption goal: symbolic vs. functional) between participants design. We followed the same procedure as in Study 3 in automobile consumption context but we additionally included control condition in the recommendation agent.

Results and Discussion

Consumers' preference toward the product

A 3 (recommendation agent) $\times$ 2 (consumption goal) ANOVA on product likeness ($\alpha = .89$) indicated a significant two-way interaction ($F(2, 218) = 6.85$, $p = .001$; $p = .007$ for main effects of recommendation agent and $p = .206$ for consumption goal). As we predicted in the symbolic

consumption situation where search for meaning is important, participants showed highest preference toward the automobile recommended by a human agent ($M = 5.55$, $SD = 0.95$) and control condition followed the second rank ($M = 5.21$, $SD = 1.05$). The participants least liked the automobile when it is recommended by the AA ($M = 4.55$, $SD = 1.13$), and the difference of human agent vs. control condition ($t(218) = 4.89$, $p < .001$) and control condition vs. AA was all significant ($M_{control}$ vs. M_{AA}, $t(218) = 3.09$, $p = .002$). However, there was no significant difference in preference of product ($M_{human} = 5.37$, $SD = 0.73$; $M_{control} = 5.05$, $SD = 0.88$; $M_{AA} = 5.37$, $SD = 0.81$) whether recommended either by human ($t(218) = 1.64$, $p = .106$) or control and control or AA ($t(218) = 1.63$, $p = .107$) in symbolic consumption condition (see Figure 10).
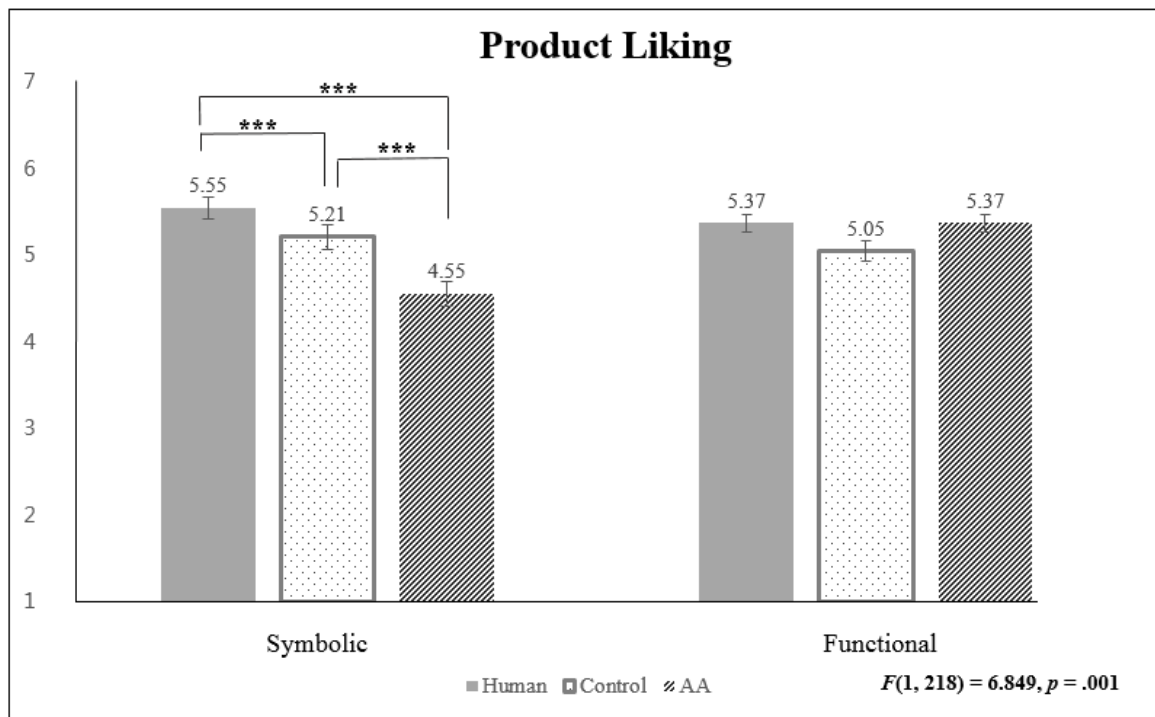

FIGURE 10 Interaction effect of recommendation agent and consumption goal type on product liking in automobile context, including control condition in recommendation system (Study 6)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

4.8 Study 7: Artificial Agent Recommendations Based on Human Data

In Study 7, we wanted to reinforce our proposition to explore consumers' perceptions of AA recommendations. By providing more specific information regarding the recommendation process and how the AA filters the data, we expected to find the underlying mechanism of why consumers are unlikely to adopt AA recommendations in a symbolic consumption area. Participants who are informed that the AA makes recommendations based on human data will resist AA recommendations more strongly. This is because the area of symbolic consumption is considered a uniquely human area where a non-human entity such as an Artificial Agent's intervention might be considered an unwelcome guest. Further, the analysis of human data by an AA can be perceived negatively.

Method

One hundred and seventy eight U.S. participants (109 female, M_{age} = 36.93, *SD* = 13.24) were recruited via Prolific Academic and randomly given to one of four conditions in a 2 (AA recommendation: human data vs. control) × 2 (consumption goal: symbolic vs. functional) between participants design. We followed the same procedure as in Study 3 in automobile consumption context but we only focused on AA condition by distinguishing giving extra information or not. To be specific in AA control condition, the same scenario utilized in Study 3 was presented to the participants, but AA condition with human data condition includes extra information that AA's suggestions are based on human data analysis.

Results and Discussion

Consumers' preference toward the product

A 2 (recommendation agent) × 2 (consumption goal) ANOVA on product likeness (α = .95) indicated a significant two-way interaction ($F(1, 174)$ = 5.69, p = .018; $p <$ .001 for both main effects of

recommendation agent and consumption goal). As we predicted that in the symbolic consumption situation by highlighting the meaning attached to the product, participants less likely to adopt AA recommendation especially when the product is suggested by analyzing human data ($M_{\text{human data}} = 4.78$, $SD = 1.05$; $M_{\text{control}} = 5.29$, $SD = 1.29$; $t(174) = 2.20$, $p = .030$). However, there was no significant preference difference between AA control condition and the condition with extra information is given ($M_{\text{human data}} = 6.01$, $SD = 0.88$; $M_{\text{control}} = 5.75$, $SD = 1.05$; $t(174) = 1.16$, $p = .247$, see Figure 11).
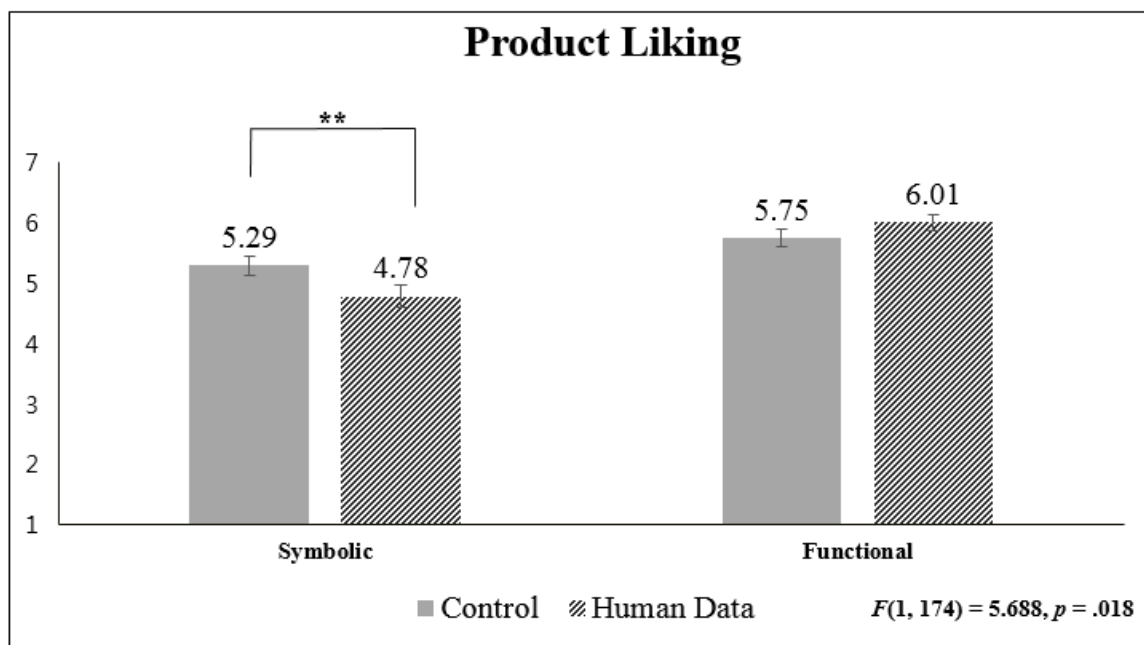

FIGURE 11   Interaction effect of consumption goal type and data source as human on product liking in automobile context (Study 7)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

4.9 Study 8: High-Complexity Consumption Situation

Study 8 was designed in the same automobile consumption context utilized in the previous studies, but the consumption complexity differed. In Study 8, we focused only on high-complexity conditions by recalling too many options and models to compare in the consumption decision process. We assume that in a high-complexity condition, the resistance to AA recommendations even in a symbolic consumption situation will disappear because when too many alternatives exist, participants may rely on the AA recommendation system to make the decision process easier.

Method

One hundred and thirty eight U.S. participants (109 female, $M_{age} = 36.93$, $SD = 13.24$) were recruited via Prolific Academic and randomly given to one of four conditions in a 2 (recommendation agent: AA vs. human) × 2 (consumption goal: symbolic vs. functional) between participants design. We followed the same procedure as in Study 3 in automobile consumption context but employed the situation as in high complexity. The high complexity was manipulated with more than 28 alternatives adopted from (Swaminathan 2003).

Results and Discussion

Consumers' preference toward the product

A 2 (recommendation agent) × 2 (consumption goal) ANOVA on product likeness ($\alpha = .96$) indicated a significant two-way interaction ($F(1, 135) = 3.95$, $p = .049$; $p = .814$ for main effects of recommendation agent and $p = .556$ for consumption goal). As we predicted that even in the symbolic consumption situation, the resistant tendency against AA recommendation disappeared ($M_{human} = 5.91$, $SD = 1.18$; $M_{AA} = 5.46$, $SD = 1.27$; $t(135) = 1.57$, $p = .120$). In addition, there was no significant difference between human or AA recommendation in functional consumption situation ($M_{human} = 5.63$,

$SD = 1.30$; $M_{AA} = 5.98$, $SD = 1.04$; $t(135) = 1.24$, $p = .216$, see Figure 12).
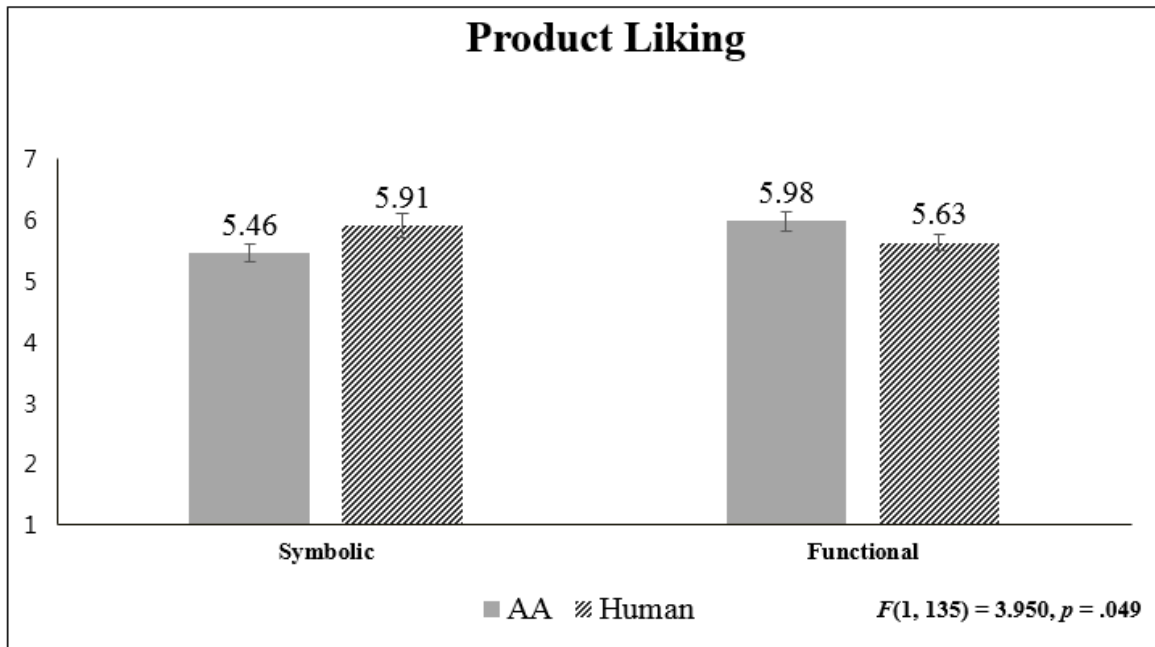

FIGURE 12   Interaction effect of recommendation agent and consumption goal type on

product liking in automobile context in complexity high condition (Study 8)

(Note: Error bars show the 95% confidence intervals around the means; *** $p < .01$, ** $p < .05$, * $p < .1$)

4.10 Study 9: Field Experiment

Study 9 was designed as a field experiment. The experiment was operationalized in the fashion market store called "Market in You" on Seoul National University campus in Korea.

Method

Thirty-one female students (M_{age} = 25.06, SD = 3.69) were recruited from Seoul National University and randomly assigned to one of the two situations recommended by an Artificial Agent or a human employee. This field study was designed to observe consumers' resistance to AA recommendations, especially when a symbolic consumption goal is manipulated. The shop employee cooperated in this experiment. The experiment was conducted over three days from July 3–5, 2018 between 1–3 p.m. The designated employee was trained for this experiment. She was instructed to approach a customer who was shopping alone and ask the person whether she would like a recommendation or not. If the customer accepted the recommendation, then the employee recommended five dresses to the customer. For the AA condition, the dresses were suggested by an iPad screen accompanied with an AA appearance. For the human recommendation condition, the same iPad was utilized to show five options of dresses, but the AA figure was not presented (see Figure 13). The recommendation condition altered between customers. For example, the first customer participated in the AA condition and the next customer participated in the human employee recommendation condition. Five dresses were suggested by a pre-programmed algorithm by randomizing 24 options of dresses in the shop (The pictures of the dresses were taken before the experiment algorithm was prepared). The researchers observed and recorded how many recommended dresses were taken to the mirror and fitting room. Every customer who participated in the experiment was asked if they noticed the field or not and asked for permission to utilize their behavioral data for this research.

FIGURE 13   Stimuli for filed study (recommended by AA condition)

Results and Discussion

An ANOVA on the number of dresses taken to the mirror indicated that we observed higher number of dresses were taken in the recommendation situation where human employee is involved compared to Artificial Agent ($M_{human} = 1.00$, $SD = 0.79$; $M_{AA} = 0.29$, $SD = 0.61$; $F(1, 29) = 7.65$, $p = .010$). In addition, An ANOVA on the number of dresses taken to the fitting room also indicated that higher number of dresses were observed when human employee recommends compared to AA ($M_{human} = 0.53$, $SD = 0.72$; $M_{AA} = 0.71$, $SD = 0.27$; $F(1, 29) = 5.10$, $p = .032$, see Figure 14).

Mirror

$F(1, 29) = 7.646, p = .010$

Fitting Room
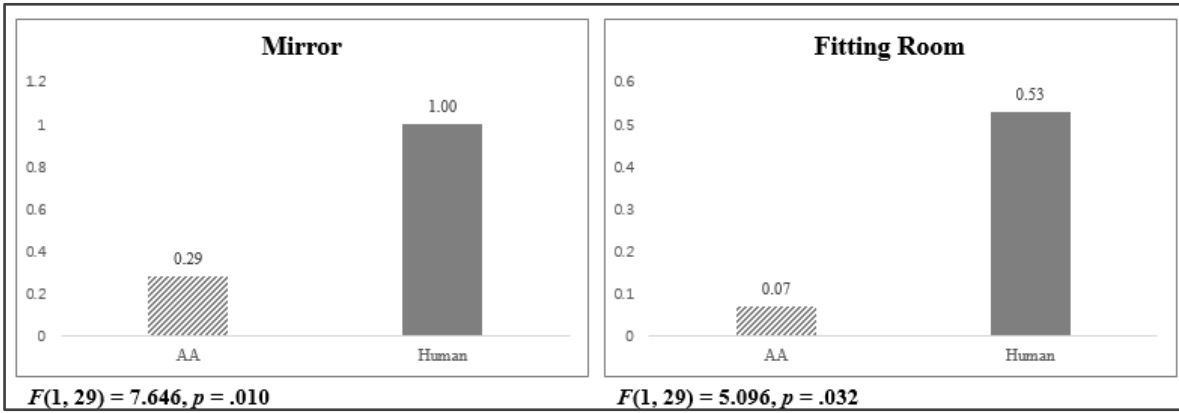
$F(1, 29) = 5.096, p = .032$

FIGURE 14   Interaction effect of recommendation agent and consumption goal type on product

liking in a real fashion market context (field study)

5. GENERAL DISCUSSION

We explored our hypotheses via eight lab experiments and one field study. The primary objective of Studies 1 (cosmetic context) and 2 (automobile context) were to examine consumers' product preferences based on the type of recommendation agent and consumption goal. Study 3 focused on finding an underlying mechanism to explain consumers' resistance to AA recommendations demonstrated in Study 2. Further, Study 4 employed a hedonic consumption goal type in addition to symbolic and functional goals. Study 5 was designed to explore the serial mediation of increased discomfort caused by undermining a uniquely human capacity. In Study 6, we demonstrated consumers' resistance as AA-specific results by including a control condition of a simple recommendation system. To strengthen our propositions, we conducted two more lab experiments by providing extra information that the AA recommendation is based on human data (Study 7) and manipulating the consumption situation in a high-complexity condition with many alternatives (Study 8). Finally, the results explored in the lab experiments were demonstrated in a field experiment.

As predicted, we found that participants showed more positive attitudes toward the human recommendation system when the symbolic consumption goal was manipulated. Depending on the type of consumption goal, the preferred recommendation agent differed. When the consumption goal was manipulated with symbolic needs, the participants showed higher product interest when a human employee recommended suggestions compared to when the AA did. Notably, the underlying mechanism to explain consumers' resistance to AA recommendations in symbolic consumption is demonstrated in the serial mediation model of increased discomforted caused by undermining a distinctive human capacity.

As advanced technology rapidly changes the consumption environment, it is important to explore how consumers perceive this technology and apply it to purchase decision-making. Recommendation systems are some of the most popular technologies utilized by companies to filter

abundant information and provide personalized suggestions. To make the recommendation system look smarter, practitioners in marketing name the recommendation system by highlighting the artificial agent. For experts, the artificial agent is just a recommendation algorithm; for laypeople, the advanced technology may produce unconscious fear. The fundamental ground of the fear is in its capacity to replace the human species. This phenomenon should be spotlighted in the research stream of social psychology but few empirical studies have focused on the consumer psychology—how consumers really perceive this technology.

Thus, our research is theoretically meaningful in that it is the first attempt to question consumers' perceptions of AA recommendations. We determined when AA recommendations produce resistant tendencies and when they do not. More importantly, the reasoning for consumers' resistance to autonomy-embedded technology was thoroughly explained by the psychological mechanisms underlying the phenomenon. This research proposed and demonstrated serial mediation in the affective response as discomfort and in the rational response as undermining human distinctiveness. To be specific, the participants experienced increased discomfort regarding the AA recommendation only when a symbolic consumption goal was manipulated, as a uniquely human area was involved. The fundamental reason for this negative feeling was because of an autonomous non-human entity's presence in a uniquely human area. In addition, the methodology utilized in this research is fairly robust and was designed systematically. The consumption goal was manipulated (Study 2 ~ 8) and cosmetic product category as color (symbolic consumption goal) and function (functional consumption goal) was utilized as consumption goal in Study 1. Finally we found the consumers' attitudes toward AA recommendation effects in the hedonic consumption goal context in addition to symbolic and functional. Hedonic consumption goal has in common with symbolic consumption goal in that it is more abstract and concrete function is less likely critical. However, contrast to symbolic consumption, hedonic consumption induce impulsive purchase with myopic approach.

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To the marketing practitioners, this research can give some critical implications. First, this study reflects real market trend of recommendation system. We are living in the world of Too Much Information (TMI) and recommendation system is helpful to filter out redundant information and advised useful suggestions. Even in the academic area, a literary archive suggests which paper I should read. To make the recommendation system look intelligent, the marketers title the recommendation system with AA in everywhere. Thus, the results demonstrated in this study can be a good guide for people in real marketing filed in that how to efficiently persuade the consumers. Based this research, the marketers dealing with symbolic consumptions, they should make a cautious approach to suggest products or services for customers with AA. In addition, we reflected real recommendation algorithm in the experiment scenario especially, for Study 7, we provided additional information in that the recommendation is based on human data. As a result, the participants showed higher negative attitudes toward the products when recommended by AA. This experiment is critical to prove the underlying mechanism of AA resistance in uniquely human area. The participants might feel unnerving the human data is analyzed even in the area of distinctive human capacity is critical. Finally, the field study shows how the previous lab experiments can be applied to the real world.

Through nine experiments including a field experiment, we consistently demonstrated consumers' resistance to AA, especially in a symbolic consumption area reflecting a uniquely human ability. Notably, the interaction effects between the recommendation agent and consumption goal type on product interest were demonstrated in the serial mediation model. In Study 3, we only demonstrated half of the underlying mechanism for increased discomfort. However, in Study 5 we fully proved why consumers resist recommendations in the symbolic consumption area. The increased discomfort was caused by undermining a uniquely human capacity. Moreover, people who have strong beliefs in human uniqueness express greater resistance to AA in the symbolic consumption area. Therefore, our proposition could have a stronger backup reason to explain why consumers dislike AA recommendations in a uniquely human area.

Therefore, marketing practitioners should take care not to fall in the trap of Artificial Agents. When naming recommendation systems, marketers should only highlight the systems' intelligence with an AA when it is appropriate.

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APPENDIX

All Measures for Studies 1 to 9

Product liking *(from 1 to 7, 7-point scale)*   Batra and Ahtola 1991; Folkes and Kamins 1999
(1) 1 = very negative, 7 = very positive   (2) 1 = very bad, 7 = very good   (3) 1 = unfavorable, 7 = favorable
Perceived Discomfort *(from 1 to 7, 7-point scale)*   Gray et al. 2012
(1) I felt uncomfortable   (2) I had unpleasant feeling   (3) I had an awkward feeling
Undermining Distinctive Human Capacity *(from 1 to 7, 7-point scale)*   Ferrari et al. 2016
(1) The recommendation system in the scenario makes the boundary of distinctive human capacity become increasingly flimsy.
Human Uniqueness Belief *(from 1 to 7, 7-point scale)*   Kamide et al. 2012
(1) Only human should have their own free will.

국문초록

인공지능이 소비자 태도에 미치는 영향:

인공지능의 상징적 제품 추천에 대한 소비자의 저항을 중심으로

인공지능이 제품을 추천하는 시대가 도래했다. 구매하고자 하는 제품 군을 인터넷에 검색하면, 그 제품 군 안에 있는 수만 가지의 제품들을 확인할 수 있다. 이 중 어떤 제품을 선택해야 하는 가는 온전히 소비자의 몫 이였다. 하지만 범람하는 제품 정보 속에서 소비자가 좀더 효율적으로 구매선택을 내릴 수 있도록 도와주는 도구에 대한 필요성이 커졌고 그에 대한 결과로 인공지능 추천 시스템이 우후죽순 생겨나게 되었다.

이러한 상황에서 필자는 의문이 들었다. 소비자는 항상 인공지능 추천시스템을 긍정적으로 생각할까? 필자의 경험으로는 인공지능 추천이 항상 달갑지만은 않았다. 특히 인공지능이 마치 사람의 영역을 넘보는 것이라 생각 될 때에는 부정적 인식이 증폭되었던 것을 경험했다. 예를 들어 토익/토플 교재는 인공지능의 추천을 믿고 선택할 수 있을 것이다. 하지만 사람에게 진정한 행복을 가져다 줄 수 있는 책, 혹은 사회적 의미에 대해 탐구하는 책을 인공지능이 제대로 추천해 줄 수 있을까?

필자는 인간의 고유 영역이라고 여겨지는 의미찾기 과정에 사람이 아닌 개체, 특히 자율성이 내재해 있는 인공지능이 침범한다면 이에 대해 사람들은 불편한 감정을 느낄 것이라 예상했다. 이 가설을 입증하기 위해 여덟 개의 설문실험과 한 개의 현장실험(field experiment)을 진행 하였다. 소비 상황에서의 인간 고유 영역을 반영하기 위해 상징적 소비 목표 (symbolic consumption goal)이 적용되었고 비교 군으로는 기능적 소비 목표 (functional consumption goal)와 쾌락적 소비 목표(hedonic consumption goal)를 선정하

였다.

　　그 결과, 필자의 예상대로, 사람들은 기능 및 쾌락적 소비 목표가 있을 때, 인공지능이 추천해준 상품에 대한 거부감이 없지만, 인간의 고유 영역을 대변하는 상징적 소비 목표가 강조되면 인공지능의 추천에 대한 거부감이 커지는 것을 확인 할 수 있었다. 인공지능에 대한 이러한 거부감은 인간의 고유 능력에 대해 침해 받는다고 생각되었기 때문에 일어나는 현상으로 실험을 통해 밝혔으며 이는 소비자들로 하여금 불편한 감정을 유발시켰다.

　　본 연구의 이론적 함의는 다음과 같다. 지금까지는 인공지능 추천 시스템을 사용했을 때 기업 매출이 얼마나 증가했는지 그 파급 효과가 어떤 지와 같은 기업적 측면에서만 연구가 진행되어 왔다. 즉 소비자가 새로운 기술이 접목된 추천 시스템을 어떻게 받아들일지 소비자의 입장에서 진행된 연구는 전무하다. 따라서 본 연구는 소비자의 입장에서 인공지능 추천시스템에 대한 태도를 밝힌 첫 번 째 연구라는데 의의가 있다. 또한 그 기저에 작용하는 설명 메커니즘을 인간 고유의 영역에 대한 침해라는 근본적인 심리 기제를 통해 밝혔다는 데에 본 연구의 중요성을 강조한다.

　　따라서 본 연구는 인공지능 추천 시스템을 어떻게 고객들에게 소구 해야 할 지 마케팅 실무자들에게 방향성을 제시하기 때문에 그 시사점이 크다. 연구결과, 현장에 있는 마케터들은 인공지능 추천 시스템을 인간 고유의 영역이라고 여겨지는 제품 군에 적용할 때에는 특히나 소비자들의 거부감을 불러 일으키지 않도록 신중하게 접근해야 하겠다.